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Product data representation and exchange: Application protocol: Process: Dimensional Inspection Information Exchange

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ABSTRACT:

KEYWORDS:

COMMENTS TO READER:

Project Leader: Theodore Vorburger, Ph.D
Address: 100 Bureau Drive, Stop 8212
Gaithersburg, MD 20899-8212
USA

Telephone: +1-301-975-3493
Telefacsimile: +1-301-869-0822
Electronic mail: tvtv@nist.gov

Project Editor:
Address:

USA
Telephone: ()
Telefacsimile: ()
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Phone + 41 22 749 01 11
Fax + 41 22 734 10 79
Internet central@iso.ch central@iso.ch

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/ IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 10303-219 was prepared by Technical Committee ISO TC184/SC4, Industrial automation systems and integration , Subcommittee SC4 Industrial data .

This International Standard is organized as a series of parts, each published separately. The structure of this International Standard is described in ISO 10303-1.

Each part of this International Standard is a member of one of the following series: description methods, implementation methods, conformance testing methodology and framework, integrated generic resources, integrated application resources, application protocols, abstract test suites, application interpreted constructs, and application modules. This part is a member of the 200 series.

A complete list of parts of ISO 10303 is available from the Internet:

[<http://www.nist.gov/sc4/editing/step/titles/>](http://www.nist.gov/sc4/editing/step/titles/)

Annexes A, B, C, D and E form a normative part of this part of ISO 10303. Annexes F, G, H, J, K and L are for information only.

Introduction

ISO 10303 is an International Standard for the computer-interpretable representation of product information and for the exchange of product data. The objective is to provide a neutral mechanism capable of describing products throughout their life cycle. This mechanism is suitable not only for neutral file exchange, but also as a basis for implementing and sharing product databases, and as a basis for archiving.

This part of ISO 10303 is a member of the application protocol series. This part of ISO 10303 specifies an application protocol (AP) for **<insert description of the overall purpose of the AP>**.

This application protocol defines the context, scope, and information requirements for **<insert phrase summarizing AP purposes>** and specifies the integrated resources necessary to satisfy these requirements. Application protocols provide the basis for developing implementations of ISO 10303 and abstract test suites for the conformance testing of AP implementations.

Clause 1 defines the scope of the application protocol and summarizes the functionality and data covered by the AP. Clause 3 lists the words defined in this part of ISO 10303 and gives pointers to words defined elsewhere. An application activity model that is the basis for the definition of the scope is provided in annex F. The information requirements of the application are specified in clause 4 using terminology appropriate to the application. A graphical representation of the information requirements, referred to as the application reference model, is given in annex G.

Resource constructs are interpreted to meet the information requirements. This interpretation produces the application interpreted model (AIM). This interpretation, given in 5.1, shows the correspondence between the information requirements and the AIM. The short listing of the AIM specifies the interface to the integrated resources and is given in 5.2. Note that the definitions and EXPRESS provided in the integrated resources for constructs used in the AIM may include select list items and subtypes which are not imported into the AIM. The expanded listing given in Annex A contains the complete EXPRESS for the AIM without annotation. A graphical representation of the AIM is given in annex H. Additional requirements for specific implementation methods are given in annex C.

Industrial automation systems and integration — Product data representation and exchange — Part 219: Application protocol: Dimensional inspection information exchange

1 Scope

This Application Protocol (AP) will specify information requirements to manage dimensional inspection of solid parts or assemblies, which includes administering, planning, and executing dimensional inspection as well as analyzing and archiving the results. Dimensional inspection can occur at any stage of the life cycle of a product where checking for conformance with a design specification is required.

Out of Scope:

Developing or modifying manufacturing process information

Generating geometry (creating the CAD model)

Generating tolerance requirements

Inspection of material properties

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 286-1:1988, *ISO system of limits and fits – Part 1: Bases of tolerances, deviations, and fits.*

ISO 286-2:1988, *ISO system of limits and fits – Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts.*

ISO 1101:1983, *Technical drawings - Geometric tolerancing - Tolerance of form, orientation, location and run-out - Generalities definitions, symbols, indications on drawings.*

ISO 5459:1981, *Technical drawings - Geometric tolerancing - Datums and datum-systems for geometric tolerances.*

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ISO/IEC 8824-1:1994, *Information Technology - Open Systems Interconnection - Abstract Syntax Notation One (ASN.1) - Part 1: Specification of Basic Notation.*

ISO 10303-1:1994, *Industrial automation systems and integration - Product data representation and exchange - Part 1: Overview and fundamental principles.*

ISO 10303-11:1994, *Industrial automation systems and integration - Product data representation and exchange - Part 11: Description methods: The EXPRESS language reference manual.*

ISO 10303-21:1994, *Industrial automation systems and integration - Product data representation and exchange - Part 21: Implementation methods: Clear text encoding of the exchange structure.*

ISO 10303-31:1994, *Industrial automation systems and integration - Product data representation and exchange - Part 31: Conformance testing methodology and framework: General concepts.*

ISO/DIS 10303-41:2000, *Industrial automation systems and integration - Product data representation and exchange - Part 41: Integrated generic resources: Fundamentals of product description and support.*

ISO 10303-42:2000, *Industrial automation systems and integration - Product data representation and exchange - Part 42: Integrated generic resources: Geometric and topological representation.*

ISO 10303-43:2000, *Industrial automation systems and integration - Product data representation and exchange - Part 43: Integrated generic resources: Representation structures.*

ISO 10303-44:2000, *Industrial automation systems and integration - Product data representation and exchange - Part 44: Integrated generic resources: Product structure configuration.*

ISO 10303-45:1998, *Industrial automation systems and integration - Product data representation and exchange - Part 45: Integrated generic resources: Materials.*

ISO 10303-47:1997, *Industrial automation systems and integration - Product data representation and exchange - Part 47: Integrated generic resources: Shape variation tolerances.*

ISO 10303-224:2000, *Industrial automation systems and integration - Product data representation and exchange - Part 224: Application protocol: Mechanical product definition for process planning using machining features.*

ISO 10303-511:1999, *Industrial automation systems and integration - Product data representation and exchange - Part 511: Application interpreted construct: Topologically bounded surface.*

ISO 10303-514:1999, *Industrial automation systems and integration - Product data representation and exchange - Part 514: Application interpreted construct: Advanced boundary representation.*

ISO 10303-519:1999, *Industrial automation systems and integration - Product data representation and exchange - Part 519: Application interpreted construct: Geometric tolerances.*

ISO 10303-522:2002, *Industrial automation systems and integration - Product data representation and exchange - Part 522: Application interpreted construct: Machining Features*.

3 Terms, definitions and abbreviations

3.1 Terms defined in ISO 1101

For the purpose of this part of ISO 10303, the following terms defined in ISO 1101 apply.

- dimension;
- tolerance.

3.2 Terms defined in ISO 5459

For the purpose of this part of ISO 10303, the following terms defined in ISO 5459 apply.

- datum.

3.3 Terms defined in ISO 10303-1

For the purpose of this part of ISO 10303, the following terms defined in ISO 10303-1 apply.

- application;
- application activity model (AAM);
- application interpreted model (AIM);
- application object;
- application protocol (AP);
- application reference model (ARM);
- implementation method;
- integrated resource;
- model;
- product;
- product data;
- protocol implementation conformance statement (PICS);

— unit of functionality (UoF).

3.4 Terms defined in ISO 10303-42

For the purpose of this part of ISO 10303, the following terms defined in ISO 10303-42 apply.

- boundary representation (B-rep) solid model;
- manifold solid boundary representation.

3.5 Other definitions

For the purpose of this part of ISO 10303, the following definitions apply.

3.5.1

basic angle

is implied where center lines of features in a pattern or surfaces shown on a drawing are located or defined by the use of basic dimensions and no angle is specified.

3.6 Abbreviations

For the purpose of this part of ISO 10303, the following abbreviations apply:

AAM	application activity model
AIC	application interpreted construct
AIM	application interpreted model
AP	application protocol
ARM	application reference model
B-rep	boundary representation
ICOM	input, control, output, mechanism
Ngon	N number of sides polygon
PICS	protocol implementation conformance statement
UoF	unit of functionality

4 Information requirements

This clause specifies the information required for the definition of product data for Dimensional Inspection Information Exchange

The information requirements are specified as a set of units of functionality, application objects, and application assertions. These assertions pertain to individual application objects and to relationships between application objects. The information requirements are defined using the terminology of the subject area of this application protocol.

NOTE 1 - A graphical representation of the information requirements is given in annex G.

NOTE 2 - The information requirements correspond to those of the activities identified as being in the scope of the application protocol in annex F.

NOTE 3 - The mapping table specified in 5.1 shows how the information requirements are met using the integrated resources and application interpreted constructs of this International Standard. The use of the integrated resources and application interpreted constructs introduces additional requirements that are common to application protocols.

4.1 Units of functionality

This subclause specifies the units of functionality for the mechanical product definition for process planning using machining features application protocol. This part of ISO 10303 specifies the following units of functionality:

4.1.1 Dimensional_measurement_features

- Dm_Feature;
- Dmf_Arc;
- Dmf_Circle;
- Dmf_Cone;
- Dmf_Cylinder;
- Dmf_Edge_Point;
- Dmf_Ellipse;
- Dmf_Generic_Feature;
- Dmf_Geometric_Curve;
- Dmf_Geometric_Surface;
- Dmf_Line_Bounded;

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- Dmf_Line_Closed_Parallel;
- Dmf_Line_Unbounded;
- Dmf_Pattern;
- Dmf_Plane;
- Dmf_Plane_Closed_Parallel;
- Dmf_Plane_Symmetric;
- Dmf_Point;
- Dmf_Sphere;
- Dmf_Surface_Of_Revolution_Dml;
- Dmf_Torus;
- Dmf_Unknown_Feature_Type_Dml;

4.1.2 feature_definition_item

The feature_definition_item UoF contains the information necessary to create a machining feature. Additionally this UoF identifies the relationship between machining features and aspects of shape.

The following application objects are used by the feature_definition_item UoF:

- Angle_taper;
- Blind_bottom_condition;
- Boss_top_condition;
- Chamfer_angle;
- Circular_path;
- Complete_circular_path;
- Conical_hole_bottom;
- Diameter_taper;
- Directed_taper;

- First_offset;
- Flat_hole_bottom;
- Flat_slot_end_type;
- Flat_with_radius_hole_bottom;
- Flat_with_taper_hole_bottom;
- General_path;
- General_pocket_bottom_condition;
- General_profile_floor;
- General_rib_top_floor;
- General_top_condition;
- Linear_path;
- Open_slot_end_type;
- Partial_area_definition;
- Partial_circular_path;
- Path;
- Planar_pocket_bottom_condition;
- Planar_profile_floor;
- Planar_rib_top_floor;
- Planar_top_condition;
- Pocket_bottom_condition;
- Profile_floor;
- Radiused_slot_end_type;
- Rib_top_floor;
- Second_chamfer_offset;

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- Second_offset;
- Slot_end_type;
- Spherical_hole_bottom;
- Through_bottom_condition;
- Through_pocket_bottom_condition;
- Through_profile_floor;
- Woodruff_slot_end_type.

4.1.3 feature_profile

The feature_profile UoF contains the information necessary to identify 2D shapes. By sweeping a feature_profile along a path, 3D features are created.

The following application objects are used by the feature_profile UoF:

- Circular_closed_profile;
- Closed_profile;
- General_closed_profile;
- General_open_profile;
- Linear_profile;
- Ngon_profile;
- Open_profile;
- Partial_circular_profile;
- Profile;
- Rectangular_closed_profile;
- Rounded_U_profile;
- Square_U_profile;
- Tee_profile;

- Vee_profile.

4.1.4 manufacturing_feature

The manufacturing_feature UoF contains the information necessary to identify shapes which represent volumes of material that shall be removed from a part by machining or shall result from machining.

The following application objects are used by the manufacturing_feature UoF:

- Bevel_gear;
- Boss;
- Catalogue_gear;
- Catalogue_knurl;
- Catalogue_marking;
- Catalogue_thread;
- Chamfer;
- Circular_boss;
- Circular_closed_shape_profile;
- Circular_cutout;
- Circular_offset_pattern;
- Circular_omit_pattern;
- Circular_pattern;
- Compound_feature;
- Compound_feature_element;
- Compound_feature_relationship;
- Constant_radius_edge_round;
- Constant_radius_fillet;
- Counterbore_hole;
- Countersunk_hole;

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- Cutout;
- Defined_gear;
- Defined_marking;
- Defined_thread;
- Diagonal_knurl;
- Diamond_knurl;
- Edge_round;
- Fillet;
- Gear;
- General_boss;
- General_cutout;
- General_outside_profile;
- General_pattern;
- General_pocket;
- General_removal_volume;
- General_revolution;
- General_shape_profile;
- Groove;
- Helical_gear;
- Hole;
- Knurl;
- Machining_feature;
- Manufacturing_feature;
- Manufacturing_feature_group;

- Marking;
- Multi_axis_feature;
- Outer_diameter;
- Outer_diameter_to_shoulder;
- Outer_round;
- Partial_circular_shape_profile;
- Planar_face;
- Pocket;
- Profile_feature;
- Protrusion;
- Recess;
- Rectangular_boss;
- Rectangular_closed_pocket;
- Rectangular_closed_shape_profile;
- Rectangular_offset_pattern;
- Rectangular_omit_pattern;
- Rectangular_open_pocket;
- Rectangular_open_shape_profile;
- Rectangular_pattern;
- Replicate_base;
- Replicate_feature;
- Revolved_feature;
- Revolved_flat;
- Revolved_round;

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- Rib_top;
- Round_hole;
- Rounded_end;
- Shape_profile;
- Slot;
- Spherical_cap;
- Spur_gear;
- Step;
- Straight_knurl;
- Thread;
- Transition_feature;
- Turned_knurl.

4.1.5 measurement_limitations

The measurement_limitations UoF contains the information necessary to identify the important sizes of the measured relationships between aspects of a part's shape or between an aspect of a part's shape and a reference shape that does not comprise the shape of the part, and the acceptable deviation from that size or relationship for the purpose of manufacturing.

The following application objects are used by the measurement_limitations UoF:

Angular_dimension_tolerance;

Angular_size_dimension_tolerance;

Angularity_tolerance;

Circular_runout_tolerance;

Circularity_tolerance;

Compound_datum;

Concentricity_tolerance;

Curved_dimension_tolerance;
Cylindricity_tolerance;
Datum;
Datum_feature;
Datum_target;
Datum_target_set;
Diameter_dimension_tolerance;
Dimensional_tolerance;
Distance_along_curve_tolerance;
Flatness_tolerance;
Geometric_tolerance;
Geometric_tolerance_precedence_relationship;
Limits_and_fits;
Linear_profile_tolerance;
Location_dimension_tolerance;
Location_tolerance;
Material_condition_modifier;
Parallelism_tolerance;
Perpendicularity_tolerance;
Placed_target;
Plus_minus_value;
Position_tolerance;
Projection;
Radial_dimension_tolerance;
Size_tolerance;

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Straightness_tolerance;

Surface_profile_tolerance;

Symmetry_tolerance;

Target_area;

Target_circle;

Target_line;

Target_point;

Target_rectangle;

Tolerance_limit;

Tolerance_range;

Tolerance_value;

Tolerance_zone;

Tolerance_zone_definition;

Total_runout_tolerance.

4.1.6 shape_representation_for_machining

The shape_representation_for_machining UoF contains the physical definition of initial and final form of the part. This definition is given via a parametric method for features, and additional geometric and topological definitions.

The following application objects are used by the shape_representation_for_machining UoF:

- Base_shape;
- Block_base_shape;
- B-rep_model;
- B-rep_model_element;
- B-rep_shape_aspect_representation;

- B-rep_shape_representation;
- Cylindrical_base_shape;
- Direction_element;
- Explicit_base_shape_representation;
- Face_shape_element;
- Face_shape_element_relationship;
- Implicit_base_shape_representation;
- Location_element;
- Ngon_base_shape;
- Orientation;
- Path_element;
- Planar_element;
- Shape;
- Shape_aspect;
- Shape_element.

4.2 Application objects

This subclause specifies the application objects for them mechanical product definition for process planning using machining features application protocol. Each application object is an atomic element that embodies a unique application concept and contains attributes specifying the data elements of the object. The application objects and their definitions are given below.

4.2.1 Address

A person or organization defined address for mail delivery. The data associated with an Address are the following:

- electronic_mail_address;
- facsimile_number;
- country;
- internal_location;
- postal_box;
- postal_code;
- region;
- street_number;
- street;
- telephone_number;
- town;

4.2.1.1 street_number

The street_number specifies the number of a location on a street.

4.2.1.2 street

The street specifies the name of a street.

4.2.1.3 postal_box

The postal_box specifies the number of a postal box.

4.2.1.4 town

The town specifies the name of a town.

4.2.1.5 region

The region specifies the name of a region.

EXAMPLE The counties of Great Britain and the states of the United States of America are examples of regions.

4.2.1.6 postal_code

The postal_code specifies the code that is used by the country's postal service.

4.2.1.7 country

The country specifies the name of a country.

4.2.1.8 internal_location

The internal_location specifies an organization-defined address for internal mail delivery.

4.2.1.9 facsimile_number

The facsimile_number specifies the number at which facsimiles may be received.

4.2.1.10 telephone_number

The telephone_number specifies the number at which telephone calls may be received.

4.2.1.11 electronic_mail_address

The electronic_mail_address specifies the electronic address at which electronic mail may be received.

4.2.1.12 telex_number

The telex_number specifies the number at which telex messages may be received.

4.2.2 Angle_Taper

An Angle_taper is a constant change in shape of a feature for a part. The start of the Angle_taper is at the placement of a feature and is applied to the entire feature. The length of the taper is determined from the feature that is applying the Angle_taper.

NOTE 1- The application object definition is derived from paragraph 4.2.2 of ISO 10303-224.

NOTE -2 Figure 1 illustrates features that have an Angle_taper applied.

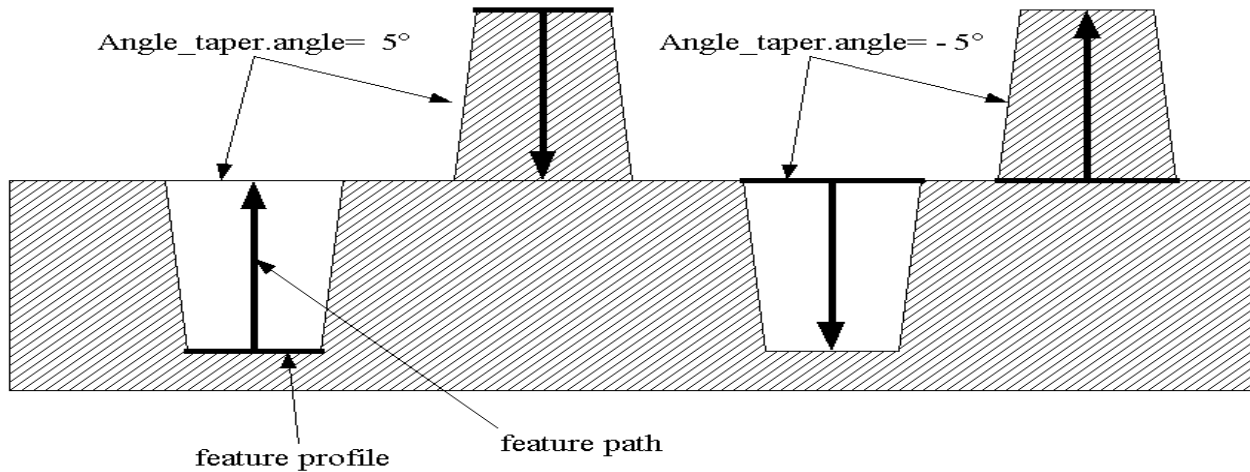


Figure 1 – Angle_taper

The data associated with an Angle_taper are the following:

— angle.

4.2.2.1 angle

The angle specifies the amount of slope from the start of an Angler_taper to the end of the Angle_taper. See for the application assertion. An angle between 0 and 90 degrees or between -90 and -180 degrees indicates that the profile for a feature grows larger along the feature path. An angle between 0 and -90 degrees or between 90 and 180 degrees indicates that the profile for a feature grows smaller along the feature path. See 4.3.1 for the application assertion.

4.2.3 Angular_Dimension_Tolerance

An Angular_dimension_tolerance is a type of Location_tolerance (see 4.2.112) that defines the allowable variation in the angle between two elements of the shape of a part. Each Angular_dimension_tolerance shall have an origin shape and a termination shape.

NOTE - The application object definition is derived from paragraph 4.2.2 of ISO 10303-224.

NOTE - Figure 3 illustrates the Angular_dimension_tolerance and Figure 2 illustrates use of the attributes.

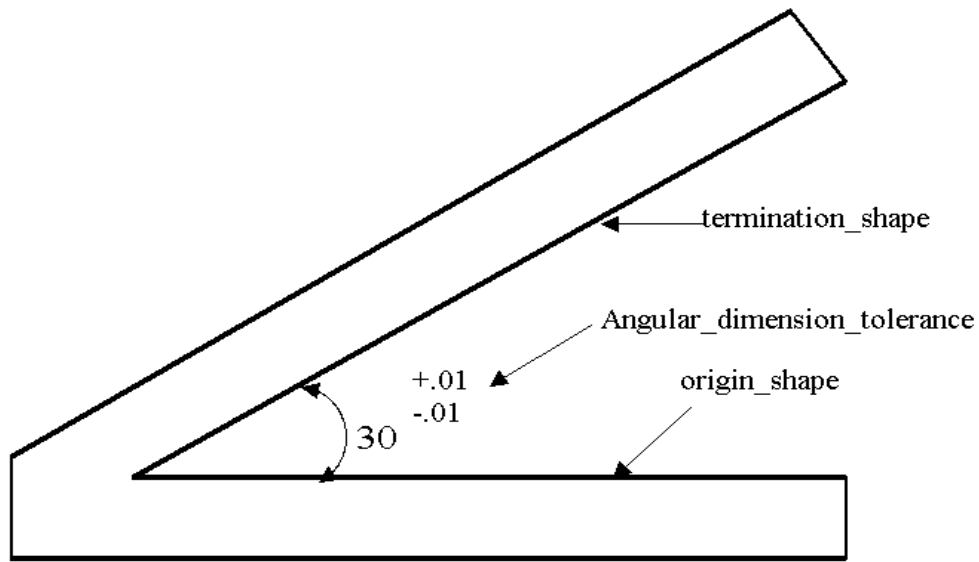


Figure 2 - Angular_dimension_tolerance

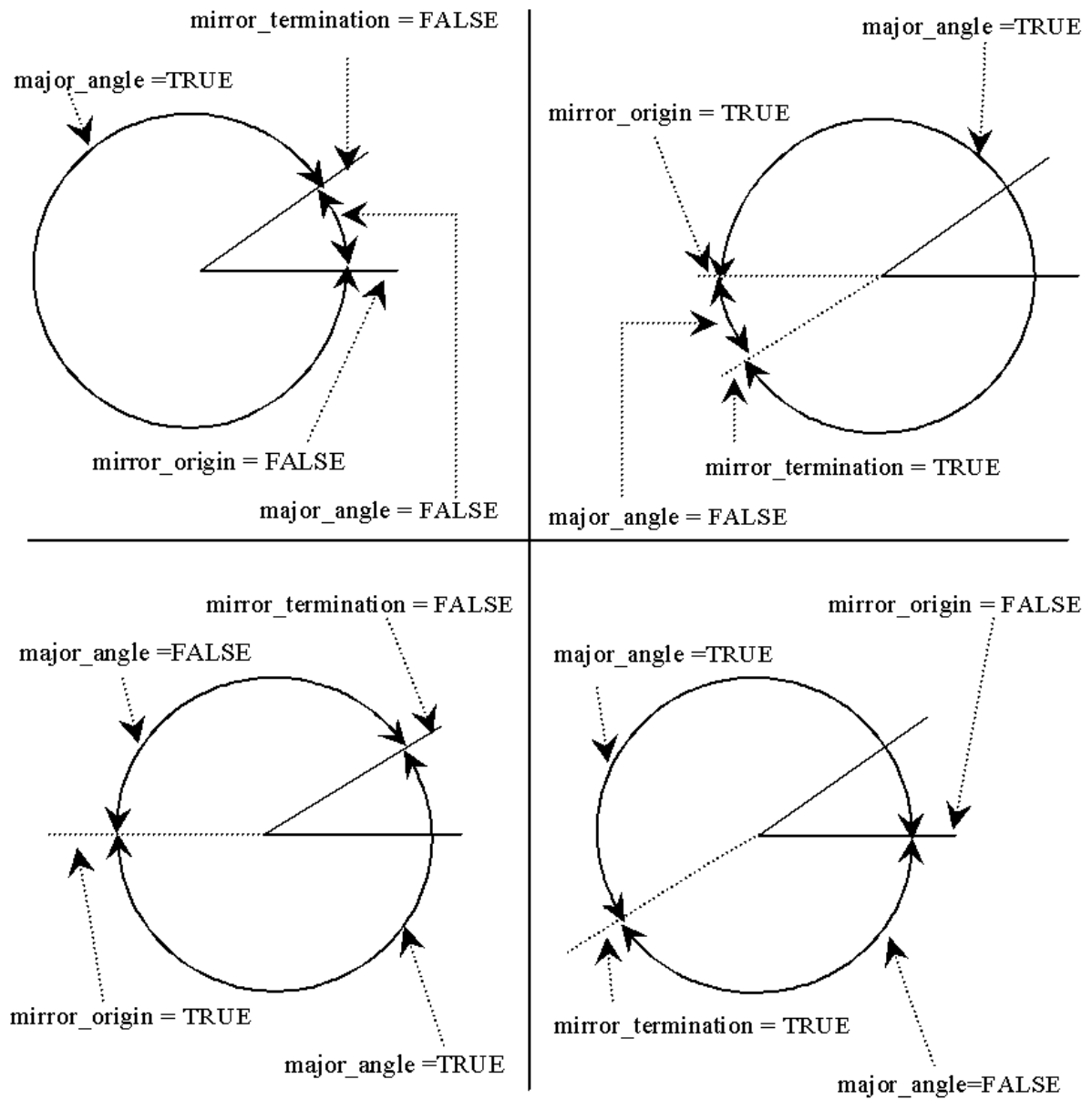


Figure 3 - Angular_dimension_tolerance attribute usage

The data associated with an Angular_-dimension_tolerance are the following:

- major_angle;
- mirror_origin;
- mirror_termination.

4.2.3.1 major_angle

The major_angle specifies a boolean value that indicates the size of the angle which defines a variation. A value of true specifies the angle to be the larger of the two angles formed by the two elements of the part's shape (origin and termination) that are related to the Angular_dimension_tolerance. This attribute is used in combination with the other attributes to determine the angle that is being limited.

4.2.3.2 mirror_origin

The mirror_origin specifies a boolean value that indicates whether the element of the part's shape defining the origin of the limitation is to be mirrored in order to define the angle whose allowable variation is being specified. A value of true indicates that the origin element is mirrored about a plane that it is orthogonal to.

4.2.3.3 mirror_termination

The mirror_termination specifies a boolean value that indicates whether the element of the part's shape that defines the termination of the limitation is to be mirrored in order to define the angle whose allowable variation is being specified. A value of true indicates that the termination element is mirrored about a plane that it is orthogonal to.

4.2.4 Angular_Size_Dimension_Tolerance

An Angular_size_dimension_tolerance is a type of Size_tolerance (see 4.2.188) that specifies the allowable variation on the size or gap formed by two angular elements of the shape of a part.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with an Angular_size_dimension_tolerance are the following:

- full_or_half;
- major_angle.

4.2.4.1 full_or_half

The `full_or_half` specifies a boolean value that indicates the method used to establish the `Angular_size_dimension_tolerance` angle. A value of true specifies the angle is established between the two sides of an angular element. A value of false specifies the angle is established between a center line datum and an angular element.

4.2.4.2 major_angle

The `major_angle` specifies a boolean value that indicates the size of the angle for defining the variation. A value of TRUE specifies the angle to be the larger of the two angles formed by the two elements of the part's shape that are related to the `Angular_size_dimension_tolerance`.

4.2.5 Angularity_Tolerance

An `Angularity_tolerance` is a type of `Geometric_tolerance` (see 4.2.99) that is the allowable variation of a surface or axis at a specified angle (other than 90 degrees) from a datum plane or axis. An `Angularity_tolerance` constrains a shape that is one of the following:

- An allowable variation, defined by a tolerance zone, between a surface and a datum plane specified by the basic angle;
- An allowable variation, defined by a diametric tolerance zone, between an axis and a datum plane specified by the basic angle.

NOTE 1 -- The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

NOTE 2 - The `Angularity_tolerance` definition is derived from paragraph 14.9 of ISO 1101.

The data associated with an `Angularity_tolerance` are the following:

- `geometric_reference`;
- `segment_size`.

4.2.5.1 geometric_reference

The `geometric_reference` specifies the datum to which the tolerance is related. See 4.3.2 for the application assertion.

4.2.5.2 segment_size

The `segment_size` specifies the length of a surface to apply a tolerance if the `Angularity_tolerance` is not applied to the total length. The `segment_size` need not be specified for a particular `Angularity_tolerance`.

4.2.6 Base_Shape

A Base_shape is the initial shape of the material before machining of the features. Each Base_shape is either an Explicit_base_shape_representation (see 4.2.72) or an Implicit_base_shape_representation (see 4.2.104).

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

4.2.7 Bevel_Gear

A bevel gear is a type of Defined_gear (see 4.2.58) that is used in meshing pairs where the axes of the pairs intersect.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

4.2.8 Blind_Bottom_Condition

A Blind_bottom_condition is a selection type of Hole_bottom_condition_select that has material in the bottom of a hole and does not go through the entire part. Each Blind_bottom_condition is either a Conical_hole_bottom (see 4.2.44), Flat_hole_bottom (see 4.2.78), Flat_with_radius_hole_bottom (see 4.2.80), Flat_with_taper_hole_bottom (see 4.2.81), or a Spherical_hole_bottom (see 4.2.194).

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Blind_bottom_condition are the following:

— start_or_end.

4.2.8.1 start_or_end

The start_or_end specifies a boolean value of TRUE if the Blind_bottom_condition is positioned at the end of a Round_hole, and a value of FALSE if it is at the start of the Round_hole.

4.2.9 Block_Base_Shape

A Block_base_shape is a type of Implicit_base_shape_representation (see 4.2.104) that describes the initial shape of the material as a rectangular cross section of some determined length.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Block_base_shape are the following:

— height;

— width.

4.2.9.1 height

The height specifies the size of the side of a Block_base_shape along the Y-axis. See 4.3.4 for the application assertion.

4.2.9.2 width

The width specifies the size of the side of a Block_base_shape along the X-axis. See 4.3.4 for the application assertion.

4.2.10 Boss

A Boss is a type of Multi_axis_feature(see 4.2.119) that is a closed shape that protrudes from the surface of the part. The intersection of the Boss and the base surface may have a radius shaped blend between them. Each Boss is either a Circular_boss (see 4.2.27), General_boss (see 4.2.84), or a Rectangular_boss (see 4.2.162). The Boss may be positioned on the face of a part with the Z-axis in the direction away from the part, or at the top of the Boss with the Z-axis in the direction toward the part face.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Boss are the following:

- boss_height;
- fillet_radius;
- top_condition.

4.2.10.1 boss_height

The boss_height specifies the maximum height of a Boss measured from the highest point on the Boss to the farthest point of intersection between the Boss and the part surface. The placement and orientation of the Linear_path shall be the same as the Boss feature. See 4.3.6 for the application assertion.

4.2.10.2 fillet_radius

The fillet_radius specifies a radius shape blend between a Boss and the surrounding surface at the base of the Boss. See 4.3.7 for the application assertion.

4.2.10.3 top_condition

The top_condition specifies the shape of the top of a Boss feature. See 4.3.5 for the application assertion.

4.2.11 Boss_Top_Condition

A Boss_top_condition is the end shape of a Boss that is the farthest distance away from the intersection of the face of the part and the Boss. A Boss top may be either flat or of any other shape. Each Boss_top_condition is either a General_top_condition (see 4.2.98) or a Planar_top_condition (see 4.2.148).

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Boss_top are the following:

- start_or_end;
- top_radius.

4.2.11.1 start_or_end

The start_or_end specifies a boolean value of TRUE if the Boss_top_condition is located at the start of the Boss, FALSE if it is located at the end of the Boss.

4.2.11.2 top_radius

The top_radius specifies a radius shape blend between a Boss_top_condition and the surrounding Boss surface at the top of the Boss. See 4.3.7 for the application assertion.

NOTE - if the Boss_top_condition was a General_top_condition that defined a spherical shape, the top_radius may not apply

4.2.12 Brep_Model

A B-rep_model is a solid model containing complete representation of shape using manifold solid boundary representation.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

4.2.13 Brep_Model_Element

A B-rep_model_element is a portion of a boundary representation.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

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The data associated with a B-rep_model_element are the following:

— element.

4.2.13.1 element

The element specifies the portion of the B-rep_model that defines the B-rep_model_element. See 4.3.8 for the application assertion.

4.2.14 Brep_Shape_Aspect_Representation

A B-rep_shape_aspect_representation is a grouping of geometric elements with respect to the boundary representation of a part.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a B-rep_shape_aspect_representation are the following:

— shape_definition.

4.2.14.1 shape_definition

The shape_definition specifies the shape that is the boundary representation. See 4.3.9 for the application assertion.

4.2.15 Brep_Shape_Representation

A B-rep_shape_representation is a grouping of boundary representations to define a shape.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a B-rep_shape_representation are the following:

— shape_definition.

4.2.15.1 shape_definition

The shape_definition specifies the shape that is the boundary representation. See 4.3.10 for the application assertion.

4.2.16 Calculated_Value

???

4.2.16.1 value_amount

4.2.16.2 calculation_method

4.2.17 Calendar_Date

A calendar_date defines a date as a day in a month of a year. The data associated with a Calendar_date are the following:

- day;
- month;
- year.

4.2.17.1 day

The day specifies the day element of a date

4.2.17.2 month

The month specifies the month element of a date

4.2.17.3 year

The year specifies the year element of a date

4.2.18 Cartesian_Coordinate_Space

The Cartesian_Coordinate_Space defines a reference system that associates a unique set of parameters with each point in an dimensional space.

4.2.18.1 units

???

4.2.19 Cartesian_Point

A cartesian_point is a point defined by its coordinates in a rectangular Cartesian coordinate space, or in a parameter space. The entity is defined in a one, two or three-dimensional space as determined by the number of coordinates in the list. The data associated with a cartesian_point are the following:

- x;
- y;
- z.

4.2.19.1 x

1The x specifies the first coordinate of the point location.

4.2.19.2 y

The y specifies the second coordinate of the point location; this will not exist in the case of a one dimensional point.

4.2.19.3 z

The z specifies the third coordinate of the point location; this will not exist in the case of a one or two-dimensional point.

4.2.20 Cartesian_Vector

A Cartesian_vector is a general direction vector in three dimensional space. The actual magnitudes of the components have no effect upon the direction being defined, only the ratio x:y:z is significant. . The data associated with a cartesian_point are the following:

— i;

— j;

— k.

4.2.20.1 i

The i specifies the first coordinate of the vector direction.

4.2.20.2 j

The j specifies the second coordinate of the vector direction.

4.2.20.3 k

The k specifies the third coordinate of the vector direction.

4.2.21 Catalogue_Gear

A Catalogue_gear is a is a type of Gear (see 4.2.21) that is a reference to a document containing the information to create a gear on a part.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Catalogue_gear are the following:

— documentation.

4.2.21.1 documentation

The documentation specifies the document that defines information pertaining to a Gear feature. See 4.3.11 for the application assertion.

4.2.22 Catalogue_Knurl

A Catalogue_knurl is a type of Knurl (see 4.2.105) that is a reference to a document containing the information to create a knurl on a part.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Catalogue_knurl are the following:

— documentation.

4.2.22.1 documentation

The documentation specifies the document that defines information pertaining to a Knurl feature. See 4.3.12 for the application assertion.

4.2.23 Catalogue_Marking

A Catalogue_marking is a type of Marking (see 4.2.116) that is a reference to a document containing the information for marking on a surface of a part.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Catalogue_marking are the following:

— documentation.

4.2.23.1 documentation

The documentation specifies the document or specification that defines information pertaining to a Marking feature. See 4.3.13 for the application assertion.

4.2.24 Catalogue_Thread

A Catalogue_thread is a type of Thread (see 4.2.208) that is a reference to a document containing the information to create threads on a part.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Chamfer are the following:

— documentation.

4.2.24.1 documentation

The documentation specifies the document that defines information pertaining to a Thread feature. See 4.3.14 for the application assertion.

4.2.25 Chamfer

A Chamfer is a type of Transition_feature (see 4.2.219) that is a transition between corresponding edges of two joining non-coplanar surfaces, having a flat cross section. A Chamfer feature requires an offset length from one face, and either an angular amount from the same surface or an offset length from a second face.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Chamfer are the following:

— chamfer_face;

— first_face_offset;

— second_face_offset.

4.2.25.1 chamfer_face

The chamfer_face specifies the flat transition face between the two edges of two faces. See 4.3.15 for the application assertion.

4.2.25.2 first_face_offset

The first_face_offset specifies a face and offset amount for one of the edges of the Chamfer. See 4.3.16 for the application assertion.

4.2.25.3 second_face_offset

The `second_face_offset` specifies a face and either an offset amount or angle amount for one of the edges of the Chamfer. See 4.3.17 for the application assertion.

4.2.26 Chamfer_Angle

A `Chamfer_angle` is a type of `Second_chamfer_offset` (see 4.2.182) that is the measured angle from the `Second_offset` face to the Chamfer face for creating a Chamfer feature.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a `Chamfer_angle` are the following:

— `angle_amount`.

4.2.26.1 angle_amount

The `Angle_amount` specifies the angular measurement from a face for creating a Chamfer feature. See 4.3.18 for the application assertion.

4.2.27 Circular_Boss

A `Circular_boss` is a type of `Boss` (see 4.2.10) that is a cylindrical shape. A `Circular_boss` may be tapered.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a `Circular_boss` are the following:

— `change_in_diameter`;

— `circular_profile`.

4.2.27.1 change_in_diameter

The `change_in_diameter` specifies a taper that defines the change in shape of the `Circular_boss`. The `change_in_diameter` need not be specified for a particular `Circular_boss`. See 4.3.20, 4.3.21, 4.3.22 and for the application assertion.

4.2.27.2 circular_profile

The `circular_profile` specifies the diameter required by a `Circular_boss`. The diameter is the distance across the `Circular_boss`. The placement of the `circular_profile` shall be with the origin of the `Circular_closed_profile` at the origin of the `Circular_boss`. The X-axis and Y-axis of the profile shall be the same as the X-axis and Y-axis of the `Circular_boss`. See 4.3.19 for the application assertion.

4.2.28 Circular_Closed_Profile

A `Circular_closed_profile` is a type of `Closed_profile` (see 4.2.37) that is an enclosed area bounded by a circle. The orientation is at the center of the circle.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a `Circular_closed_profile` are the following:

— `diameter`.

4.2.28.1 diameter

The `diameter` specifies the distance across the `Circular_closed_profile`. See 4.3.23 for the application assertion.

4.2.29 Circular_Closed_Shape_Profile

A `Circular_closed_shape_profile` is a type of `Shape_profile` (see 4.2.187) that defines a completely enclosed volume.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a `Circular_closed_shape_profile` are the following:

— `closed_boundary`.

4.2.29.1 closed_boundary

The `closed_boundary` specifies the outline of the `Shape_profile` feature. The outline defines an area that shall be enclosed and circular. The placement of the `closed_profile` shall be with the origin of the Path, that defines the profile, at the origin of the `Circular_closed_shape_profile`. The X-axis and Y-axis of the profile shall be the same as the X-axis and Y-axis of the `Circular_closed_shape_profile`. See 4.3.24 for the application assertions.

4.2.30 Circular_Cutout

A `Circular_cutout` is a type of `Cutout` (see 4.2.50) that is an enclosed volume of circular shape. A `Circular_cutout` is similar in definition to a `Hole` (see 4.2.103), but differ in the type of process required to manufacture.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a `Circular_cutout` are the following:

— `circular_boundary`.

4.2.30.1 circular_boundary

The circular_boundary is the distance across the Circular_cutout. The placement and orientation of the Circular_closed_profile (see 4.2.28) shall be the same as the Circular_cutout feature. See 4.3.25 for the application assertion.

4.2.31 Circular_Offset_Pattern

A Circular_offset_pattern is a Circular_pattern with a modification of the placement of a particular occurrence of the base feature relative to its expected placement.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Circular_offset_pattern are the following:

- angular_offset;
- index_number.

4.2.31.1 angular_offset

The angular_offset is the amount of offset from the expected feature location in a Circular_pattern, along the base feature diameter for placing another feature. See 4.3.26 for the application assertion.

4.2.31.2 index_number

The index_number specifies the value for unique identification of a location of a base feature used in a Circular_pattern. See 4.3.26 for the application assertion.

4.2.32 Circular_Omit_Pattern

A Circular_omit_pattern is a Circular_pattern with an omission of a particular occurrence of the base feature.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Circular_omit_pattern are the following:

- omit_index.

4.2.32.1 omit_index

The omit_index specifies the value for unique identification of the base feature to be omitted in a Circular_pattern. See 4.3.27 for the application assertion.

4.2.33 Circular_Path

A `Circular_path` is a type of `Path` (see 4.2.138) that is a direction of travel along an arc of constant radius around the Z-axis of the feature. Each `Circular_path` is either a `Complete_circular_path` (see 4.2.38) or a `Partial_circular_path` (see 4.2.135).

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a `Circular_path` are the following:

— `radius`.

4.2.33.1 radius

The `radius` specifies the constant distance from an axis for the `Circular_path`. See 4.3.28 for the application assertion.

4.2.34 Circular_Pattern

A `Circular_pattern` is a type of `Replicate_feature` (see 4.2.172) that is a base feature arranged in a pattern around a circular arc, equally spaced about an axis. Instances of base features need not be rotated. When a base feature rotation is required, the first feature instance is not rotated. The second through the Nth feature instance are rotated by the same angular amount measured from the placement and orientation of the preceding feature instance. (This does not imply the use of chain dimensioning.)

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a `Circular_pattern` are the following:

- `angular_spacing`;
- `base_feature_diameter`;
- `base_feature_rotation`;
- `missing_base_feature`;
- `number_of_features`;
- `relocated_base_feature`.

4.2.34.1 angular_spacing

The `angular_spacing` specifies the angle amount between features in a `Circular_pattern`. See 4.3.31 for the application assertion.

4.2.34.2 base_feature_diameter

The `base_feature_diameter` specifies the size of the circle for placement of features in a `Circular_pattern`. See 4.3.31 for the application assertion.

4.2.34.3 base_feature_rotation

The `base_feature_rotation` specifies the angle to rotate one feature in regard to the orientation of a previous feature in a `Circular_pattern`. See 4.3.31 for the application assertion.

4.2.34.4 missing_base_feature

The `missing_base_feature` specifies the definition to remove any number of base features from the `Circular_pattern`. The `missing_base_feature` need not be specified for a particular `Circular_pattern`. There may be more than one `missing_base_feature` for a `Circular_pattern`. See 4.3.30 for the application assertion.

4.2.34.5 number_of_features

The `number_of_features` specifies the quantity of a base feature to be used in a `Circular_pattern`. See 4.3.31 for the application assertion.

4.2.34.6 relocated_base_feature

The `relocated_base_feature` specifies the definition to offset any number of base features from the `Circular_pattern`. The `relocated_base_feature` need not be specified for a particular `Circular_pattern`. There may be more than one `relocated_base_feature` for a `Circular_pattern`. See 4.3.29 for the application assertion.

4.2.35 Circular_Runout_Tolerance

A `Circular_runout_tolerance` is a type of `Geometric_tolerance` (see 4.2.99) that is a tolerance to control circular elements of a part to a datum axis the part is rotated about. The tolerance is applied independent of any circular position as the part is rotated 360 degrees. Where applied to surfaces around a datum axis, `Circular_runout_tolerance` may be used to control the cumulative variations of circularity and coaxiality. Where applied to surfaces at right angles to the datum axis, it controls circular elements of a plane surface.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a `Circular_runout_tolerance` are the following:

- `geometric_reference`;
- `runout_angle`.

4.2.35.1 geometric_reference

The `geometric_reference` specifies the datum to which the tolerance is related. See 4.3.32 for the application assertion.

4.2.35.2 runout_angle

The `runout_angle` specifies the direction to control a runout tolerance. If the angle is specified, the runout tolerance applies in this angle which is fixed with respect to the datum axis. The runout need not be specified for a particular `Circular_runout_tolerance`.

4.2.36 Circularity_Tolerance

A `Circularity_tolerance` is a type of `Geometric_tolerance` (see 4.2.99) that describes the allowable deviation of a surface from round. The actual surface shall lie within a tolerance zone defined by two concentric circles.

NOTE 1 - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

NOTE 2 - The `Circularity_tolerance` definition is derived from paragraph 14.3 of ISO 1101.

4.2.37 Closed_Profile

A `Closed_profile` is a type of `Profile` (see 4.2.153) that is an outline or shape that bounds an enclosed area with no opening. Each `Closed_profile` is either a `Circular_closed_profile` (see 4.2.28), `General_closed_profile` (see 4.2.85), `Ngon_profile` (see 4.2.121), or a `Rectangular_closed_profile` (see 4.2.164)

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

4.2.38 Complete_Circular_Path

A `Complete_circular_path` is a type of `Circular_path` (see 4.2.33) that is a direction of travel that begins and ends at the same point on the arc.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

4.2.39 Compound_Datum

A Compound_datum is a type of Datum (see 4.2.54) that is a set of two or more Datum_feature objects which are for establishing a single datum plane or axis.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Compound_datum are the following:

— element.

4.2.39.1 element

The element specifies the list of Datum_feature objects for defining the Compound_datum. See 4.3.33 for the application assertion.

4.2.40 Compound_Feature

A Compound_feature is a type of Machining_feature (see 4.2.113) that is a union of one or more Machining_feature objects to create a more complex feature definition. The placement of a Compound_feature is relative to either the part, another Compound_feature, or a Replicate_feature which uses a Compound_feature as the base feature. Features which are elements of the Compound_feature have placement defined relative to the Compound_feature placement.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Compound_feature are the following:

— element;

— feature_description;

— feature_name.

4.2.40.1 element

The element specifies the base features that when combined defines a Compound_feature. There shall be more than one element for a Compound_feature. See 4.3.34 for the application assertion.

4.2.40.2 feature_description

The feature_description specifies a user defined explanation of the Compound_feature. A Compound_feature may but need not require a feature_description.

4.2.40.3 feature_name

The feature_name specifies a user defined name for the Compound_feature that need not be unique.

4.2.41 Compound_Feature_Element

A Compound_feature_element specifies the type of Machining_feature (see 4.2.113) or Transition_feature (see 4.2.219) to be used for a particular element of a Compound_feature. A Compound_feature consists of two or more Compound_feature_element objects and need not require Compound_feature_element objects to be ordered.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Compound_feature_element are the following:

— element.

4.2.41.1 element

The element specifies the base feature to be used as one of the components for the Compound_feature. See 4.3.35 and 4.3.36 for the application assertions.

4.2.42 Compound_feature_relationship

A Compound_feature_relationship defines the sequence in which the Compound_feature elements are applied in the Compound_feature. The Compound_feature_relationship defines which feature is the preceding feature and which is the succeeding feature.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Compound_feature_relationship are the following:

— predecessor;

— successor.

4.2.42.1 predecessor

The predecessor specifies the Compound_feature_element with the highest precedence. See 4.3.37 for the application assertion.

4.2.42.2 successor

The successor specifies Compound_feature_element with a lesser precedence. See 4.3.37 for the application assertion.

4.2.43 Concentricity_tolerance

A Concentricity_tolerance is a type of Geometric_tolerance (see 4.2.99) that is a cylindrical or conical feature of a part which shall be fundamentally concentric. When the part is rotated about the datum axis, the axis of the feature shall be within the cylindrical tolerance zone.

NOTE 1 - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

NOTE 2 - The Concentricity_tolerance definition is derived from paragraph 14.11 of ISO 1101.

The data associated with a Concentricity_tolerance are the following:

- geometric_reference;
- value_qualifier.

4.2.43.1 geometric_reference

The geometric_reference specifies the datum to which the tolerance is related. See 4.3.38 for the application assertion.

4.2.43.2 value_qualifier

The value_qualifier specifies whether the Concentricity_tolerance is either a diametric tolerance or is not.

4.2.44 Conical_hole_bottom

A Conical_hole_bottom is a type of Blind_bottom_condition (see 4.2.8) that defines the bottom of a Round_hole to be conical in shape. A Conical_hole_bottom shall be a constant decrease in the hole diameter until the radius is zero. The Conical_hole_bottom may have a tip_radius defined at the smallest end of the Conical_hole_bottom.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Conical_hole_bottom are the following:

- tip_angle;
- tip_radius.

4.2.44.1 tip_angle

The tip_angle specifies the amount of constant slope to decrease the Round_hole diameter until the diameter is zero. The tip_angle is a conical bottom for a Round_hole. The tip_angle shall be greater than 0 degrees and less than 180 degrees. See 4.3.39 for the application assertion.

4.2.44.2 tip_radius

The tip_radius specifies the radius of a conical bottom for a Round_hole. A conical bottom is a constant decrease in diameter until the diameter is zero, or until it becomes tangent to a tip_radius. The tip_radius need not be specified for a particular Conical_hole_bottom. See 4.3.39 for the application assertion.

4.2.45 Constant_radius_edge_round

A Constant_radius_edge_round is a type of Edge_round (see 4.2.71) that is defined with a constant radius value.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Constant_radius_edge_round are the following:

- first_face_offset;
- second_face_offset;
- radius.

4.2.45.1 first_face_offset

The first_face_offset specifies the amount of offset from the first_face_shape (see 4.2.71.2) to the center of the edge_round_face (see 4.2.71.1). A constant_radius_edge_round may but need not require a first_face_offset. 4.3.40 See for the application assertion.

4.2.45.2 second_face_offset

The second_face_offset specifies the amount of offset from the second_face_shape (see 4.2.71.3) to the center of the edge_round_face (see 4.2.71.1). A constant_radius_edge_round may but need not require a second_face_offset. See 4.3.40 for the application assertion.

4.2.45.3 radius

The radius specifies the amount of curvature for a convex transition between the two faces of a Constant_radius_edge_round. See 4.3.40 for the application assertion.

4.2.46 Constant_radius_fillet

A Constant_radius_fillet is a type of Fillet (see 4.2.76) that is defined with a constant radius value.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a `Constant_radius_fillet` are the following:

- `first_face_offset`;
- `second_face_offset`;
- `radius`.

4.2.46.1 `first_face_offset`

The `first_face_offset` specifies the amount of offset from the `first_face_shape` (see 4.2.76.2) to the center of the `fillet_face` (see 4.2.76.1). A `constant_radius_fillet` may but need not require a `first_face_offset`. See 4.3.41 for the application assertion.

4.2.46.2 `second_face_offset`

The `second_face_offset` specifies the amount of offset from the `second_face_shape` (see 4.2.76.3) to the center of the `fillet_face` (see 4.2.76.1). A `constant_radius_fillet` may but need not require a `first_face_offset`. See 4.3.41 for the application assertion.

4.2.46.3 `radius`

The `radius` specifies the amount of curvature for a concave transition between two surfaces. See 4.3.41 for the application assertion.

4.2.47 `Counterbore_hole`

A `Counterbore_hole` is a type of `Hole` (see 4.2.103) that is a combination of two `Round_holes`. The first `Round_hole` shall have either a `Through_bottom_condition` or `Blind_bottom_condition`, the second shall have a `Blind_bottom_condition`, and a larger diameter than the first `Round_hole`. The top of the first `Round_hole` shall mate with the bottom of the second `Round_hole`. The `Counterbore_hole` orientation shall be the same as the orientation of the first `Round_hole`. Both `Round_holes` shall be co-axial.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a `Counterbore_hole` are the following:

- `larger_hole`;
- `smaller_hole`.

4.2.47.1 `larger_hole`

The `larger_hole` specifies the `Round_hole` that will be used as the larger hole for the `Counterbore_hole`. See 4.3.42 for the application assertion.

4.2.47.2 smaller_hole

The smaller_hole specifies the Round_hole that will be used as the smaller hole for the Counterbore_hole. See 4.3.42 for the application assertion.

4.2.48 Countersunk_hole

A Countersunk_hole is a type of Hole (see 4.2.103) that is a combination of two Round_holes. The first Round_hole shall have a Through_bottom_condition or Blind_bottom_condition. The second shall be a Round_hole with a Blind_bottom_condition, and a taper. The top of the first Round_hole shall mate with the bottom of the second Round_hole. The taper of the second Round_hole shall be larger than the diameter of the Round_hole, decreasing to the same diameter at the point where the two holes join. The Countersunk_hole orientation shall be the same as the orientation of the first Round_hole. Both Round_holes shall be co-axial.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Countersunk_hole are the following:

- constant_diameter_hole;
- tapered_hole.

4.2.48.1 constant_diameter_hole

The constant_diameter specifies the Round_hole without a taper that will be used as the constant diameter hole for the Countersunk_hole. See 4.3.43 for the application assertion.

4.2.48.2 tapered_hole

The tapered_hole specifies the Round_hole with a taper that will be used as the tapered hole for the Counterbore_sunk. See 4.3.43 for the application assertion.

4.2.49 Curved_dimension_tolerance

A Curved_dimension_tolerance is a type of Size_tolerance (see 4.2.188) that is the tolerance on a dimension for a curve measured along the entire path of the curve.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

4.2.50 Cutout

A Cutout is a type of Pocket (see 4.2.150) that is a volume to be removed from the part. Cutouts shall pass through two faces of a Part. Each Cutout is either a Circular_cutout (see 4.2.30) or a General_cutout (see 4.2.86).

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Cutout are the following:

— bottom_condition.

4.2.50.1 bottom_condition

The bottom_condition specifies the shape of the bottom of a Cutout feature. The bottom_condition shall pass entirely through the part, it shall be a Through_pocket_bottom_condition (see 4.2.210). See 4.3.44 for the application assertion.

4.2.51 Cylindrical_base_shape

A Cylindrical_base_shape is a type of Implicit_base_shape_representation (see 4.2.104) that is the initial shape of the material which is cylindrical.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Cylindrical_base_shape are the following:

— diameter.

4.2.51.1 diameter

The diameter specifies the distance across a Cylindrical_base_shape. See 4.3.45 for the application assertion.

4.2.52 Cylindricity_tolerance

A Cylindricity_tolerance is a type of Geometric_tolerance (see 4.2.99) that describes the amount of deviation a feature may have from being truly cylindrical. The feature shall be contained between two coaxial cylinders. The distance between the two coaxial cylinders defines the allowable tolerance deviation.

NOTE 1 - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

NOTE 2 - The Cylindricity_tolerance definition is derived from paragraph 14.4 of ISO 1101.

4.2.53 Date_Time

???

4.2.53.1 date

4.2.53.2 hour

4.2.53.3 minute

4.2.53.4 second

4.2.53.5 offset

4.2.54 Datum

A Datum is defined in clause 3.1 of ISO 5459. A Datum is either a Datum_feature or a Compound_datum.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Datum are the following:

- name;
- precedence.

4.2.54.1 name

The name specifies a word by which a Datum is commonly called. This name shall be unique within a part.

4.2.54.2 precedence

The precedence specifies a sequence that datums are applied when there are two or more datums required for the definition of a Geometric_tolerance.

4.2.55 Datum_feature

A Datum_feature is a type of Datum (see 4.2.54) that is a feature on a part used to establish a Datum.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Datum_feature are the following:

- datum_representation;
- modifier.

4.2.55.1 datum_representation

The datum_representation specifies the type of representation for defining a Datum_feature. The Datum_feature may be defined by either a Datum_target definition or by Part shape representation. See 4.3.47 and 4.3.48 for the application assertions.

4.2.55.2 modifier

The modifier specifies the tolerance value applied to the Datum_feature. The modifier need not be specified for a particular Datum_feature. See 4.3.46 for the application assertion.

4.2.56 Datum_target

A Datum_target is a geometric element on the surface of a part to locate a Datum for reference by a Geometric_tolerance. A Datum_target is either a Placed_target (see 4.2.142) or a Target_area (see 4.2.202).

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Datum_target are the following:

— identifier.

4.2.56.1 identifier

The identifier specifies a unique identification for the Datum_target.

4.2.57 Datum_target_set

A Datum_target_set is a set of Datum_target objects that are used to define a datum reference for a Geometric_tolerance .

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Datum_target_set are the following:

— rule_description;

— target_shape.

4.2.57.1 rule_description

The rule_description specifies the type of datum that is formed by the Datum_target_set. The rule_description need not be specified for a particular Datum_target_set.

EXAMPLE - "V-block" indicates that two Datum_target objects on a cylindrical element are to form the areas of contact on a V-shaped fixture.

4.2.57.2 target_shape

The `target_shape` specifies the set of Datum targets that define the `Datum_target_set`. There may be more than one `target_shape` for a `Datum_target`. See 4.3.49 for the application assertion.

4.2.58 Defined_gear

A `Defined_gear` is a type of `Gear` (see 4.2.83) that is specified explicitly, all attributes for a `Gear` are declared and defined. `Bevel_gear`(see 4.2.7), `Helical_gear`(see 4.2.102) or `Spur_gear` (see 4.2.195).

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

4.2.59 Defined_marking

A `Defined_marking` is a type of `Marking` (see 4.2.116) that is specified explicitly, all attributes for a `Marking` are declared and defined.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a `Defined_marking` are the following:

- `character_height`;
- `character_spacing`;
- `font_name`;
- `special_instructions`.

4.2.59.1 character_height

The `character_height` specifies the size of the text used for a `Defined_marking` feature. See 4.3.51 for the application assertion.

4.2.59.2 character_spacing

The `character_spacing` specifies the amount of space between text letters used for a `Defined_marking` feature. See 4.3.51 for the application assertion.

4.2.59.3 font_name

The `font_name` specifies the appearance of the characters. A font consists of typeface, treatment, and size. See 4.3.50 for the application assertion.

EXAMPLE - Example of `font_name` characteristic is type face Times Roman. Example of `font_name` characteristic is a treatment of Bold or Italic. Example of `font_name` characteristic is size 10 point.

4.2.59.4 special_instructions

The special_instructions specifies a description on how to apply the text given by the Defined_marking entity. See 4.3.50 for the application assertion.

4.2.60 Defined_thread

A Defined_thread is a type of Thread (see 4.2.208) that is specified explicitly.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Defined_thread are the following:

- crest;
- minor_diameter;
- pitch_diameter.

4.2.60.1 crest

The crest specifies the distance between the opposing points of the thread. The crest is formed by the intersection of the sides of the thread if extended, if necessary, beyond the top of the thread. The crest need not be specified for a particular Defined_thread. See 4.3.52 for the application assertion.

4.2.60.2 minor_diameter

The minor_diameter specifies the dimension of the smallest diameter of the Defined_thread and is applied to both an internal and an external thread. The minor_diameter need not be specified for a particular Defined_thread. See 4.3.52 for the application assertion.

4.2.60.3 pitch_diameter

The pitch_diameter specifies the dimension of an imaginary cylinder passing through the threads so as to make equal the widths of the threads and the widths of the spaces cut by the cylinder. See 4.3.52 for the application assertion.

4.2.61 Derived_Shape_Element

???

4.2.61.1 is_derived_from

4.2.61.2 role

4.2.62 Descriptive_parameter

A Descriptive_parameter is a type of Property_parameter (see 4.2.157) that is an explanation of the property being defined by a specification.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Descriptive_parameter are the following:

— descriptive_string.

4.2.62.1 descriptive_string

The descriptive_string specifies a word or group of words by which a Descriptive_parameter is explained.

4.2.63 Diagonal_knurl

A Diagonal_knurl is a type of Turned_knurl (see 4.2.220) with helical cuts at an angle about the axis of a surface.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Diagonal_knurl are the following:

— helix_angle;

— helix_hand.

4.2.63.1 helix_angle

The helix_angle specifies the angle the knurl pattern makes with the orientation axis of an applied to surface. See 4.3.54 for the application assertion.

4.2.63.2 helix_hand

The helix_hand specifies a description of whether the helix angle is applied to an orientation axis in a clockwise or a counterclockwise direction. See 4.3.53 for the application assertion.

4.2.64 Diameter_dimension_tolerance

A Diameter_dimension_tolerance is a type of Size_tolerance (see 4.2.188) that is the allowable variation of the size of a hole in a surface.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

4.2.65 Diameter_taper

A diameter_taper is a constant change in shape of a feature for a part. A Diameter_taper starts at the placement of a feature and is applied to the entire feature. The initial diameter and the length of the taper is determined from the Machining_feature that is applying the Diameter_taper. The final_diameter is specified as a diameter different than the initial diameter.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Diameter_taper are the following:

— final_diameter.

4.2.65.1 final_diameter

The final_diameter specifies the diameter of the circle at the end of the taper. The final_diameter may be smaller or larger than the beginning diameter for a Machining_feature. See 4.3.55 for the application assertion.

NOTE - The diameter at the beginning of the Diameter_taper is the same as the referencing feature diameter.

4.2.66 Diamond_knurl

A Diamond_knurl is a type of Turned_knurl (see 4.2.220) that is a knurl ridge that is doubly helical, a left hand and a right hand helix, about the axis of a surface, with equal spacing of the two.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Diamond_knurl are the following:

— helix_angle.

4.2.66.1 helix_angle

The helix_angle specifies the angle the knurl pattern makes with the orientation axis of an applied to surface. See 4.3.56 for the application assertion.

4.2.67 Dimensional_tolerance

A Dimensional_tolerance is the total amount a specific dimension is permitted to vary, which is the difference between maximum and minimum permitted limits of size. Each Dimensional_tolerance is either a Location_tolerance (see 4.2.112) or a Size_tolerance (see 4.2.188)

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

EXAMPLE - A dimension given as 1.624 +.002/-.002 means it may be 1.626 or 1.622, or anywhere between these limit dimensions.

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The data associated with a Dimensional_tolerance are the following:

- dimension_description;
- dimension_value;
- limit;
- significant_digits;
- unit_of_measure.

4.2.67.1 dimension_description

The dimension_description specifies a textual description of any conditions which may affect the interpretation of the tolerance information that is defined. There may be more than one dimension_description for a Dimensional_tolerance. The dimension_description need not be specified for a particular Dimensional_tolerance.

EXAMPLE - A Dimension_tolerance may apply in 2 places.

4.2.67.2 dimension_value

The dimension_value specifies the total amount by which a specific dimension is permitted to vary.

4.2.67.3 limit

The limit specifies the tolerance value applied to the Dimension_tolerance. The limit need not be specified for a particular Dimensional_tolerance. See 4.3.57 for the application assertion.

4.2.67.4 significant_digits

The significant_digits specifies the number of decimal places indicating the accuracy of dimension or tolerance. Significant_digits need not be specified for a particular Dimensional_tolerance.

4.2.67.5 unit_of_measure

The unit_of_measure specifies the unit in which the quantity is expressed.

4.2.68 Directed_taper

A Directed_taper is a constant change in shape of a feature for a part. A Directed_taper starts at the location of the placement of a feature and is applied to the entire feature. The length of the taper is determined from the Machining_feature that is applying the Directed_taper.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Directed_taper are the following:

- angle;
- direction.

4.2.68.1 angle

The angle specifies the amount of slope from the start of the Directed_taper to the end of the Directed_taper. An angle between zero and 90 degrees or between negative 90 and negative 180 degrees indicates that the profile grows larger along the draft direction. An angle between zero and negative 90 degrees or between 90 and 180 degrees indicates that the profile grows smaller along the draft direction. See 4.3.59 for the application assertion.

4.2.68.2 direction

The direction specifies the reference direction from which the Directed_taper angle is measured. The direction specifies a vector that points in the direction to apply the taper. See 4.3.58 for the application assertion.

4.2.69 Direction_element

A Direction_element is a type of Shape_element (see 4.2.186) that is a Shape_aspect definition for a direction.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

4.2.70 Distance_along_curve_tolerance

A Distance_along_curve_tolerance is a type of Location_tolerance (see 4.2.112) that is the distance calculated between two elements along a path defined by a third element of geometry.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Distance_along_curve_tolerance are the following:

- path;
- with_curve_direction.

4.2.70.1 path

The path specifies the shape that the tolerance applies to. See 4.3.60 for the application assertion.

4.2.70.2 with_curve_direction

The with_curve_direction specifies a boolean value that indicates the direction along the element to apply the tolerance. A value of true indicates the tolerance value is applied from the start point of the curve to the end point of the curve. A value of false indicates that the direction does not matter.

Dm_Analysis_Dofs_Dml
Dm_Data_Aquisition_Software
Dm_Dimension_Parameter
Dm_Execution_Result
Dm_Execution_Result_Measurement
Dm_Feature
Dm_Feature_Analysis_Mode_Dml
Dm_Feature_Tolerance_Mode_Dml
Dm_Parameter
Dm_Parameter_Analysis_Dml
Dm_Parameter_Value_Limits
Dm_Point
Dm_Point_Parameter
Dm_Program_Identification
Dm_Program_Run
Dm_Result_Parameter
Dm_Vector_Parameter
Dmf_Arc
Dmf_Circle
Dmf_Cone
Dmf_Cylinder
Dmf_Edge_Point
Dmf_Ellipse
Dmf_Generic_Feature
Dmf_Geometric_Curve
Dmf_Geometric_Surface
Dmf_Line_Bounded
Dmf_Line_Closed_Parallel
Dmf_Line_Unbounded
Dmf_Pattern
Dmf_Plane
Dmf_Plane_Closed_Parallel
Dmf_Plane_Symmetric
Dmf_Point
Dmf_Sphere
Dmf_Surface_Of_Revolution_Dml
Dmf_Torus

Dmf_Unknown_Feature_Type_Dml
Dof_Attribute_Dml

4.2.71 Edge_round

An Edge_round is a type of Transition_feature (see 4.2.219) that is a convex circular arc transition between two intersecting surfaces. The blend surface is tangent to both of the adjacent surface edges. An Edge_round may be a Constant_radius_edge_round (see 4.2.45).

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with an Edge_round are the following:

- edge_round_face;
- first_face_shape;
- second_face_shape.

4.2.71.1 edge_round_face

The edge_round_face specifies the circular transition surface between the two edges of two surfaces. See 4.3.61 for the application assertion.

4.2.71.2 first_face_shape

The first_face shape specifies one of two surfaces the Edge_round feature will transition between. See 4.3.61 for the application assertion.

4.2.71.3 second_face_shape

The second_face shape specifies the other surfaces the Edge_round feature will transition between. See 4.3.61 for the application assertion.

4.2.72 Explicit_base_shape_representation

An Explicit_base_shape_representation is a type of Base_shape (see 4.2.6) that is the geometric representation needed to define the shape of the initial material.

EXAMPLE - A B-rep model containing the geometry for a cast part may be an Explicit_base_shape_representation.

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The data associated with an Explicit_base_shape_representation are the following:

- B-rep_form;
- explicit_shape;
- user_defined_description.

4.2.72.1 B-rep_form

The B-rep_form specifies the shape that is the representation of the initial material. See 4.3.62 for the application assertion.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

4.2.72.2 explicit_shape

The explicit_shape specifies an indicator used to denote the particular shape of the part when it can not be defined with an implicit definition and has an explicit shape.

The value of the endcut_shape_type shall be one of the following:

- casting;
- composite shape;
- forging;
- user_defined.

NOTE See 1.1.1.1.1- 1.1.1.1.4 for the definition of each allowable value for endcut_shape_type.

1.1.1.1.1

casting

the base shape of the part is created by pouring molten material into a mold.

1.1.1.1.2

composite shape

the base shape of the part is defined with non-metallic materials.

1.1.1.1.3

forging

the base shape of the part is created by heating metal and hammering a formed shape.

1.1.1.1.4

user_defined

the base shape of the part has non standard description defined by the user.

4.2.72.3 user_defined_description

The user_defined_description_description specifies a non standard description defined by the user. The user_defined_description_description need not be specified for a Explicit_base_shape_representation.

4.2.73 Face_shape_element

A Face_shape_element is a type of Shape_element (see 4.2.186) hat is a Shape_aspect definition for a Face.

4.2.74 Face_shape_element_relationship

A Face_shape_element_relationship defines the sequence in which face_shape_element objects are applied. The Face_shape_element_relationship defines which face is the preceding face and which face is the succeeding face.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Face_shape_element_relationship are the following:

- predecessor;
- successor.

4.2.74.1 predecessor

The predecessor specifies the Face_shape_element (see 4.2.73) with the highest precedence. See 4.3.63 for the application assertion.

4.2.74.2 successor

The successor specifies the Face_shape_element (see 4.2.73) with the lesser precedence. See 4.3.63 for the application assertion.

4.2.75 Feature

???

4.2.75.1 label**4.2.75.2 placement**

4.2.76 Fillet

A Fillet is a type of Transition_feature (see 4.2.219) that is a concave circular arc transition between two intersecting surfaces. The blend surface may be tangent to both of the adjacent surface edges. A Fillet may be a Constant_radius_fillet (see 4.2.46).

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Fillet are the following:

- fillet_face;
- first_face_shape;
- second_face_shape.

4.2.76.1 fillet_face

The fillet_face specifies the circular transition surface between the two edges of two surfaces. See 4.3.64 for the application assertion.

4.2.76.2 first_face_shape

The first_face_shape specifies one of two surfaces the Fillet feature will transition between. See 4.3.64 for the application assertion.

4.2.76.3 second_face_shape

The second_face_shape specifies the second of two surfaces the Fillet feature will transition between. See 4.3.64 for the application assertion.

4.2.77 First_offset

A First_offset is the amount of length offset from a face for creating a Chamfer feature.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

NOTE - illustrates a First_offset for a Chamfer feature.

The data associated with a First_offset are the following:

- face_shape;
- offset_amount.

4.2.77.1 face_shape

The first_face specifies a geometric shape for one of two faces the Chamfer feature will transition between. See 4.3.65 for the application assertion.

4.2.77.2 offset_amount

The offset_amount specifies a distance from the edge of a face to the start of the Chamfer. See 4.3.66 for the application assertion.

4.2.78 Flat_hole_bottom

A Flat_hole_bottom is a type of Blind_bottom_condition (see 4.2.8) that is the bottom of a Round_hole that shall be flat and have no corner radius.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

4.2.79 Flat_slot_end_type

A Flat_slot_end_type is a type of Slot_end_type (see 4.2.190) that is an end condition of a slot that shall be a planar shape perpendicular to both of the adjacent Slot wall surfaces. The intersection of the Slot wall surfaces and the end planar shape need not be blended by a radius.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Flat_slot_end_type are the following:

- first_radius;
- second_radius.

4.2.79.1 first_radius

The first radius specifies the circular arc transition between the wall of the Slot feature and the planar surface of the Flat_slot_end_type. The position of the first radius is where the Slot wall intersects the Flat_slot_end_type at a positive value along the X-axis. See 4.3.67 for the application assertion.

4.2.79.2 second_radius

The second radius specifies the circular arc transition between the wall of the Slot feature and the planar surface of the Flat_slot_end_type. The position of the second radius is where the Slot wall intersects the Flat_slot_end_type at a negative value along the X-axis. See 4.3.67 for the application assertion.

4.2.80 Flat_with_radius_hole_bottom

A Flat_with_radius_hole_bottom is a type of Blind_bottom_condition (see 4.2.8) that the bottom of a Round_hole is flat and has corner radius that are smaller than the diameter of the Round_hole.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Flat_with_radius_hole_bottom are the following:

— corner_radius.

4.2.80.1 corner_radius

The corner_radius specifies the radius between the side and the floor of a Round_hole (see 4.2.178). See 4.3.68 for the application assertion.

4.2.81 Flat_with_taper_hole_bottom

A Flat_with_taper_hole_bottom is a type of Blind_bottom_condition (see 4.2.8) that the bottom of a Round_hole is flat and has a planar taper from the sides of the Round_hole.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Flat_with_taper_hole_bottom are the following:

— final_diameter;

— taper_diameter.

4.2.81.1 final_diameter

The final_diameter specifies the diameter of the Round_hole floor which is a diameter smaller than the initial diameter. See 4.3.69 for the application assertion.

4.2.81.2 taper_diameter

The taper_diameter specifies the angle between the side and the floor of a Round_hole (see 4.2.178), measured along the axis inside the Round_hole. See 4.3.69 for the application assertion.

4.2.82 Flatness_tolerance

A Flatness_tolerance is a type of Geometric_tolerance (see 4.2.99) that is a tolerance for how much a surface is allowed to deviate from being flat. All points of the actual surface shall lie between two parallel planes that are a distance apart equal to the specified tolerance.

NOTE 1 - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

NOTE 2 - The Flatness_tolerance definition is derived from paragraph 14.2 of ISO 1101.

The data associated with a Flatness_tolerance are the following:

— segment_size.

4.2.82.1 segment_size

The segment_size specifies the length of a surface to apply a tolerance if the Flatness_tolerance is not applied to the total length. The segment_size need not be specified for a particular Flatness_tolerance.

4.2.83 Gear

A Gear is a type of Machining_feature (see 4.2.113) that is a toothed machine part, such as a wheel or cylinder, that meshes with another toothed part to transmit motion or to change speed or direction. Each Gear is one of the following: Defined_gear (see 4.2.58) or a Catalogue_gear (see 4.2.21).

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Gear are the following:

- applied_shape;
- face_width;
- module_or_diameter_pitch;
- nominal_tool_depth;
- normal_attribute;
- number_of_teeth;
- rake_shift_factor;
- reference_pressure_angle;
- tip_diameter.

4.2.83.1 applied_shape

The `applied_shape` specifies a base shape for applying the Gear feature. See 4.3.70 for the application assertion.

4.2.83.2 face_width

The `face_width` specifies a width over the toothed part of a gear, measured along a generator of the reference cylinder. See 4.3.71 for the application assertion.

4.2.83.3 module_or_diameter_pitch

The `module_or_diameter_pitch` specifies which of either the module or diametral pitch of a gear is specified by the `normal_attribute` (see 4.2.83.5).

The module of a spur gear is the quotient of the pitch at the reference surface divided by π . The normal module of a helical gear is the quotient of the normal pitch divided by π . The normal pitch is the pitch at the reference surface measured along the arc of a co-cylindrical normal helix, lying between the tooth traces of consecutive corresponding flanks.

The diametral pitch is the quotient of the number π divided by the pitch, or the quotient of the number of teeth divided by the reference diameter. The normal diametral pitch of a helical gear is the quotient of the number π divided by the normal pitch, or the quotient of the number of teeth divided by the product of the reference diameter and the cosine of the helix angle.

4.2.83.4 nominal_tool_depth

The `nominal_tool_depth` specifies the radial distance between the tooth tip and root circles. See 4.3.71 for the application assertion.

4.2.83.5 normal_attribute

The `normal_attribute` specifies the module when the value of `module_or_diameter_pitch` is 'module' or the diametral pitch when the value of `module_or_diameter_pitch` is 'diameter pitch'. For a spur gear, the `normal_attribute` is the module or diametral pitch, requiring no qualification; for a helical gear, the `normal_attribute` specifies the normal module or the normal diametral pitch. See 4.3.71 for the application assertion.

4.2.83.6 number_of_teeth

The `number_of_teeth` specifies the number of teeth in the circumference produced on the part surface. See 4.3.71 for the application assertion.

4.2.83.7 rake_shift_factor

The `rack_shift_factor` is the quotient of the rack shift divided by the module (see 4.2.83.3). The rack shift specifies the distance measured along a common normal between the reference cylinder of the gear and the datum plane of the basic rack, when the rack and the gear are superposed so that the flanks of a tooth of one are tangent to those of the other. By convention, the profile shift is positive when the datum plane is external to the cylinder and negative when it cuts it. This definition is valid for both external and internal gears. For internal gears, tooth profiles are considered to be those of the tooth spaces. See 4.3.71 for the application assertion.

4.2.83.8 reference_pressure_angle

The `reference_pressure_angle` specifies the acute angle between a radial line passing through the point of intersection of the profile with the reference circle and a tangent to the profile at that point. See 4.3.71 for the application assertion.

4.2.83.9 tip_diameter

The `tip_diameter` specifies the diameter of the tip circle. See 4.3.71 for the application assertion.

4.2.84 General_boss

A `General_boss` is a type of `Boss` (see 4.2.10) that is an enclosed volume bounded by an arbitrary shape.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a `General_boss` are the following:

- `change_in_boundary`;
- `enclosed_boundary`.

4.2.84.1 change_in_boundary

The `change_in_boundary` specifies a taper that defines the change in shape of the `General_boss`. The `change_in_boundary` need not be specified for a particular `General_boss`. See 4.3.73 and 4.3.74 for the application assertion.

4.2.84.2 enclosed_boundary

The `enclosed_boundary` specifies an outline or shape that bounds an enclosed area with no opening for a `General_boss`. The `Closed_profile` specifies the area required by a `General_boss`. The placement of the `enclosed_boundary` shall be with the origin of the `Closed_profile` at the origin of the `General_boss`. The X-axis and Y-axis of the profile shall be the same as the X-axis and Y-axis of the `General_boss`. See 4.3.72 for the application assertion.

4.2.85 General_closed_profile

A General_closed_profile is a type of Closed_profile (see 4.2.37) that is an enclosed area bounded by a arbitrary shape. The orientation is defined by the explicit geometry of the shape.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a General_closed_profile are the following:

— closed_profile_shape.

4.2.85.1 closed_profile_shape

The closed_profile_shape specifies a closed curve that defines the arbitrary shape of the profile. See 4.3.75 for the application assertion.

4.2.86 General_cutout

A General_cutout is a type of Cutout (see 4.2.50) that is a volume of arbitrary shape removed from the part and shall pass through two faces of the part. A General_cutout is similar in definition to a General_pocket, but differ in the type of process required to manufacture.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a Circular_cutout are the following:

— boundary.

4.2.86.1 boundary

The boundary specifies an outline or shape that is an area that may be closed or partially open. The profile specifies the area required by a General_cutout. The placement of the boundary shall be with the origin of the Profile at the origin of the General_cutout. The X-axis and Y-axis of the profile shall be the same as the X-axis and Y-axis of the General_cutout. See 4.3.76 for the application assertion.

4.2.87 General_open_profile

A General_open_profile is a type of Open_profile (see 4.2.124) that is specified by a shape bounded by an arbitrary planar shape. The orientation is defined by the explicit geometry of the shape.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a General_open_profile are the following:

— enclosed_boundary.

4.2.87.1 enclosed_boundary

The enclosed_boundary specifies a curve with no enclosing bounds that defines the arbitrary planar shape of the profile. See 4.3.77 for the application assertion.

4.2.88 General_outside_profile

A General_outside_profile is a type of Profile_feature (see 4.2.154) that is specified the removal volume of raw stock or other excess material of arbitrary shape from the outside shape of the part. The General_outside_profile feature may remove material from the entire outside shape or some portion of the shape. A single part may have several General_outside_profile objects, with the Z-axes of the coordinate systems of the General_outside_profile objects pointing in any direction.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a General_outside_profile are the following:

— boundary.

4.2.88.1 boundary

The boundary specifies a profile that identifies the outside shape of the part. The placement of the boundary shall be with the origin of the profile at the origin of the General_outside_profile feature. The X-axis and Y-axis of the profile shall be the same as the X-axis and Y-axis of the feature. See 4.3.78 for the application assertion.

4.2.89 General_path

A General_path is a type of Path (see 4.2.138) that is a direction of travel along an arbitrary curve.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a General_path are the following:

— sweep_path.

4.2.89.1 sweep_path

The sweep_path specifies a continues set of curves that define an arbitrary direction of travel. See 4.3.79 for the application assertion.

4.2.90 General_pattern

A General_pattern is a type of Replicate_feature (see 4.2.172) that is a base shape component and a list of arbitrary placements to arrange identical copies of the base feature. The placement of all instances of the base feature are relative to the Replicate_feature coordinate system.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a General_pattern are the following:

— feature_placement.

4.2.90.1 feature_placement

The feature_placement specifies a set of axis and positions to place a base feature in the General_pattern. A General_pattern is defined as one base feature and many placements allowing the base feature to be placed several times in a random pattern. There may be more than one feature_placement for a General_pattern. See 4.3.80 for the application assertion.

4.2.91 General_pocket

A General_pocket is a type of Pocket (see 4.2.150) that is a volume of arbitrary shape removed from the part.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a General_pocket are the following:

— boundary;

— volume_not_removed.

4.2.91.1 boundary

The boundary specifies an outline or shape that is an area that may be closed or partially open. The profile specifies the area required by a General_pocket. The placement of the boundary shall be with the origin of the Profile at the origin of the General_pocket. The X-axis and Y-axis of the profile shall be the same as the X-axis and Y-axis of the General_pocket. See 4.3.81 for the application assertion.

4.2.91.2 volume_not_removed

The volume_not_removed specifies an amount of material that is not to be removed from the pocket. The Boss feature defines the shape of the material that is to remain in the pocket. See 4.3.82 or 4.3.83 for the application assertion.

4.2.92 General_pocket_bottom_condition

A General_pocket_bottom_condition is a type of Pocket_bottom_condition (see 4.2.151) that specifies an enclosed area bounded by an arbitrary shape.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a General_pocket_bottom_condition are the following:

- floor;
- floor_radius.

4.2.92.1 floor

The floor specifies the face at the bottom of a Pocket feature, adjacent to all the pocket walls. See 4.3.84 for the application assertion.

4.2.92.2 floor_radius

The floor radius is specifies the amount of curvature for an arc between the bottom and the sides of a pocket feature. See 4.3.85 for the application assertion.

4.2.93 General_profile_floor

A General_profile_floor is a type of Profile_floor (see 4.2.155) that specifies an enclosed area bounded by an arbitrary shape.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a General_profile_floor are the following:

- floor.

4.2.93.1 floor

The floor specifies the face at the bottom of a General_profile_floor feature, adjacent to all the Shape_profile walls. See 4.3.86 for the application assertion.

4.2.94 General_removal_volume

A General_removal_volume is a type of Multi_axis_feature(see 4.2.119) that is an enclosed volume of arbitrary shape that shall be removed from the part. The position and orientation shall be determined from the shape defining geometry.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

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The data associated with a General_removal_volume are the following:

— removal_volume.

4.2.94.1 removal_volume

The removal_volume specifies the arbitrary shape to be removed. See 4.3.87 for the application assertion.

4.2.95 General_revolution

A General_revolution is a type of Revolved_feature (see 4.2.173) that is an arbitrary planar shape swept one complete revolution about an axis. The arbitrary planar shape shall be finite in length, coplanar with the axis of revolution, and shall not intersect the axis of revolution. The General_revolution may be either an outer shape of a part or a volume removal, depending on the material direction.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a General_revolution are the following:

— outer_edge_shape.

4.2.95.1 outer_edge_shape

The outer_edge_shape specifies an outline or shape that shall be revolved about an axis. The General_open_profile specifies the outer edge shape required by a General_revolution. The placement of the outer_edge_shape shall be on the Y-axis of the General_revolution at a specified distance away from the origin of the General_revolution. The X-axis and Y-axis of the profile shall be the same as the Y-axis and Z-axis of the General_revolution. See 4.3.88 for the application assertion.

4.2.96 General_rib_top_floor

A General_rib_top_floor is a type of Rib_top_floor (see 4.2.177) that specifies an enclosed area bounded by an arbitrary shape. The floor defining shapes may be defined in a particular sequence.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a General_rib_top_floor are the following:

— rib_top_face.

4.2.96.1 rib_top_face

A rib_top_face specifies a set of faces at the bottom of a Rib_top (see 4.2.176). The order of the faces is achieved using a Face_shape_element_relationship (see 4.2.74). See 4.3.89 for the application assertion.

4.2.97 General_shape_profile

A `General_shape_profile` is a type of `Shape_profile` (see 4.2.187) that is a volume of arbitrary shape which defines a portion of the part.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a `General_shape_profile` are the following:

— `profile_boundary`.

4.2.97.1 profile_boundary

The `profile_boundary` specifies the outline of the `Shape_profile` feature. The outline defines an area that may or may not be entirely enclosed. The placement of the `profile_boundary` shall be with the origin of the Path, that defines the profile, at the origin of the `General_shape_profile`. The X-axis and Y-axis of the profile shall be the same as the X-axis and Y-axis of the `General_shape_profile`. See 4.3.90 for the application assertions.

4.2.98 General_top_condition

A `General_top_condition` is a type of `Boss_top_condition` (see 4.2.11) that specifies an enclosed area bounded by an arbitrary shape that defines the top of a Boss feature.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a `General_top_condition` are the following:

— `top_face`.

4.2.98.1 top_face

The `top_face` specifies a face at the top of a Boss feature, adjacent to the Boss sides. See 4.3.91 for the application assertion.

4.2.99 Geometric_tolerance

A Geometric_tolerance is the maximum or minimum variation from true geometric form or position that may be permitted in manufacture. Geometric_tolerance should be employed only for those requirements of a part critical to its functioning or interchangeability. Each Geometric_tolerance is one of the following: Angularity_tolerance (see 4.2.5), Circular_runout_tolerance (see 4.2.35), Circularity_tolerance (see 4.2.36), Concentricity_tolerance (see 4.2.43), Cylindricity_tolerance (see 4.2.52), Flatness_tolerance (see 4.2.82), Linear_profile_tolerance (see 4.2.109), Parallelism_tolerance (see 4.2.131), Perpendicularity_tolerance (see 4.2.140), Position_tolerance (see 4.2.152), Straightness_tolerance (see 4.2.199), Surface_profile_tolerance (see 4.2.200), Symmetry_tolerance (see 4.2.201), or a Total_runout_tolerance (see 4.2.218).

NOTE 1 - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

NOTE 2- Geometric tolerance definitions are derived from ISO 1101.

The data associated with a Geometric_tolerance are the following:

- applied_shape;
- geometric_tolerance_value;
- modifier_control;
- significant_digits;
- unit_of_measure;
- zone_definition.

4.2.99.1 applied_shape

The applied_shape specifies the shape on a Part that is being toleranced by a Geometric_tolerance. There may be more than one applied_shape for a Geometric_tolerance. See 4.3.93 for the application assertion.

4.2.99.2 geometric_tolerance_value

The geometric_tolerance_value specifies the tolerance amount that a part is allowed to meet the required accuracy for proper fit.

4.2.99.3 modifier_control

The modifier_control specifies the material condition which is applied to the shape being toleranced by the Geometric_tolerance. The modifier_control need not be specified for a particular Geometric_tolerance. See 4.3.92 for the application assertion.

4.2.99.4 significant_digits

The `significant_digits` specifies the number of decimal places indicating the accuracy of the tolerance.

4.2.99.5 unit_of_measure

The `unit_of_measure` specifies the quantity of measure in which the value is given.

4.2.99.6 zone_definition

The `zone_definition` specifies the tolerance zone that restricts the `Geometric_tolerance`. The `zone_definition` need not be specified for a particular `Geometric_tolerance`. See 4.3.94 for the application assertion.

4.2.100 Geometric_tolerance_precedence_relationship

A `Geometric_tolerance_precedence_relationship` is a composite geometric tolerance. A part may have a shape that has a geometric tolerance and that shape is the basic shape for a pattern which may also have a geometric tolerance. The geometric tolerance for the base shape shall have precedence over the geometric tolerance for the pattern.

NOTE - The application object definition definition is derived from paragraph 4.2.2 of ISO 10303-224.

The data associated with a `Geometric_tolerance_precedence_relationship` are the following:

- `base_shape_tolerance`;
- `pattern_shape_tolerance`.

4.2.100.1 base_shape_tolerance

The `base_shape_tolerance` specifies the `Geometric_tolerance` which is applied to a shape on a Part. See 4.3.95 for the application assertion.

4.2.100.2 pattern_shape_tolerance

The `pattern_shape_tolerance` specifies the `Geometric_tolerance` which is applied to a pattern on a Part. See 4.3.95 for the application assertion.

4.2.101 Groove

A Groove is a type of `Revolved_feature` (see 4.2.173) that is a narrow channel or depression that is swept through one complete revolution about an axis.

NOTE - illustrates two Groove features. The face shape that has the Groove applied to it is determined by the profile orientation.

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The data associated with a Groove are the following:

- sweep.

4.2.101.1 sweep

The sweep specifies an outline or shape that shall be revolved about an axis. The Open_profile specifies the sweep shape required by a Groove. The placement of the profile shall be along the X-axis of the Groove at a specified distance away from the origin. The orientation of the Open_profile is independent of the orientation of the Groove feature. The Groove feature may be defined on different faces of a part depending on the orientation of the profile. See 4.3.96 for the application assertion.

4.2.102 Helical_gear

A Helical_gear is a type of Defined_gear (see 4.2.58) that is a cylindrical gear whose tooth traces are helices.

NOTE - illustrates the Helical_gear.

The data associated with an Helical_gear are the following:

- left_or_right_tooth;
- reference_helix_angle.

4.2.102.1 left_or_right_tooth

The left_or_right_hand_tooth specifies a description of whether the gear teeth are right or left handed.

Right hand teeth are teeth whose successive transverse profiles show clockwise displacement with increasing distance from an observer looking along the straight line generators of the reference surface

Left hand teeth are teeth whose successive transverse profiles show anti-clockwise displacement with increasing distance from an observer looking along the straight line generators of the reference surface.

4.2.102.2 reference_helix_angle

The reference_helix_angle is the acute angle between the tangent to the tooth trace of a straight helical gear and the straight generator of the reference cylinder on which it lies. See for the application assertion.

4.2.103 Hole

A Hole is a type of Multi_axis_feature(see 4.2.119) that is the removal of a cylindrical volume from a part. Each Hole is either a Counterbore_hole (see 4.2.47), Countersunk_hole (see 4.2.48), or a Round_hole (see 4.2.178). The Hole may be positioned at its bottom with the Z-axis in the direction out

of the Hole or at a position at the top of the hole with the Z-axis in the direction into the part.

4.2.104 Implicit_base_shape_representation

An Implicit_base_shape_representation is a type of Base_shape (see 4.2.6) that is the type of representation needed to define the shape of the initial material. The shape of the material may be either cylindrical, rectangular, or a polygon of any number of sides. Each Implicit_base_shape_representation is either a Block_base_shape (see 4.2.9), Cylindrical_base_shape (see 4.2.51), or a Ngon_base_shape (see 4.2.120).

The data associated with an Implicit_base_shape_representation are the following:

- base_shape_length;
- placement.

4.2.104.1 base_shape_length

The base_shape_length is the size of the length of a Implicit_base_shape_representation. See 4.3.97 for the application assertion.

4.2.104.2 placement

A placement specifies the positioning of the part with respect to basic material stock. The positioning will be different for different types of Implicit_base_shape_representation. See 4.3.98 for the application assertion.

A Cylindrical_base_shape shall be positioned with the Z axis parallel to the length of the shape. The X and Y axis shall be orthogonal to the Z axis. The axis shall be positioned in the exact center of the circular profile of the Cylindrical_base_shape.

A Block_base_shape shall be positioned with the Z axis parallel to the length of the shape, the Y axis shall be parallel to the height of the shape, and the X axis shall be parallel to the width of the shape. The axis shall be positioned in the exact center of the rectangular profile of the Block_base_shape.

A Ngon_base_shape shall be position with the Z axis parallel to the length of the shape, the X axis shall be parallel to at least one side of the Ngon_base_shape, and the Y axis shall be orthogonal to the X and Z axis. The axis shall be positioned in the exact center of the ngon profile of the Ngon_base_shape.

4.2.105 Knurl

A Knurl is a type of Machining_feature (see 4.2.113) that is a scoring pattern made by a series of small ridges or beads on a metal surface. Each Knurl is either a Catalogue_knurl (see 4.2.22) or a Turned_knurl (see 4.2.220).

The data associated with a Knurl are the following:

- applied_shape;

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— partial_profile.

4.2.105.1 applied_shape

The applied_shape specifies a base shape for applying the Knurl feature. See 4.3.100 for the application assertion.

4.2.105.2 partial_profile

The partial_profile specifies the placement and length of a surface to apply a Knurl feature. The partial_profile need not be specified for a particular Knurl. See 4.3.99 for the application assertion.

4.2.106 Limits_and_fits

A Limits_and_fits contains the necessary information to express a tolerance of the limits-and-fits system standardized by ISO 286. The data associated with a Limits_and_fits are the following:

- deviation;
- fitting type;
- grade.

4.2.106.1 deviation

The deviation specifies the class descriptor, by characters, for the designated limits and fits.

NOTE - The characters 'A' to 'ZC' for holes or 'a' to 'zc' for shafts may be used for deviation.

4.2.106.2 fitting type

The fitting type specifies whether the tolerance declaration applies to a shaft or to a hole. The fitting type need not be specified for a particular Limits_and_fits.

4.2.106.3 grade

The grade specifies the quality or the accuracy grade of a tolerance.

NOTE - The grade is based on the international standard tolerance grade IT01 to IT18.

4.2.107 Linear_path

A Linear_path is a type of Path (see 4.2.138) that is a direction of travel along a line. The data associated with a Linear_path are the following:

- direction;

— distance.

4.2.107.1 direction

The direction specifies a vector which indicates the the direction of the path starting from the path placement. See 4.3.102 for the application assertion.

4.2.107.2 distance

The distance specifies the length of the path. See 4.3.101 for the application assertion.

4.2.108 Linear_profile

A Linear_profile is a type of Open_profile (see 4.2.124) that is a straight line of a specified length. The Linear_profile shall have orientation parallel to the X-axis.

NOTE - illustrates a Linear_profile that is being applied to the Planar_face feature.

The data associated with a Linear_profile are the following:

— profile_length.

4.2.108.1 profile_length

The profile_length specifies the length of the profile. See 4.3.103 for the application assertion.

4.2.109 Linear_profile_tolerance

A Linear_profile_tolerance is a type of Geometric_tolerance (see 4.2.99) that is a uniform boundary or zone along the true profile within which all elements of the surface shall lie.

NOTE 1 - illustrates the Linear_profile_tolerance

NOTE 2 - The Linear_profile_tolerance definition is derived from paragraph 14.5 of ISO 1101.

The data associated with a Linear_profile_tolerance are the following:

— affected_plane;

— geometric_reference.

4.2.109.1 affected_plane

The affected_plane specifies the plane to apply the Linear_profile_tolerance. The affected_plane need not be specified for a particular Linear_profile_tolerance. See 4.3.1054.3.104 for the application assertion.

4.2.109.2 geometric_reference

The geometric_reference specifies the datum to which the tolerance is related. See for the application assertion.

4.2.110 Location_dimension_tolerance

A Location_dimension_tolerance is a type of Location_tolerance (see 4.2.112) that is the allowable variation in locating one feature of a part with respect to another.

The data associated with a Location_dimension_tolerance are the following:

- directed;
- plane_and_direction.

4.2.110.1 directed

The directed specifies a logical value designating the importance of direction for measuring a location_dimension_tolerance. If value is TRUE, location_dimension_tolerance is measured from point of origin to point of termination, if FALSE, an in tolerance result shall occur regardless of direction of measurement.

4.2.110.2 plane_and_direction

The plane_and_direction specifies a plane that contains the geometry for the Location_dimension_tolerance and a direction that is the location of the plane that contains the Location_dimension_tolerance. The plane_and_direction need not be specified for a particular Location_dimension_tolerance. See 4.3.106 for the application assertion.

EXAMPLE - A part might be viewed in a front view for defining a location_dimension_tolerance.

4.2.111 Location_element

A Location_element is a type of Shape_element (see 4.2.186) that is a Shape_aspect representation for a reference point.

4.2.112 Location_tolerance

A Location_tolerance is a type of Dimensional_tolerance (see 4.2.67) that defines tolerances that are an allowable variation in location between an origin shape and a termination shape. Each Location_tolerance is either an Angular_dimensional_tolerance (see 4.2.3), Location_dimension_tolerance (see 4.2.110), or Distance_along_curve_tolerance (see 4.2.70). The data associated with a Location_tolerance are the following:

- origin_shape;
- termination_shape.

4.2.112.1 origin_shape

The origin_shape specifies the shape on the Part that defines the starting position for a Location_tolerance. See 4.3.107 for the application assertion.

4.2.112.2 termination_shape

The termination_shape specifies the shape on the Part that defines the ending position for a Location_tolerance. See 4.3.107 for the application assertion.

4.2.113 Machining_feature

A Machining_feature is a type of Manufacturing_feature (see 4.2.114) that identifies a volume of material that shall be removed to obtain the final part geometry from the initial stock. Machining_features requires both direction and location in placing them on a part. Each Machining_feature may be one of the following: Knurl (see 4.2.105), Multi_axis_feature (see 4.2.119), Outer_round (see 4.2.130), Revolved_feature (see 4.2.173), Thread (see 4.2.208), Marking (see 4.2.116), Spherical_cap (see 4.2.193), or a Compound_feature (see 4.2.40). The data associated with a Machining_feature are the following:

- placement;
- usage_name.

4.2.113.1 placement

The placement specifies the position and orientation of a Machining_feature relative to the base shape for a part. See 4.3.108 for the application assertion.

4.2.113.2 usage_name

The usage_name specifies a user defined name that is additional information about the use of a feature. The usage_name need not be specified for a particular Machining_feature.

4.2.114 Manufacturing_feature

A Manufacturing_feature is a type of Shape_element (see 4.2.186) that identifies the types of features necessary to manufacture a machined part. Each Manufacturing_feature is either a Machining_feature (see 4.2.113), a Replicate_feature (see 4.2.172), or a Transition_feature (see 4.2.219).

4.2.115 Manufacturing_feature_group

A Manufacturing_feature_group specifies the collection of manufacturing features with a usage identification. A Manufacturing_feature_group shall allow for the collection of collections.

EXAMPLE - A Manufacturing_feature_group may be used to group together all of the hold down holes for a part.

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The data associated with a `Manufacturing_feature_group` are the following:

- `feature_groups`;
- `group_description`;
- `group_name`.

4.2.115.1 `feature_groups`

The `feature_group` specifies the list of `Manufacturing_feature` (see 4.2.114) or the `Manufacturing_feature_group` (see 4.2.115) to be grouped. See 4.3.109 and 4.3.110 for the application assertion.

4.2.115.2 `group_description`

The `group_description` specifies additional text information about the `Manufacturing_feature_group`.

4.2.115.3 `group_name`

The `group_name` specifies identification for the `Manufacturing_feature_group`.

4.2.116 Marking

A `Marking` is a type of `Machining_feature` (see 4.2.113) that is one or more text characters on a surface of a part. Each `Marking` is either a `Defined_marking` (see 4.2.59) or a `Catalogue_marking` (see 4.2.23).

The data associated with a `Marking` are the following:

- `applied_to_shape`;
- `text`.

4.2.116.1 `applied_to_shape`

The `applied_to_shape` specifies a base shape for applying the `Marking` feature. See 4.3.112 for the application assertion.

4.2.116.2 `text`

The `text` specifies the characters that will be applied to the part. See 4.3.111 for the application assertion.

4.2.117 Material_condition_modifier

A Material_condition_modifier is a description of a condition for a part surface, it is an indication whether the maximum material principle is to be applied respectively to the tolerated feature, the datum feature, or both. Tolerances of position are determined by a material condition of a mating surface.

The data associated with a Material_condition_modifier are the following:

— material_type.

4.2.117.1 material_type

The material_type specifies the type of condition allowed for the Material_condition_modifier.

EXAMPLE - maximum material condition (MMC), least material condition (LMC) and regardless of feature size (RFS).

4.2.118 Measurement_Location

???

4.2.118.1 machine**4.2.118.2 name****4.2.119 Multi_axis_feature**

A Multi_axis_feature is a type of Machining_feature (see 4.2.113) that identifies milling features for a part, and not turned features. Each Multi_axis_feature may be one of the following: Boss (see 4.2.10), General_removal_volume (see 4.2.94), Hole (see 4.2.103), Rounded_end (see 4.2.179), Planar_face (see 4.2.144), Pocket (see 4.2.150), Profile_feature (see 4.2.154), Protrusion (see 4.2.158), Rib_top (see 4.2.176), Slot (see 4.2.189), and Step (see 4.2.197). The data associated with Multi_axis_feature are the following:

— maximum_feature_limit.

4.2.119.1 maximum_feature_limit

The maximum_feature_limit specifies a planar limitation for a feature. No portion of the feature shall exist beyond this planar definition. The normal to the plane shall be in the direction away from the Machining_feature. See 4.3.113 for the application assertion.

4.2.120 Ngon_base_shape

An Ngon_base_shape is a type of Implicit_base_shape_representation (see 4.2.104) that specifies the initial shape of the material is a polygon with any number of sides.

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The data associated with a Ngon_base_shape are the following:

- circumscribed_or_across_flats;
- corner_radius;
- diameter;
- number_of_sides.

4.2.120.1 circumscribed_or_across_flats

The circumscribed_or_across_flats specifies the type of diameter being used to define the Ngon_profile. Circumscribed is the diameter that the Ngon_base_shape fits inside of, with the corners on the circle that defines the diameter. Across flats, is the diameter that fits inside of the Ngon_profile with the sides of the shape being tangent to the circle that defines the diameter.

4.2.120.2 corner_radius

The corner_radius specifies the size of an arc blend between two sides of the ngon. See 4.3.114 for the application assertion.

4.2.120.3 diameter

The diameter specifies the size of either the circumscribed diameter, or the diameter across the flats. See 4.3.114 for the application assertion.

4.2.120.4 number_of_sides

The number_of_sides specifies how many sides are needed for the Ngon. See 4.3.114 for the application assertion.

4.2.121 Ngon_profile

An Ngon_profile is a type of Closed_profile (see 4.2.37) that is an enclosed area bounded by three or more connected straight line sides. The orientation is at the center of the profile with one side of the ngon parallel to the X-axis crossing the Y-axis at a negative value.

The data associated with a Ngon_profile are the following:

- circumscribed_or_across_flats;
- corner_radius;
- diameter;
- number_of_sides.

4.2.121.1 circumscribed_or_across_flats

The circumscribed_or_across_flats specifies the type of diameter being used to define the Ngon_profile. Circumscribed is the diameter that the Ngon_base_shape fits inside of, with the corners on the circle that defines the diameter. Across flats, is the diameter that fits inside of the Ngon_profile with the sides of the shape being tangent to the circle that defines the diameter.

4.2.121.2 corner_radius

The corner_radius specifies the size of an arc blend between two sides of the ngon. See 4.3.115 for the application assertion.

4.2.121.3 diameter

The diameter specifies specifies the size of either the circumscribed diameter, or the diameter across the flats. See 4.3.115 for the application assertion.

4.2.121.4 number_of_sides

The number_of_sides specifies how many sides are needed for the Ngon. See 4.3.115 for the application assertion.

4.2.122 Numeric_parameter

A Numeric_parameter is a type of Property_parameter (see 4.2.157) that a numeric value with units of the property being defined. A Numeric_parameter is either a Numeric_parameter or a Numeric_parameter_with_tolerance (see 4.2.123). The data associated with a Numeric_parameter are the following:

- parameter_units;
- parameter_value.

4.2.122.1 parameter_units

The parameter_units specifies the quantity of measure in which the value is given.

EXAMPLE - watt, meters, degrees, etc.

4.2.122.2 parameter_value

The parameter_value specifies the numeric amount associated with the units of a specific characteristic of interest.

4.2.123 Numeric_parameter_with_tolerance

A `Numeric_parameter_with_tolerance` is a type of `Numeric_parameter` (see 4.2.122) with an implied tolerance value.

NOTE - A thread has a implicit definition for the `minor_diameter` attribute. This attribute has no explicit geometry definition, so the dimensional tolerance of this attribute is represented with `Numeric_parameter_with_tolerance`.

The data associated with a `Numeric_parameter_with_tolerance` are the following:

— `implicit_tolerance`.

4.2.123.1 implicit_tolerance

The `implicit_tolerance` specifies the type of tolerance to apply to a numeric parameter value. See 4.3.116 and 4.3.117 for the application assertion.

4.2.124 Open_profile

An `Open_profile` is a type of `Profile` (see 4.2.153) that is an outline or shape with no enclosing or confining bounds. The open ends of the profile may extend infinitely. Each `Open_profile` is either a `General_open_profile` (see 4.2.87), `Linear_profile` (see 4.2.108), `Partial_circular_profile` (see 4.2.136), `Rounded_U_profile` (see 4.2.180), `Square_U_profile` (see 4.2.196), `Tee_profile` (see 4.2.207), or a `Vee_profile` (see 4.2.224). The data associated with an `Open_profile` are the following:

— `profile_limit`.

4.2.124.1 profile_limit

The `profile_limit` specifies a planar limitation for a feature. No portion of the profile shall exist beyond this planar definition. The normal to the plane shall be in the direction away from the `Open_profile`. See 4.3.118 for the application assertion.

4.2.125 Open_slot_end_type

An `Open_slot_end_type` is a type of `Slot_end_type` (see 4.2.190) that is an end condition of a slot that shall pass through the end of the part.

4.2.126 Organisation

???

4.2.126.1 address

4.2.126.2 id

4.2.126.3 short_name

4.2.126.4 long_name

4.2.127 Orientation

An Orientation is the direction and location of the basic shape of a part, feature on the part, or of the component of a feature which are Profile objects and Path objects. The data associated with an Orientation are the following:

- axis;
- location.

4.2.127.1 axis

The axis specifies a line in 3D space about which the part or portions of the part are arranged.

4.2.127.2 location

The location specifies a point in 3D space used to position the part or portions of the part.

4.2.128 Outer_diameter

An Outer_diameter is a type of Outer_round (see 4.2.130) that is a sweeping of an outline specified by a line segment one complete revolution about an axis. The line is finite in length, coplanar with the axis. An Outer_diameter may have a constant diameter around the axis of rotation, or it may be tapered.

The data associated with an Outer_diameter are the following:

- diameter;
- feature_length;
- reduced_size.

4.2.128.1 diameter

The diameter specifies the maximum diametric size of an Outer_diameter feature. See 4.3.119 for the application assertion.

4.2.128.2 feature_length

The length specifies the size of a Outer_diameter feature, measured along the feature's axis. See 4.3.119 for the application assertion.

4.2.128.3 reduced_size

The `reduced_size` specifies the constant change in the `Outer_diameter` along the feature length. See 4.3.120, 4.3.121 and 4.3.122 for the application assertion.

4.2.129 Outer_diameter_to_shoulder

An `Outer_diameter_to_shoulder` is a type of `Outer_round` (see 4.2.130) that is a sweeping of a shape one complete revolution about an axis. The shape shall be specified by two lines that connect at a point and extend infinitely. The enclosed angle shall be smaller than a straight angle. The intersection of the two lines need not be blended with a radius.

The data associated with an `Outer_diameter_to_shoulder` are the following:

- `diameter`;
- `feature_length`;
- `v_shape_boundary`.

4.2.129.1 diameter

The `diameter` specifies the size of the part at the point of the Vee, or where the two sides come together, swept about an axis of rotation. See 4.3.123 for the application assertion.

4.2.129.2 feature_length

The `feature_length` specifies the size of a `Outer_diameter` `feature_to_shoulder`, measured along the feature's axis. See 4.3.123 for the application assertion.

4.2.129.3 v_shape_boundary

The `v_shape_boundary` specifies an outline or shape that shall be revolved about an axis. The `Vee_profile` specifies the revolved shape required by an `Outer_diameter_to_shoulder`. The placement of the profile shall be along the X-axis of the `Outer_diameter_to_shoulder` at a specified distance away from the origin. The orientation of the Y-axis of the `Vee_profile` shall be the same as the Y-axis of the `Outer_diameter_to_shoulder` and the X-axis of the `Vee_profile` shall be the same as the Z-axis of the `Outer_diameter_to_shoulder`. See 4.3.124 for the application assertion.

4.2.130 Outer_round

An `Outer_round` is a type of `Machining_feature` (see 4.2.113) that is an outline or significant shape that is swept through a complete revolution about an axis. Each `Outer_round` is either an `Outer_diameter` (see 4.2.128) or an `Outer_diameter_to_shoulder` (see 4.2.129). The axis of revolution shall be the same as the Z-axis of the feature.

4.2.131 Parallelism_tolerance

A Parallelism_tolerance is a type of Geometric_tolerance (see 4.2.99) that is the condition of a surface equidistant at all points from a datum plane or an axis equidistant along its length to a datum axis or plane. A Parallelism_tolerance specifies one of the following:

- A tolerance zone defined by two planes or lines parallel to a datum plane, or axis, within which the line elements of the surface or axis shall lie.
- A cylindrical tolerance zone whose axis is parallel to a datum axis within which the axis shall lie

NOTE 1- illustrates Parallelism_tolerance for a plane.

NOTE 2 - illustrates Parallelism_tolerance for an axis.

NOTE 3 - The Parallelism_tolerance definition is derived from paragraph 14.7 of ISO 1101.

The data associated with a Parallelism_tolerance are the following:

- affected_plane;
- geometric_reference;
- segment_size.

4.2.131.1 affected_plane

The affected_plane specifies the plane to apply the tolerance value. The affected_plane is equivalent to a 2D drawing view. The affected_plane need not be specified for a particular Parallelism_tolerance. See 4.3.126 for the application assertion.

4.2.131.2 geometric_reference

The geometric_reference specifies the datum to which the tolerance is related. See 4.3.125 for the application assertion.

4.2.131.3 segment_size

The segment_size specifies the length of a surface to apply a tolerance if the Parallelism_tolerance is not applied to the total length. A segment_size need not be specified for a particular Parallelism_tolerance.

4.2.132 Parameter_Calculated_Value

???

4.2.132.1 calculated_value

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4.2.132.2 specification

4.2.133 Part

???

4.2.133.1 physical_form

4.2.133.2 part_id

4.2.133.3 part_revision_id

4.2.133.4 art_name

4.2.133.5 part_description

4.2.133.6 security_classification

4.2.133.7 serial_number_dml

4.2.133.8 lot_number_dml

4.2.133.9 vendor_dml

4.2.134 Partial_area_definition

A Partial_area_definition is the limitations of a surface for applying a Machining_feature. Thread and Knurl features are applied to cylindrical shapes. Partial_area_definition places a limitation on how much and where to apply the feature on the cylindrical shape.

NOTE - illustrates a Defined_thread with a Partial_area_definition. The drawing call out '5.12 MIN.THREAD' defines the amount of cylindrical shape that has the thread applied.

The data associated with a Partial_area_definition are the following:

- effective_length;
- maximum_length;
- placement.

4.2.134.1 effective_length

The effective_length specifies the length of the thread which is usable by the feature. When applied to a

knurl the effective_length defines the overall length of the knurl. The effective_length is not required for a Knurl feature. See 4.3.127 for the application assertion.

4.2.134.2 maximum_length

The maximum_length specifies the dimension along a surface to apply a feature. A Thread is a type of Machining_features that is applied to a surface. The dimensional distance limits the length along the surface axis for defining these feature objects. A knurl does not require maximum_length. The maximum_length need not be specified for a particular Partial_area_definition. See 4.3.127 for the application assertion.

4.2.134.3 placement

The placement specifies where to locate the Partial_area_definition. See 4.3.128 for the application assertion.

4.2.135 Partial_circular_path

A Partial_circular_path is a type of Circular_path (see 4.2.33) that is a direction of travel along an arc of constant radius around an axis. The path shall begin and end at different points on the arc.

NOTE - illustrates two Slot feature with a Square_U_profile and a Partial_circular_paths.

The data associated with a Partial_circular_path are the following:

— sweep_angle.

4.2.135.1 sweep_angle

The sweep_angle specifies the size of the angle to define an arc shaped path. See 4.3.129 for the application assertion.

4.2.136 Partial_circular_profile

A Partial_circular_profile is a type of Open_profile (see 4.2.124) that is specified by an arc. The arc shall be a constant radius swept about a point. The orientation of the profile shall be positioned at the origin of the arc, with one end point of the arc on the X-axis.

The data associated with a Partial_circular_profile are the following:

— radius;

— sweep_angle.

4.2.136.1 radius

The radius specifies the size of the arc to define a Partial_circular_profile. See 4.3.130 for the application assertion.

4.2.136.2 sweep_angle

The sweep_angle specifies the size of the angle to define an circular shaped profile. See 4.3.130 for the application assertion.

4.2.137 Partial_circular_shape_profile

A Partial_circular_shape_profile is a type of Shape_profile (see 4.2.187) that defines a volume that is not enclosed on all sides. The data associated with a Partial_circular_shape_profile are the following:

— open_boundary.

4.2.137.1 open_boundary

The open_boundary specifies the outline of the Shape_profile feature. The outline defines an area that shall be circular and shall not be enclosed. The placement of the open_boundary shall be with the origin of the Path, that defines the profile, at the origin of the Partial_circular_shape_profile. The X-axis and Y-axis of the profile shall be the same as the X-axis and Y-axis of the Partial_circular_shape_profile. See 4.3.131 for the application assertions.

4.2.138 Path

A Path is a continuous set of curves that define a direction of travel. These curves do not intersect or duplicate themselves. A Path shall have its own orientation which may be the same orientation as the Machining_feature which requires it as a part of a feature definition. The orientation of a Path may be the same orientation as the Machining_feature. Each Path is either a Circular_path (see 4.2.33), General_path (see 4.2.89), or a Linear_path (see 4.2.107). The data associated with a Path are the following:

— placement.

4.2.138.1 placement

The placement specifies where to locate the Path. See 4.3.132 for the application assertion.

4.2.139 Path_element

A Path_element is a type of Shape_element (see 4.2.186) that is a continuous set of geometric curve that represent the path for a particular Machining_feature.

4.2.140 Perpendicularity_tolerance

A Perpendicularity_tolerance is a type of Geometric_tolerance (see 4.2.99) that is the amount of deviation of a surface to a perpendicular to a datum. The actual surface shall lie within two planes a tolerance apart

and perpendicular to a datum surface.

NOTE 1 - illustrates a Perpendicularity_tolerance.

NOTE 2 - The Perpendicularity_tolerance definition is derived from paragraph 14.8 of ISO 1101.
The data associated with a Perpendicularity_tolerance are the following:

- affected_plane;
- geometric_reference;
- segment_size.

4.2.140.1 affected_plane

The affected_plane specifies the plane to apply the tolerance value. The affected_plane is equivalent to a 2D drawing view. The affected_plane need not be specified for a particular Perpendicularity_tolerance. See 4.3.134 for the application assertion.

4.2.140.2 geometric_reference

The geometric_reference specifies the datum to which the tolerance is related. See 4.3.133 for the application assertion.

4.2.140.3 segment_size

The segment_size specifies the length of a surface to apply a tolerance if the Perpendicularity_tolerance is not applied to the total length. The segment_size need not be specified for a particular Perpendicularity_tolerance.

4.2.141 Person_In_Orgaisation

???

4.2.141.1 id

4.2.141.2 first_name

4.2.141.3 last_name

4.2.141.4 middle_names

4.2.141.5 prefix_titles

4.2.141.6 suffix_titles

4.2.141.7 address

4.2.142 Placed_target

A Placed_target is a type of Datum_target (see 4.2.56) that is the implicit definition of a Datum_target. A Placed_target is either a Target_point (see 4.2.205), Target_line (see 4.2.204), Target_rectangle (see 4.2.206), or a Target_circle (see 4.2.203). The data associated with Placed_target are the following:

— placement.

4.2.142.1 placement

The placement specifies location and orientation for the implicit definitions of the types of Placed_target. See 4.3.135 for the application assertion.

4.2.143 Planar_element

A Planar_element is a type of Shape_element (see 4.2.186) that is a flat surface. The data associated with a Planar_element are the following:

— location;

— normal.

4.2.143.1 location

The location specifies the position of the planar surface. See 4.3.137 for the application assertion.

4.2.143.2 normal

The normal specifies the vector which indicates the normal of a plane being defined for the planar surface. See 4.3.136 for the application assertion.

4.2.144 Planar_face

A Planar_face is a type of Multi_axis_feature(see 4.2.119) that is an unbounded planar cut of a part. The Planar_face shall have an orientation such that the Z-axis is the direction away from the part.

NOTE - illustrates the Planar_face.

The data associated with a Planar_face are the following:

— course_of_travel;

— face_boundary;

- removal_boundary;
- removal_direction;
- volume_not_removed.

4.2.144.1 course_of_travel

The `course_of_travel` specifies a straight line with magnitude and direction. The placement and orientation of the `Linear_path` shall be the same as the `Planar_face` feature. See 4.3.140 for the application assertion.

4.2.144.2 face_boundary

The `face_boundary` specifies the complete or partial outside final shape of the part after the planar cut has been applied. A `Planar_face` may but need not require `face_boundary` to be defined. See 4.3.138 for the application assertion.

4.2.144.3 removal_boundary

The `removal_boundary` specifies a line with direction and magnitude that when swept along a path defines the area on a part for volume removal. The orientation and placement of the `Linear_profile` shall be the same as the `Planar_face`. See for the application assertion.

4.2.144.4 removal_direction

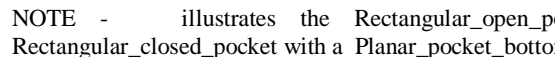
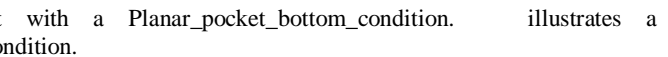
The `removal_direction` specifies the direction of material removal from the `Planar_face` feature. See 4.3.141 for the application assertion.

4.2.144.5 volume_not_removed

The `volume_not_removed` specifies an amount of material that is not to be removed from the pocket. The `Boss` feature defines the shape of the material that is to remain in the pocket. See 4.3.142 or 4.3.143 for the application assertion.

4.2.145 Planar_pocket_bottom_condition

A `Planar_pocket_bottom_condition` is a type of `Pocket_bottom_condition` (see 4.2.151) that characterizes the bottom of a pocket which is flat.

NOTE -  illustrates the `Rectangular_open_pocket` with a `Planar_pocket_bottom_condition`.  illustrates a `Rectangular_closed_pocket` with a `Planar_pocket_bottom_condition`.

The data associated with a `Planar_pocket_bottom_condition` are the following:

- floor_location;
- floor_normal;

— floor_radius.

4.2.145.1 floor_location

The floor_location specifies the position of the bottom of a pocket feature for a planar floor. See 4.3.145 for the application assertion.

NOTE - illustrates the Rectangular_open_pocket with a Planar_pocket_bottom_condition and a floor_location.

4.2.145.2 floor_normal

The floor_normal specifies the vector which indicates the normal of a plane being defined for the bottom of a pocket. See 4.3.144 for the application assertion.

NOTE - illustrates the Rectangular_open_pocket with a Planar_pocket_bottom_condition and a floor_normal.

4.2.145.3 floor_radius

The floor_radius specifies the amount of curvature for an arc between the bottom and the sides of a Pocket feature. See 4.3.146 for the application assertion.

4.2.146 Planar_profile_floor

A Planar_profile_floor is a type of Profile_floor (see 4.2.155) that characterizes the bottom of a Shape_profile feature which is flat.

NOTE - illustrates a Shape_profile with a Planar_profile_floor.

The data associated with a Planar_profile_floor are the following:

— floor.

4.2.146.1 floor

A floor specifies a planar floor for the Shape_profile (see 4.2.187) feature. The normal to the plane shall be in the direction away from the Planar_profile_floor feature. See 4.3.147 for the application assertion.

4.2.147 Planar_rib_top_floor

A Planar_rib_top_floor is a type of Rib_top_floor (see 4.2.177) that is the bottom of a Rib_top (see 4.2.176) which is flat. The data associated with a Planar_rib_top_floor are the following:

— boundary;

— floor_face.

4.2.147.1 boundary

The boundary specifies the complete or partial outside final shape of the Rib_top feature. See 4.3.148 for the application assertion.

4.2.147.2 floor_face

A floor_face specifies a planar floor for the Rib_top (see 4.2.176) feature. The normal to the plane shall be in the direction away from the Rib_top feature. See 4.3.149 for the application assertion.

4.2.148 Planar_top_condition

A Planar_top_condition is a type of Boss_top_condition (see 4.2.11) for a Boss that is flat.

NOTE - illustrates a Circular_boss with a Planar_top_condition.

The data associated with a Planar_top_condition are the following:

- top_location;
- top_normal.

4.2.148.1 top_location

The top_location specifies the position of the top of a boss feature for a planar top. See 4.3.151 for the application assertion.

4.2.148.2 top_normal

The top_normal specifies the vector that indicates the normal of a plane being defined for the top of a boss. See 4.3.150 for the application assertion.

4.2.149 Plus_minus_value

The Plus_minus_values is the upper and lower limits or tolerance value applied directly to a dimension. When applied to a Dimensional_tolerance, the dimensional_value is the tolerance value. When applied to a Numeric_parameter_with_tolerance, the parameter_value is the tolerance value.

EXAMPLE - An illustration of Dimensional_tolerance with a Plus_minus_value is $10 +.005 / -.002$.

The data associated with a Plus_minus_value are the following:

- lower_limit;
- significant_digits;
- upper_limit.

4.2.149.1 lower_limit

The lower_limit specifies the low limit value.

4.2.149.2 significant_digits

The significant_digits specifies the number of decimal places indicating the accuracy of a dimension or tolerance.

4.2.149.3 upper_limit

The upper_limit specifies the high limit value.

4.2.150 Pocket

A Pocket is a type of Multi_axis_feature(see 4.2.119) that is a volume with a specific shape, removed from the part. The sides of a pocket may be parallel to the pocket's orientation vector coming out of the pocket or the sides may be tapered. The placement may be at the bottom of the Pocket with the Z-axis in the direction out of the pocket or at the top of the pocket with the Z-axis in the direction into the pocket. Each Pocket is either a Cutout (see 4.2.50), General_pocket (see 4.2.91), Recess (see 4.2.161), Rectangular_closed_pocket (see 4.2.163), or a Rectangular_open_pocket (see 4.2.168).

The data associated with a Pocket are the following:

- base_radius;
- bottom_condition;
- change_in_boundary;
- pocket_depth.

4.2.150.1 base_radius

The base_radius specifies a radius shape blend between a Pocket and the surrounding Part surface at the top of the Pocket. See 4.3.155 for the application assertion.

4.2.150.2 bottom_condition

The bottom_condition specifies the shape of the bottom of a Pocket feature. See 4.3.156 and 4.3.157 for the application assertions.

4.2.150.3 change_in_boundary

The change_in_boundary specifies a taper that defines the change in shape of the Pocket. The

change_in_boundary need not be specified for a particular Pocket. See 4.3.152 and 4.3.153 for the application assertion.

4.2.150.4 pocket_depth

The pocket_depth specifies an measured distance from the bottom of a pocket to a point that is outside of the pocket feature. Pocket_depth places a limitation on the Pocket definition so not to interfere with other features that might be nearby. The placement and orientation of the Linear_path that defines pocket_depth shall be the same as the Pocket feature. See 4.3.154 for the application assertion.

EXAMPLE - If a portion of the part should extend over the top of the pocket feature, the depth value would not interfere with it.

4.2.151 Pocket_bottom_condition

A Pocket_bottom_condition specifies the bottom state for a pocket. The Pocket bottom may be flat, or any arbitrary shape, or the pocket may pass through the part. Each Pocket_bottom_condition is either a General_pocket_bottom_condition (see 4.2.92), Planar_pocket_bottom_condition (see 4.2.145), or a Through_pocket_bottom_condition (see 4.2.210).

The data associated with a Pocket_bottom_condition are the following:

— start_or_end.

4.2.151.1 start_or_end

The start_or_end specifies a boolean value of TRUE if the Pocket_bottom_condition is positioned at the start of the of the defining Linear_path (see 4.2.107) for the Pocket, and a value of FALSE if it is at the end of the of the defining Linear_path for the Pocket.

4.2.152 Position_tolerance

A Position_tolerance is a type of Geometric_tolerance (see 4.2.99) that denotes a tolerance zone for a theoretically exact position_tolerance of a surface, and is established with respect to a datum.

NOTE 1 - illustrates the Position_tolerance.

NOTE 2 - The Position_tolerance definition is derived from paragraph 14.10 of ISO 1101.

The data associated with a Position_tolerance are the following:

— affected_plane;

— geometric_reference;

— value_qualifier.

4.2.152.1 affected_plane

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The `affected_plane` specifies the plane to apply the tolerance value. The `affected_plane` is equivalent to a 2D drawing view. The `affected_plane` need not be specified for a particular `Position_tolerance`. See 4.3.159 for the application assertion.

4.2.152.2 geometric_reference

The `geometric_reference` specifies the datum to which the tolerance is related. See 4.3.158 for the application assertion.

4.2.152.3 value_qualifier

The `value_qualifier` specifies the type of tolerance. A `Position_tolerance` of `TRUE` is a diametric tolerance. A `Position_tolerance` of `FALSE` is not a diametric tolerance.

4.2.153 Profile

A Profile is a planar outline used in the definition of a feature. A Profile may be either open or closed. A Profile shall be in the X-Y plane and have an orientation that will position it in reference to a `Machining_feature`, which may require a profile as a part of its definition. Each Profile is either a `Closed_profile` (see 4.2.37) or an `Open_profile` (see 4.2.124) The data associated with a Profile are the following:

— `placement`.

4.2.153.1 placement

The `placement` specifies where to locate the Profile in reference to the Part orientation. See 4.3.160 for the application assertion.

4.2.154 Profile_feature

A `Profile_feature` is a type of `Multi_axis_feature` (see 4.2.119) that is the removal of excess material from the boundary shape of a part. Each `Profile_feature` is either a `General_outside_profile` (see 4.2.88), or a `Shape_profile` (see 4.2.187). The data associated with a `Profile_feature` are the following:

— `profile_swept_shape`.

4.2.154.1 profile_swept_shape

The `profile_swept_shape` specifies an implicit 2D line (see 4.2.108) definition that, when combined with a Profile, creates the shape of the `Profile_feature`. The `profile_swept_shape` places a limitation on the `Profile_feature` definition so not to interfere with other features that might be nearby. The placement of the `Linear_path` that defines `profile_sweep_shape` shall be the same as the `Profile_feature` feature. The orientation shall be with the Z-axis toward the direction of travel of the profile boundary, and the Y-axis in the direction away from the part material. See 4.3.161 for the application assertion.

EXAMPLE - If a portion of the part should extend over the top of the Profile_feature, the depth value would not interfere with it.

4.2.155 Profile_floor

A Profile_floor is the bottom condition for a Shape_profile (see 4.2.187) The Profile_floor may be flat, or any arbitrary shape. Each Profile_floor is either a General_profile_floor (see 4.2.93), or a Planar_profile_floor (see 4.2.146). The data associated with a Profile_floor are the following:

- floor_radius;
- start_or_end.

4.2.155.1 floor_radius

The floor_radius specifies the radius of curvature for an arc between the bottom and the sides of a Pocket feature. See 4.3.162 for the application assertion.

4.2.155.2 start_or_end

The start_or_end specifies a boolean value of TRUE if the Profile_floor is positioned at the end of a Shape_profile, and a value of FALSE if it is at the start of the Shape_profile.

4.2.156 Projection

A Projection is an extension of a feature from the part so that a tolerance zone can be created. A feature is extended from one end of a feature for a specified length. The data associated with a Projection are the following:

- projection_end;
- projection_length.

4.2.156.1 projection_end

The projection_end specifies the physical shape that is the extension of a feature. See 4.3.163 for the application assertion.

4.2.156.2 projection_length

The projection_length specifies the amount to extend the end of a feature.

4.2.157 Property_parameter

A Property_parameter is an element of information that describes a characteristic that comprises the property. Each Property_parameter may be one of the following: Descriptive_parameter (see 4.2.62) or a Numeric_parameter (see 4.2.122). The data associated with a Property_parameter are the following:

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— parameter_name.

4.2.157.1 parameter_name

The parameter_name specifies a word or group of words that identify a characteristic of interest for a Property_parameter.

4.2.158 Protrusion

A Protrusion is a type of Multi_axis_feature(see 4.2.119) that is an arbitrary shape that extends out from a surrounding surface.

The data associated with a Protrusion are the following:

— shape_volume.

4.2.158.1 shape_volume

The shape_volume specifies the arbitrary shape that defines the shape of a Protrusion. See 4.3.164 for the application assertion.

4.2.159 Radial_dimension_tolerance

A Radial_dimension_tolerance is a type of Size_tolerance (see 4.2.188) that is the allowable variation for the radial distance from the center of a circular curve to a point on the curve.

4.2.160 Radiused_slot_end_type

A Radiused_slot_end_type is a type of Slot_end_type (see 4.2.190) that is an end condition of a slot that shall be a cylindrical shape tangent to both of the adjacent Slot wall surfaces.

4.2.161 Recess

A Recess is a type of a Pocket (see 4.2.150) that has a bottom, and a floor radius, but the sides of the pocket shall be no higher than the floor radius. The Recess shall not pass entirely through the part but shall have a floor bottom. The type of bottom condition shall be a Pocket bottom_condition (see 4.2.151).

The data associated with a Recess are the following:

— bottom_condition;

— fillet_boundary;

— volume_not_removed.

4.2.161.1 bottom_condition

The `bottom_condition` specifies the shape of the bottom of a Recess feature. The `bottom_condition` shall not pass entirely through the part. See 4.3.166 for the application assertion.

4.2.161.2 `fillet_boundary`

The `fillet_boundary` specifies an outline or shape that is an enclosed area that shall be a close profile. The profile specifies the area required by a Recess. The placement of the `fillet_boundary` shall be with the origin of the Profile at the origin of the Recess. The X-axis and Y-axis of the profile shall be the same as the X-axis and Y-axis of the Recess. See 4.3.165 for the application assertion.

4.2.161.3 `volume_not_removed`

The `volume_not_removed` specifies an amount of material that is not to be removed from the pocket. The Boss feature defines the shape of the material that is to remain in the recess 4.3.167 or 4.3.168 for the application assertion.

4.2.162 `Rectangular_boss`

A `Rectangular_boss` is a type of Boss (see 4.2.10) that is an enclosed volume with opposite sides that are equal in length.

NOTE - illustrates the `Rectangular_boss`. The lengths are determined in the profile view of the Boss.

The data associated with a `Rectangular_boss` are the following:

- `change_in_boundary`;
- `rectangular_profile`.

4.2.162.1 `change_in_boundary`

The `change_in_boundary` specifies a taper that defines the change in shape of the `Rectangular_boss`. The `change_in_boundary` need not be specified for a particular `Rectangular_boss`. See 4.3.169 and 4.3.170 for the application assertion.

4.2.162.2 `rectangular_profile`

The `rectangular_profile` specifies an enclosed area bounded by four sides with opposite sides equal in length and corners at 90 degrees. The orientation is at the center of the rectangle, the X-axis is parallel to the length of the rectangle and the Y-axis is parallel to the width. See 4.3.171 for the application assertion.

4.2.163 `Rectangular_closed_pocket`

A `Rectangular_closed_pocket` is a type of Pocket (see 4.2.150) that is an enclosed volume with opposite sides that are equal in length.

The data associated with a `Rectangular_closed_pocket` are the following:

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- closed_boundary;
- volume_not_removed.

4.2.163.1 closed_boundary

The closed_boundary specifies the outline or shape that is an enclosed area that has a completely closed profile. The profile specifies the area required by a Rectangular_closed_pocket. The placement of the closed_boundary shall be with the origin of the profile at the origin of the pocket. The X-axis and Y-axis of the profile shall be the same as the X-axis and Y-axis of the Rectangular_closed_pocket. See 4.3.172 for the application assertion.

4.2.163.2 volume_not_removed

The volume_not_removed specifies an amount of material that is not to be removed from the pocket. The Boss feature defines the shape of the material that is to remain in the pocket. See 4.3.173 or 4.3.174 for the application assertion.

4.2.164 Rectangular_closed_profile

A Rectangular_closed_profile is a type of Closed_profile (see 4.2.37) that is an enclosed area bounded by four sides with opposite sides equal in length and corners at 90 degrees. The orientation is at the center of the rectangle, the X-axis is parallel to the length of the rectangle and the Y-axis is parallel to the width.

NOTE - illustrates the Rectangular_closed_profile.

The data associated with a Rectangular_closed_profile are the following:

- corner_radius;
- profile_length;
- profile_width.

4.2.164.1 corner_radius

The corner_radius specifies the size of the arc in all four corners of the rectangular profile. See 4.3.175 for the application assertion.

4.2.164.2 profile_length

The profile_length specifies the length of the side, along the X-axis, of the rectangular profile. See 4.3.175 for the application assertion.

4.2.164.3 profile_width

The profile_width specifies the length of the side, along the Y-axis, of the rectangular profile. See 4.3.175

for the application assertion.

4.2.165 Rectangular_closed_shape_profile

The `Rectangular_closed_shape_profile` is a type of `Shape_profile` (see 4.2.187) that is an enclosed volume with opposite sides that are equal in length. The data associated with a `Rectangular_closed_shape_profile` are the following:

- `closed_boundary`.

4.2.165.1 closed_boundary

The `closed_boundary` specifies the outline or shape that is an enclosed area that has a completely closed profile. The profile specifies the area required by a `Rectangular_closed_shape_profile`. The placement of the `closed_boundary` shall be with the origin of the profile at the origin of the profile. The X-axis and Y-axis of the profile shall be the same as the X-axis and Y-axis of the `Rectangular_closed_shape_profile`. See 4.3.176 for the application assertion.

4.2.166 Rectangular_offset_pattern

A `Rectangular_offset_pattern` is a modification of the placement of a particular occurrence of the base feature in a `Rectangular_pattern` relative to its expected placement.

NOTE - illustrates the `Rectangular_offset_pattern`.

The data associated with a `Rectangular_offset_pattern` are the following:

- `column_index`;
- `offset_direction`;
- `offset_distance`;
- `row_index`.

4.2.166.1 column_index

The `column_index` specifies the unique identification for a feature in a column of multiple features. See 4.3.178 for the application assertion.

4.2.166.2 offset_direction

The `offset_direction` specifies the direction to offset a base feature from its original position in the rectangular pattern. See 4.3.177 for the application assertion.

4.2.166.3 offset_distance

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The `offset_distance` specifies the amount of offset from a feature location in a `Rectangular_pattern` for placing another feature. See 4.3.178 for the application assertion.

4.2.166.4 `row_index`

The `row_index` specifies the unique identification for a feature in a `row` of multiple features. See 4.3.178 for the application assertion.

4.2.167 `Rectangular_omit_pattern`

A `Rectangular_omit_pattern` is an omission of a particular occurrence of the base feature in an `Rectangular_pattern`.

The data associated with a `Rectangular_omit_pattern` are the following:

- `column_index`;
- `row_index`.

4.2.167.1 `column_index`

The `column_index` specifies the unique identification for a feature in a `column` of multiple features. See 4.3.179 for the application assertion.

4.2.167.2 `row_index`

The `row_index` specifies the unique identification for a feature in a `row` of multiple features. See 4.3.179 for the application assertion.

4.2.168 `Rectangular_open_pocket`

A `Rectangular_open_pocket` is a type of `Pocket` (see 4.2.150) that is an open profile with opposite sides that are of equal length and with one side that does not make contact with the part. The open boundary is defined by a `Square_U_profile` (see 4.2.196) such that, when swept along a path, the profile defines the area on a part for volume removal. The orientation and placement of the `Square_U_profile` shall be the same as the `Rectangular_open_pocket`.

The data associated with a `Rectangular_open_pocket` are the following:

- `open_boundary`;
- `volume_not_removed`.

4.2.168.1 `open_boundary`

The `open_boundary` specifies the outline or shape that is an enclosed area that is open on one side. The profile specifies the area required by a `Rectangular_open_pocket`. The placement of the open boundary shall be with the origin of the profile at the origin of the pocket. The X-axis and Y-axis of the profile

shall be the same as the X-axis and Y-axis of the Rectangular_open_pocket. See 4.3.182 for the application assertion.

4.2.168.2 volume_not_removed

The volume_not_removed specifies an amount of material that is not to be removed from the pocket. The Boss feature defines the shape of the material that is to remain in the pocket. See 4.3.180 or 4.3.181 for the application assertion.

4.2.169 Rectangular_open_shape_profile

The Rectangular_open_shape_profile is a type of Shape_profile (see 4.2.187) that is an open profile with opposite sides that are of equal length and with one side that does not make contact with the part. The data associated with a Rectangular_open_shape_profile are the following:

— open_boundary.

4.2.169.1 open_boundary

The open_boundary specifies the outline or shape that is an enclosed area that is open on one side. The profile specifies the area required by a Rectangular_open_shape_profile. The placement of the open_boundary shall be with the origin of the profile at the origin of the feature. The X-axis and Y-axis of the profile shall be the same as the X-axis and Y-axis of the Rectangular_open_shape_profile. See 4.3.183 for the application assertion.

4.2.170 Rectangular_pattern

A Rectangular_pattern is a type of Replicate_feature (see 4.2.172) that is a shape component arranged in a pattern of rows and columns.

The data associated with a Rectangular_pattern are the following:

- column_layout_direction;
- column_spacing;
- columns;
- missing_base_feature;
- relocated_base_feature;
- row_layout_direction;
- row_spacing;
- rows.

4.2.170.1 column_layout_direction

The `column_layout_direction` specifies the linear direction for defining the columns of the pattern. See 4.3.184 for the application assertion.

4.2.170.2 column_spacing

The `column_spacing` specifies the amount of space between features in a `Rectangular_pattern` column. See 4.3.185 for the application assertion.

4.2.170.3 columns

The `columns` specifies the number of columns for placing features in the `Rectangular_pattern`. See 4.3.185 for the application assertion.

4.2.170.4 missing_base_feature

The `missing_base_feature` specifies the definition to remove any number of base features from the `Rectangular_pattern`. The `missing_base_feature` need not be specified for a particular `Rectangular_pattern`. There may be more than one `missing_base_feature` for a `Rectangular_pattern`. See 4.3.187 for the application assertion.

4.2.170.5 relocated_base_feature

The `relocated_base_feature` specifies the definition to offset any number of base features from the `Rectangular_pattern`. The `relocated_base_feature` need not be specified for a particular `Rectangular_pattern`. There may be more than one `relocated_base_feature` for a `Rectangular_pattern`. See 4.3.186 for the application assertion.

4.2.170.6 row_layout_direction

The `row_layout_direction` specifies the linear direction for defining the rows of the pattern. See 4.3.184 for the application assertion.

4.2.170.7 row_spacing

The `row_spacing` specifies the amount of space between features in a `Rectangular_pattern` row. See 4.3.185 for the application assertion.

4.2.170.8 rows

The `rows` specifies the number of rows for placing features in the `Rectangular_pattern`. See 4.3.185 for the application assertion.

4.2.171 Replicate_base

A `Replicate_base` is the type of feature to be used as a base feature for reproduction. The `Replicate_base` shall have a base defined by either a `Machining_feature` (see 4.2.113) or a `Replicate_feature` (see 4.2.172). The data associated with a `Replicate_base` are the following:

- `base_feature`.

4.2.171.1 `base_feature`

The `base_feature` specifies the feature that will be reproduced by the `Replicate_feature`. The `base_feature` may be either a `Machining_feature` (see 4.2.113) or a `Replicate_feature` (see 4.2.172). See 4.3.188 and 4.3.189 for the application assertion.

4.2.172 `Replicate_feature`

A `Replicate_feature` is a type of `Machining_feature` (see 4.2.113) that is a basis shape, and the arrangement of identical copies of that base shape. Each base shape is a `Machining_feature` oriented to the first defined position of a pattern. The patterns describe how to replicate that feature to different placements on the part. Each `Replicate_feature` is either a `Circular_pattern` (see 4.2.34), `General_pattern` (see 4.2.90), or a `Rectangular_pattern` (see 4.2.170). The data associated with a `Replicate_feature` are the following:

- `placement`;

- `replicate_base_feature`.

4.2.172.1 `placement`

The `placement` specifies the position and orientation of a `Replicate_feature` relative to the base shape for a part. See 4.3.190 for the application assertion.

4.2.172.2 `replicate_base_feature`

The `replicate_base_feature` specifies the feature that will be replicated by the `Replicate_feature`. See 4.3.191 for the application assertion.

4.2.173 `Revolved_feature`

A `Revolved_feature` is a type of `Machining_feature` (see 4.2.113) that is a sweeping of a planar shape one complete revolution about an axis. The planar shape shall be finite in length, coplanar with the axis of revolution, and shall not intersect the axis of revolution. The axis of revolution shall be the same as the Z-axis of the feature. The `Revolved_feature` may be either an outer shape of a part or a volume removal, depending on the material direction. Each `Revolved_feature` is either a `General_revolution` (see 4.2.95), `Groove` (see 4.2.101), `Revolved_flat` (see 4.2.174), or a `Revolved_round` (see 4.2.175).

The data associated with a `Revolved_feature` are the following:

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- material_side;
- radius.

4.2.173.1 material_side

The material_side specifies the material direction. The direction of removal indicates the direction the material will be removed from the part. See 4.3.193 for the application assertion.

4.2.173.2 radius

The radius specifies the distance from the axis of rotation to define placement of the profile that will be swept about the axis. See 4.3.192 for the application assertion.

4.2.174 Revolved_flat

A Revolved_flat is a type of Revolved_feature (see 4.2.173) that is the sweeping of a straight line about an axis.

NOTE - illustrates the Revolved_flat.

The data associated with a Revolved_flat are the following:

- flat_edge_shape.

4.2.174.1 flat_edge_shape

The flat_edge_shape specifies the line with direction and magnitude that when revolved about an axis defines the area on a part for volume removal. The placement of the profile shall be along the X-axis of the Revolved_flat at a specified distance away from the origin. The Y-axis orientation of the Linear_profile shall be the same as the Y-axis of the Revolved_flat, the X-axis and Z-axis are independent of the orientation of the Revolved_flat feature. See 4.3.194 for the application assertion.

4.2.175 Revolved_round

A Revolved_round is a type of Revolved_feature (see 4.2.173) that is the sweeping of an arc about an axis.

NOTE - illustrates the Revolved_round.

The data associated with a Revolved_round are the following:

- rounded_edge_shape.

4.2.175.1 rounded_edge_shape

The `rounded_edge_shape` specifies the arc that when revolved about an axis defines the area on a part for volume removal. The placement of the profile shall be along the X-axis of the `Revolved_round` at a specified distance away from the origin. The Z-axis orientation of the `Partial_circular_profile` shall be the same as the Y-axis of the `Revolved_round`, the X-axis and Y-axis are independent of the orientation of the `Revolved_round` feature. See 4.3.195 for the application assertion.

4.2.176 Rib_top

The `Rib_top` is a type of `Multi_axis_feature` (see 4.2.119) that is the removal of a volume to a floor with no sides, or floor radius. `Rib_top` features may adjoin with another `Rib_top` feature.

EXAMPLE - The material that separates two pockets on a part is an example of a rib. The top surface of that rib would be an example of a `Rib_top`.

NOTE - illustrates the `Rib_top` feature.

The data associated with a `Rib_top` are the following:

- `floor_condition`;
- `removal_direction`.

4.2.176.1 floor_condition

A `floor_condition` specifies the bottom state of a `Rib_top`. The floor may be flat or any arbitrary shape. See 4.3.197 for the application assertion.

4.2.176.2 removal_direction

A `removal_direction` specifies a vector that points in the general direction away from the material for a `Rib_top`. See 4.3.196 for the application assertion.

4.2.177 Rib_top_floor

A `Rib_top_floor` is the bottom restriction for a `Rib_top` (see 4.2.176). The bottom may be flat, or any arbitrary shape. Each `Rib_top_floor` is either a `General_rib_top_floor` (see 4.2.96), or a `Planar_rib_top_floor` (see 4.2.147).

4.2.178 Round_hole

A `Round_hole` is a type of `Hole` (see 4.2.103) that is a removal of a volume of cylindrical shape from a part. A `Round_hole` need not be tapered. The orientation is at a point in the bottom of the hole. The Z-axis is along the centerline with the direction out of the hole.

The data associated with a `Round_hole` are the following:

- `bottom_condition`;
- `change_in_diameter`;

- diameter;
- hole_depth.

4.2.178.1 bottom_condition

The bottom_condition specifies the shape of the bottom of a Round_hole feature. Each bottom_condition may be one of the following Blind_bottom_condition (see 4.2.8), or Through_bottom_condition (see 4.2.209). See 4.3.199 and 4.3.198 for the application assertion.

4.2.178.2 change_in_diameter

The change_in_diameter specifies the taper that defines the change in shape of the Round_hole. The change_in_diameter need not be specified for a particular Round_hole. See 4.3.202, 4.3.203 and 4.3.204 for the application assertion.

4.2.178.3 diameter

The diameter is the distance across a Round_hole. The placement and orientation of the Circular_closed_profile shall be the same as the Round_hole feature. See 4.3.200 for the application assertion.

4.2.178.4 hole_depth

The hole depth is some amount of distance from the bottom of a Round_hole to a point that is outside of the Round_hole feature. Hole depth places a limitation on the Round_hole depth definition so not to interfere with other features that might be nearby. The placement and orientation of the Linear_path shall be the same as the Round_hole feature. See 4.3.201 for the application assertion.

4.2.179 Rounded_end

A Rounded_end is a type of Multi_axis_feature (see 4.2.119) that is a partially circular shape passed along a linear path.

NOTE - illustrates the Rounded_end.

The data associated with a Rounded_end are the following:

- course_of_travel;
- partial_circular_boundary.

4.2.179.1 course_of_travel

The course_of_travel specifies a straight line with magnitude and direction. The placement and

orientation of the Linear_path that defines the course_of_travel shall be the same as the Rounded_end feature. See 4.3.205 for the application assertion.

4.2.179.2 partial_circular_boundary

The partial_circular_boundary specifies the arc that when swept along a path defines the area on a part for volume removal. The placement and orientation of the Partial_circular_profile that defines the partial_circular_boundary shall be the same as the Rounded_end feature. See 4.3.206 for the application assertion.

4.2.180 Rounded_U_profile

A Rounded_U_profile is a type of Open_profile (see 4.2.124) that is a shape bounded by two parallel lines and a semicircle. Each line begins at the end point of the semicircle. The lines are tangent to the circle and extend infinitely. The profile is positioned with the opening in the direction of the Y-axis. The orientation is at a point on the profile the farthest distance from the opening measured along the Y-axis. The X-axis is tangent to the semicircle.

The data associated with a Rounded_U_profile are the following:

— width.

4.2.180.1 width

The width specifies the distance across a Round_U_profile. See 4.3.207 for the application assertion.

NOTE - illustrates the Rounded_U_profile.

4.2.181 Run_Administrator

???

4.2.181.1 administrator

4.2.181.2 shift

4.2.182 Second_chamfer_offset

A Second_chamfer_offset is a choice of methods for creating a Chamfer feature. A Chamfer requires an offset and the choice between a second offset or an angle. Each Second_chamfer_offset is either a Chamfer_angle (see 4.2.26) or a Second_offset (see 4.2.183). The data associated with a Second_chamfer_offset are the following:

— second_face.

4.2.182.1 second_face

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The `second_face` is one of two faces the Chamfer feature will transition between. The first face is specified by `First_offset` (see 4.2.77). See 4.3.208 for the application assertion.

4.2.183 Second_offset

A `Second_offset` is a type of `Second_chamfer_offset` (see 4.2.182) that is the amount of length offset from a face for creating a Chamfer feature.

NOTE - illustrates a `Second_offset` for a Chamfer feature.

The data associated with a `Second_offset` are the following:

— `offset_amount`.

4.2.183.1 offset_amount

The `offset_amount` specifies the offset value from the edge of a face to the Chamfer face. See 4.3.209 for the application assertion.

4.2.184 Shape

A `Shape` is the physical form of the part that is being machined. The data associated with a `Shape` are the following:

— `base_shape_definition`;

— `B-rep_form`;

— `element`.

4.2.184.1 base_shape_definition

The `base_shape_definition` specifies either the implicit or the explicit definition of the Part. See 4.3.210 for the application assertion.

4.2.184.2 B-rep_form

The `B-rep_form` specifies the boundary representation shape of the Part. The `B-rep_form` need not be specified for a particular `Shape`. There may be more than one `B-rep_form` for a `Shape`. See 4.3.211 for the application assertion.

4.2.184.3 element

The `element` specifies the components of the shape of the Part. The `element` need not be specified for a particular `Shape`. There may be more than one `element` for a `Shape`. See 4.3.212 for the application assertion.

4.2.185 Shape_aspect

A Shape_aspect is a region of interest with respect to the shape of a part. A Shape_aspect may be an element of the shape of the part or a reference shape that does not lie on the shape of the part, but is used to specify a characteristic of the shape of the part. The data associated with a Shape_aspect are the following:

- B-rep_form;
- B-rep_shape;
- element.

4.2.185.1 B-rep_form

The B-rep_form specifies aspects of the boundary representation of the Part. There may be more than one B-rep_form for a Shape_aspect. See 4.3.214 for the application assertion.

4.2.185.2 B-rep_shape

The B-rep_shape specifies the boundary representation of the shape of the Part. The B-rep_shape need not be specified for a particular Shape_aspect. There may be more than one B-rep_shape for a Shape_aspect. See 4.3.213 for the application assertion.

4.2.185.3 element

The element specifies components of the shape of the Part. The element need not be specified for a particular Shape_aspect. See 4.3.215 for the application assertion.

4.2.186 Shape_element

A Shape_element is a specific kind of Shape_aspect that identifies a portion of a shape and its representation. Each Shape_element is either a Direction_element (see 4.2.69), Face_shape_element (see 4.2.73), Location_element (see 4.2.111), Manufacturing_feature (see 4.2.114), Path_element (see 4.2.139) or a Planar_element (see 4.2.143).

4.2.187 Shape_profile

A Shape_profile is a type of Profile_feature (see 4.2.154) that is the removal volume of raw stock or other excess material from the boundary shape of a part. The sides of a profile may be parallel to the profile's orientation vector, or may be parallel with an offset amount.. The placement may be at the bottom of the profile with the Z-axis in the direction toward the top of the profile, or at the top of the profile with the Z-axis in the direction toward the bottom of the profile. The bottom of the boundary shape is limited by a floor condition. Each Shape_profile is either a Circular_closed_shape_profile (see 4.2.28), Partial_circular_shape_profile (see 4.2.136), General_shape_profile (see 4.2.97), Rectangular_closed_shape_profile (see 4.2.165), or a Rectangular_open_shape_profile (see 4.2.169).

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NOTE - illustrates a Shape_profile.

The data associated with a Shape_profile are the following:

- floor_condition;
- removal_direction.

4.2.187.1 floor_condition

The floor_condition specifies the shape of the bottom of a Shape_profile feature. The floor_condition is either a Profile_floor (see 4.2.155) or a Through_profile_floor (see 4.2.211). See 4.3.217 and 4.3.218 for the application assertions.

4.2.187.2 removal_direction

A removal_direction specifies a vector that points in the general direction away from the material for a Shape_profile. See 4.3.216 for the application assertion.

4.2.188 Size_tolerance

A Size_tolerance is a type of Dimensional_tolerance (see 4.2.67) that is the size dimension tolerance characteristic for a geometric element. Each Size_tolerance is either an Angular_size_dimension_tolerance (see 4.2.4), Curved_dimension_tolerance (see 4.2.49), Diameter_dimension_tolerance (see 4.2.64), or a Radial_-dimension_tolerance (see 4.2.159). The data associated with a Size_tolerance are the following:

- applied_shape.

4.2.188.1 applied_shape

The applied_shape specifies the physical shape of the Part that is being tolerated. See 4.3.219 for the application assertion.

4.2.189 Slot

A Slot is a type of Multi_axis_feature(see 4.2.119) that is a channel or depression with continuous direction of travel. The Slot origin shall be located at one end of the slot, the Z-axis shall indicate the direction of the slot, and the Y-axis shall indicate the direction away from the part.

The data associated with a Slot are the following:

- course_of_travel;
- end_conditions;
- sweep_shape.

4.2.189.1 course_of_travel

The `course_of_travel` specifies a 3D space curve, that when combine with a Profile, creates the shape of the Slot. See 4.3.221 for the application assertion.

4.2.189.2 end_conditions

The `end_conditions` specifies the type of implicit shape at the ends of the Slot. See 4.3.222 for the application assertion.

4.2.189.3 sweep_shape

The `sweep_shape` specifies the implicit 2D profile definition that, when combine with a Path, creates the shape of the Slot. See for the application assertion.

4.2.190 Slot_end_type

A `Slot_end_type` is the end conditions of a slot. A slot shall have two ends, each end shall be open or closed. Each `Slot_end_type` is either a `Flat_slot_end_type` (see 4.2.79), `Open_slot_end_type` (see 4.2.125), `Radiused_slot_end_type` (see 4.2.160), or a `Woodruff_slot_end_type` (see 4.2.225). The data associated with a `Slot_end_type` are the following:

— `first_or_second`.

4.2.190.1 first_or_second

The `first_or_second` specifies a value of 'FIRST' if the `Slot_end_type` is closest to the positioning point of a Slot or 'SECOND' if it is the farthest away.

4.2.191 Specification

A Specification is a document that defines information pertaining to properties or processes for a part or an aspect of a part. The data associated with a Specification are the following:

— `constraint`;

— `specification_class`;

— `specification_description`;

— `specification_id`.

4.2.191.1 constraint

The `constraint` specifies the restriction on the Specification. The constraint need not be specified for a particular Specification. There may be more than one constraint for a Specification. See 4.3.223 for the

application assertion.

4.2.191.2 specification_class

The `specification_class` specifies a section within a Specification that is divided into classes. A Specification may but need not require a `specification_class`.

4.2.191.3 specification_description

The `specification_description` specifies in human interpretable prose a description of the contents of the specification and any notes with respect to the Specification. A Specification may but need not require a `specification_description`.

4.2.191.4 specification_id

The `specification_id` specifies a unique identifier of the document.

4.2.192 Specification_usage_constraint

A `Specification_usage_constraint` is a restriction on the application of information defined within a Specification. The data associated with a `Specification_usage_constraint` are the following:

- `class_id`;
- `element`.

4.2.192.1 class_id

The `class_id` specifies the data or range of data with respect to the element that defines the restriction imposed on the usage of the Specification.

4.2.192.2 element

The `element` specifies the particular piece or area of information that is being restricted within the Specification.

4.2.193 Spherical_cap

A `Spherical_cap` is a type of `Machining_feature` (see 4.2.113) that is circular about an axis of rotation. A `Spherical_cap` consists of all points a given distance from a point constituting its center. The Z-axis shall be in the direction away from the material.

NOTE - illustrates the `Spherical_cap`.

The data associated with a `Spherical_cap` are the following:

— internal_angle;

— radius.

4.2.193.1 internal_angle

The internal_angle specifies the size of an angle from an axis for defining a portion of a sphere to use as a spherical_cap feature. The X-axis defines the start of the spherical_cap and the internal_angle is measured from this axis. . See 4.3.224 for the application assertion.

4.2.193.2 radius

The radius specifies the constant distance from a point for defining a sphere. See 4.3.224 for the application assertion.

4.2.194 Spherical_hole_bottom

A Spherical_hole_bottom is a type of Blind_bottom_condition (see 4.2.8) that is a bottom of a Round_hole which is concentric about an axis and defined by a radius. The radius is the same as the radius of the hole.

The data associated with Spherical_hole_bottom are the following:

— radius.

4.2.194.1 radius

The radius specifies the radius at the bottom of the Round_hole. See 4.3.225 for the application assertion.

4.2.195 Spur_gear

A Spur_gear is a type of Defined_gear (see 4.2.58) that is a cylindrical gear whose tooth traces are straight line generators of the reference cylinder.

4.2.196 Square_U_profile

A Square_U_profile is a type of Open_profile (see 4.2.124)) that is a shape bounded by three lines. One is the base line and has a defined length. The other two lines begin at the ends of the base line, and extend infinitely at any angle to the base line greater than zero degrees and less than 180 degrees. The two lines may also be at right angle to the base line. The corners of the Square_U_profile need not be blended by a radius.

The data associated with Square_U_profile are the following:

— first_angle;

— first_radius;

— second_angle;

— second_radius;

— width.

4.2.196.1 first_angle

The first_angle specifies the size of an angle between one side of the profile and the base. See 4.3.226 for the application assertion.

4.2.196.2 first_radius

The first_radius specifies the radius shape blend between one side of the profile and the base. See 4.3.226 for the application assertion.

4.2.196.3 second_angle

The second_angle specifies the size of an angle between the second side of the profile and the base. See 4.3.226 for the application assertion.

4.2.196.4 second_radius

The second_radius specifies the radius shape blend between the second side of the profile and the base. 4.3.226 See for the application assertion.

4.2.196.5 width

The width specifies the size of the base line for a Square_U_profile. See 4.3.226 for the application assertion.

4.2.197 Step

A Step is a type of Multi_axis_feature(see 4.2.119) that is a linear sweep of a shape. The shape shall be specified by two lines that connect at a point and extend infinitely. The enclosed angle shall be smaller than 180 degrees. The intersection of the two lines need not be blended with a radius.

NOTE - illustrates the Step.

The data associated with a Step are the following:

— course_of_travel;

— removal_boundary;

— volume_not_removed.

4.2.197.1 course_of_travel

The `course_of_travel` specifies the straight line with magnitude and direction. The placement and orientation of the `Linear_path` shall be the same as the `Step` feature. See 4.3.228 for the application assertion.

4.2.197.2 removal_boundary

The `removal_boundary` specifies the a `Vee_profile` (see 4.2.224) that when swept along a path defines the area on a part for volume removal. The placement and orientation of the `Vee_profile` shall be the same as the `Step` feature. See 4.3.227 for the application assertion.

4.2.197.3 volume_not_removed

The `volume_not_removed` specifies an amount of material that is not to be removed from the pocket. The `Boss` feature defines the shape of the material that is to remain in the pocket. See 4.3.229 or 4.3.230 for the application assertion.

4.2.198 Straight_knurl

A `Straight_knurl` is a type of `Turned_knurl` (see 4.2.220) that is typified by knurl scoring that is parallel to the axis of the scored surface.

4.2.199 Straightness_tolerance

A `Straightness_tolerance` is a type of `Geometric_tolerance` (see 4.2.99) that is the amount of deviation a surface or line shall have from being straight. No element of the surface or line deviate more than a specified tolerance amount from a straight line.

NOTE 1 - illustrates the `Straightness_tolerance`.

NOTE 2 - The `Straightness_tolerance` definition is derived from paragraph 14.1 of ISO 1101.
The data associated with a `Straightness_tolerance` are the following:

- `affected_plane`;
- `segment_size`.

4.2.199.1 affected_plane

The `affected_plane` specifies the plane to apply the tolerance value. The `affected_plane` is equivalent to a 2D drawing view. The `affected_plane` need not be specified for a particular `Straightness_tolerance`. See 4.3.231 for the application assertion.

4.2.199.2 segment_size

The `segment_size` specifies the length of a surface to apply a tolerance if the `Straightness_tolerance` is not

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applied to the total length. The `segment_size` need not be specified for a particular `Straightness_tolerance`.

4.2.200 Surface_profile_tolerance

A `Surface_profile_tolerance` is a type of `Geometric_tolerance` (see 4.2.99) that is a uniform boundary or zone along the true profile within which all elements of the surface shall lie.

NOTE 1 - illustrates `Surface_profile_tolerance`.

NOTE 2 - The `Surface_profile_tolerance` definition is derived from paragraph 14.6 of ISO 1101.
The data associated with a `Surface_profile_tolerance` are the following:

— `geometric_reference`.

4.2.200.1 geometric_reference

The `geometric_reference` specifies the datum to which the tolerance is related. See 4.3.232 for the application assertion.

4.2.201 Symmetry_tolerance

A `Symmetry_tolerance` is a type of `Geometric_tolerance` (see 4.2.99) that defines a tolerance zone limited by two parallel planes a distance apart and disposed symmetrically to the median plane with respect to a datum axis or datum plane; or when projected in a plane, limited by two parallel straight lines a distance apart and disposed symmetrically with respect to a datum axis or datum plane.

NOTE 1 - illustrates the `Symmetry_tolerance`.

NOTE 2 - The `Symmetry_tolerance` definition is derived from paragraph 14.12 of ISO 1101.
The data associated with a `Symmetry_tolerance` are the following:

— `affected_plane`;

— `geometric_reference`.

4.2.201.1 affected_plane

The `affected_plane` specifies the plane to apply the tolerance value. The `affected_plane` is equivalent to a 2D drawing view. The `affected_plane` need not be specified for a particular `Symmetry_tolerance`. See 4.3.234 for the application assertion.

4.2.201.2 geometric_reference

The `geometric_reference` specifies the datum to which the tolerance is related. See 4.3.233 for the application assertion.

4.2.202 Target_area

A Target_area is a type of Datum_target (see 4.2.56) that is an enclosed area bounded by an arbitrary shape required to define a Datum_target. The shape of the Target_area is described explicitly by a set of curves. The data associated with Target_area are the following:

— area_shape.

4.2.202.1 area_shape

The area_shape specifies the physical form of the Target_area shape. See 4.3.235 for the application assertion.

4.2.203 Target_circle

A Target_circle is a type of Placed_target (see 4.2.142) that is an enclosed area bounded by a circle required to define a Datum_target. The origin of the Datum_target is the center of the circle, and the orientation is the x-y plane. The data associated with a Target_circle are the following:

— target_diameter.

4.2.203.1 target_diameter

The target_diameter specifies the diameter value of the Target_circle.

4.2.204 Target_line

A Target_line is a type of Placed_target (see 4.2.142) that is a straight curve. The origin shall be the first end point of the Target_line, the second end point shall be located on the Z-axis at a specified length. The data associated with a Target_line are the following:

— target_length.

4.2.204.1 target_length

The target_length specifies the length value of the Target_line.

4.2.205 Target_point

A Target_point is a type of Placed_target (see 4.2.142) that is a single point. The origin shall be at the Target_point.

4.2.206 Target_rectangle

A Target_rectangle is a type of Placed_target (see 4.2.142) that is an area bounded by four sides with opposite sides equal in length. The center of the rectangle is at the origin. The orientation of the rectangle is with the length along the X-axis and the width along the Y-axis. The data associated a with

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Target_rectangle are the following:

- target_length;
- target_width.

4.2.206.1 target_length

The target_length specifies the length value of the Target_rectangle.

4.2.206.2 target_width

The target_width specifies the width value of the Target_rectangle.

4.2.207 Tee_profile

A Tee_profile is a type of Open_profile (see 4.2.124) the cross-section of which has the shape of the twentieth letter of the English alphabet in capital form. The first line has a defined length. The second line begins at the midpoint of the first line and is perpendicular to it. The second line extends infinitely. The corners of the Tee_profile need not be blended by a radius. The profile is positioned with the opening in the direction of the Y-axis. The orientation is at a point on the profile the farthest distance from the opening measured along the Y-axis. The X-axis is tangent to the bottom of the profile.

The data associated with a Tee_profile are the following:

- cross_bar_depth;
- cross_bar_width;
- depth;
- first_angle;
- first_offset;
- radius;
- second_angle;
- second_offset;
- width.

4.2.207.1 cross_bar_depth

The cross_bar_depth specifies the depth dimension of the Tee cross bar size. See 4.3.236 for the application assertion.

4.2.207.2 cross_bar_width

The `cross_bar_width` specifies the width dimension of the Tee cross bar size. See 4.3.236 for the application assertion.

4.2.207.3 depth

The `depth` specifies the depth dimension of the Tee stem. See 4.3.236 for the application assertion.

4.2.207.4 first_angle

The `first_angle` specifies the angular measurement for creating a chamfer on the open end of a Tee_profile. See 4.3.236 for the application assertion.

4.2.207.5 first_offset

The `first_offset` specifies the distance from the edge of the Tee stem to create a chamfer on the open end of a Tee_profile. See 4.3.236 for the application assertion.

4.2.207.6 radius

The `radius` specifies the arc size for blending the sides of a Tee_profile cross bar. See 4.3.236 for the application assertion.

4.2.207.7 second_angle

The `second_angle` specifies the angular measurement for creating a chamfer between the stem and the cross bar parts of a Tee_profile. See 4.3.236 for the application assertion.

4.2.207.8 second_offset

The `second_offset` specifies a distance from the edge of the Tee stem to create a chamfer a distance from the edge of a surface to the finish of a chamfer. See 4.3.236 for the application assertion.

4.2.207.9 width

The `width` specifies the width dimension of the Tee stem. See 4.3.236 for the application assertion.

4.2.208 Thread

A Thread is a type of Machining_feature (see 4.2.113) that is a ridge of uniform section on the form of a helix on the external or internal surface of a cylinder. Each Thread is either a Catalogue_thread (see 4.2.24) or a Defined_thread (see 4.2.60).

NOTE 1 - illustrates the Thread and illustrates Thread attributes.

NOTE 2 - Threads may be used to screw parts together.

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NOTE 3 - An outside thread might be on a Outer_round, an inside thread might be in a Round_hole.
The data associated with a Thread are the following:

- applied_shape;
- fit_class;
- form;
- inner_or_outer_thread;
- major_diameter;
- number_of_threads;
- partial_profile;
- qualifier;
- thread_hand.

4.2.208.1 applied_shape

The applied_shape specifies the physical shape of the Part that will define where the Thread feature will be applied. See 4.3.240 for the application assertion.

4.2.208.2 fit_class

The fit_class specifies the value for the type of fit specification for the thread. These types are distinguished from each other by the amount of tolerance and allowance. The fit_class need not be specified for a particularThread. See 4.3.237 for the application assertion.

EXAMPLE - Examples of ANSI fit class are: 1A, 2A, and 3A which apply to external threads only, and 1B, 2B, and 3B which apply to internal threads only.

4.2.208.3 form

The form specifies the definition of the shape of the thread. Various forms of threads are used to hold parts together, to adjust parts with reference to each other, or to transmit power. See 4.3.237 for the application assertion.

EXAMPLE - Examples of form are: metric, square, unified, sharp V, buttress, standard worm, and knuckle.

4.2.208.4 inner_or_outer_thread

An inner_or_outer_thread specifies whether or not the thread is applied as an internal thread or an

external thread.

4.2.208.5 major_diameter

The `major_diameter` specifies the dimension of the largest diameter of the Thread and is applied to both an internal and an external thread. See 4.3.236 for the application assertion.

4.2.208.6 number_of_threads

The `number_of_threads` specifies the density of threads per inch when used with English unit of measure and is the thread pitch when used with metric unit of measure. See 4.3.236 for the application assertion.

4.2.208.7 partial_profile

The `partial_profile` specifies the limitations to be applied on the Thread feature. See 4.3.239 for the application assertion.

4.2.208.8 qualifier

The `qualifier` specifies additional text information that describes a Thread. The `qualifier` need not be specified for a particular Thread. See 4.3.237 for the application assertion.

4.2.208.9 thread_hand

The `thread_hand` specifies a description of whether the thread is right or left handed. When viewed toward an end, a right hand winds in a clockwise direction and a left hand winds in a counterclockwise direction. See 4.3.237 for the application assertion.

4.2.209 Through_bottom_condition

A `Through_bottom_condition` is a selection type of `Hole_bottom_condition_select` that shall pass through two faces of a part; the depth is specified by the feature. The `Through_bottom_condition` length is specified by the size of the Hole feature.

NOTE - illustrates the `Through_bottom_condition`.

4.2.210 Through_pocket_bottom_condition

A `Through_pocket_bottom_condition` is a pocket that passes through two faces of a part; the depth is defined by the `pocket_depth` (see 4.2.150.4) of the Pocket feature.

NOTE - illustrates `Through_pocket_bottom_condition`.

4.2.211 Through_profile_floor

A `Through_profile_floor` is a `Shape_profile` which passes through two faces of a part; the depth is specified by the size of the feature.

4.2.212 Time_Offset

???

4.2.212.1 direction

4.2.212.2 hour

4.2.212.3 minute

4.2.213 Tolerance_limit

A Tolerance_limit is an upper or lower tolerance value applied directly to a dimension. When applied to a Dimensional_tolerance, the dimensional_value (see 4.2.67.2) shall be a tolerance value. When applied to a Numeric_parameter_with_tolerance, the parameter_value (see 4.2.122.2) shall be a tolerance value. There shall be a qualifier that describes the tolerance context. The data associated with a Tolerance_limit are the following:

— limit_qualifier.

4.2.213.1 limit_qualifier

The limit_qualifier specifies a description of the Tolerance_limit context.

EXAMPLE - '30.5 MAX' or '5 MIN' are Tolerance_limit examples and the words 'MAX' or 'MIN' are limit_qualifier examples.

4.2.214 Tolerance_range

A Tolerance_range is the upper and lower tolerance range applied directly to a dimension. When applied to a Dimensional_tolerance, the dimensional_value (see 4.2.67.2) may be a nominal tolerance value. When applied to a Numeric_parameter_with_tolerance, the parameter_value (see 4.2.122.2) may be a nominal tolerance value. The data associated with a Tolerance_range are the following:

— lower_range;

— significant_digits;

— upper_range.

4.2.214.1 lower_range

The lower_range specifies the lowest allowable value for a dimensional tolerance.

4.2.214.2 significant_digits

The `significant_digits` specifies the number of decimal places indicating the accuracy of the tolerance.

4.2.214.3 upper_range

The `upper_range` specifies the highest allowable value for a dimensional tolerance.

4.2.215 Tolerance_value

A `Tolerance_value` is the representation of the magnitude of the allowable deviation required for dimensions. These tolerance values may be explicitly defined or may require a specification for definition. The data associated with a `Tolerance_value` are the following:

- `defined_value`;
- `envelope`.

4.2.215.1 defined_value

The `defined_value` specifies the tolerance deviation value. See 4.3.241, 4.3.242, 4.3.243, and 4.3.244 for the application assertion.

4.2.215.2 envelope

The `envelope` specifies that each geometric constraint has to be fulfilled in itself. The envelope of the perfect shape corresponding to the maximum material shall not be larger than the specified dimension and tolerance. The `envelope` attribute shall be a boolean value, if TRUE the envelope is required for the `Tolerance_value`.

4.2.216 Tolerance_zone

A `Tolerance_zone` is an area where all points of the geometric element that have tolerances shall be contained.

EXAMPLE - A point, line, surface, or plane are examples for geometric elements that have tolerances zones.

The data associated with a `Tolerance_zone` are the following:

- `common_zone`;
- `extended_shape`;
- `form_type`;
- `zone_definition`.

4.2.216.1 common_zone

The `common_zone` specifies a boolean value that indicates if a `Tolerance_zone` is applied to more than one geometric tolerance. A TRUE value would indicate a common zone.

4.2.216.2 extended_shape

The `extended_shape` specifies the extension of a feature for the purpose of creating the `Tolerance_zone`. The `extended_shape` need not be specified for a particular `Tolerance_zone`. See 4.3.246 for the application assertion.

4.2.216.3 form_type

The `form_type` specifies the shape of the `Tolerance_zone`.

EXAMPLE - 'Cylindrical', 'parallelepiped', 'spherical' are examples for `form_type`.

4.2.216.4 zone_definition

The `zone_definition` specifies the defining boundaries for a `Tolerance_zone`. See 4.3.245 for the application assertion.

4.2.217 Tolerance_zone_definition

A `Tolerance_zone_definition` is the boundaries of a `Tolerance_zone`. Each `Tolerance_zone` shall be defined by at least one shape and may be defined with two shapes.

The data associated with a `Tolerance_zone_definition` are the following:

- `first_element`;
- `second_element`.

4.2.217.1 first_element

The `first_element` specifies a geometric shape for defining the boundary for the `Tolerance_zone_definition`. A second element specifies a second geometric shape. See 4.3.247 for the application assertion.

4.2.217.2 second_element

The `second_element` specifies the second of two shapes for defining the boundary for the `Tolerance_zone_definition`. The `second_element` need not be specified for a particular `Tolerance_zone_definition`. See 4.3.247 for the application assertion.

4.2.218 Total_runout_tolerance

A **Total_runout_tolerance** is a type of **Geometric_tolerance** (see 4.2.99) that is a compound tolerance used to control the functional relationship of one or more surfaces of a part to a datum axis. The types of surfaces controlled by **Total_runout_tolerance** tolerances include those surfaces constructed around a datum axis and those constructed at right angles to a datum axis. Surfaces shall be within the tolerance when the part is rotated about the datum axis.

NOTE 1 - illustrates the **Total_runout_tolerance**.

NOTE 2 - The **Total_runout_tolerance** definition is derived from paragraph 14.13 of ISO 1101.

The data associated with a **Total_runout_tolerance** are the following:

- **geometric_reference**;
- **runout**.

4.2.218.1 geometric_reference

The **geometric_reference** specifies the datum to which the tolerance is related. See 4.3.248 for the application assertion.

4.2.218.2 runout

The **runout** specifies the direction to control a runout tolerance. If the angle is specified the runout tolerance applies in this angle which is fixed with respect to the datum axis. The runout need not be specified for a particular **Total_runout_tolerance**.

4.2.219 Transition_feature

A **Transition_feature** is a type of **Manufacturing_feature** (see 4.2.114) that is a transition area between two surfaces. This feature differs from **Machining_feature** objects in that it requires no orientation for placement. Each **Transition_feature** is either a **Chamfer** (see 4.2.25), **Edge_round** (see 4.2.71), or a **Fillet** (see 4.2.76).

4.2.220 Turned_knurl

A **Turned_knurl** is a type of **Knurl** (see 4.2.105) that is a scoring pattern consisting of a series of shallow cuts on a cylindrical surface. Each **Turned_knurl** is either a **Diagonal_knurl** (see 4.2.63), **Diamond_knurl** (see 4.2.66), or a **Straight_knurl** (see 4.2.198).

NOTE 1 - illustrates the **Turned_knurl**.

NOTE 2 - A knurl may be used to aid in gripping a part.

The data associated with a **Turned_knurl** are the following:

- **diametral_pitch**;

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- major_diameter;
- nominal_diameter;
- number_of_teeth;
- root_fillet;
- tooth_depth.

4.2.220.1 diametral_pitch

The `diametral_pitch` specifies the ratio of the number of teeth in the circumference to the nominal diameter. See 4.3.249 for the application assertion.

4.2.220.2 major_diameter

The `major_diameter` specifies size of the part before a knurl is applied to it. See 4.3.249 for the application assertion.

4.2.220.3 nominal_diameter

The `nominal_diameter` specifies the size of the part after a knurl has been applied. See 4.3.249 for the application assertion.

4.2.220.4 number_of_teeth

The `number_of_teeth` specifies the number of teeth in the circumference produced on the part surface. The `number_of_teeth` need not be specified for a particular `Turned_knurl`. See 4.3.249 for the application assertion.

4.2.220.5 root_fillet

The `root_fillet` specifies the dimension of a radius between teeth on a knurling tool. See 4.3.249 for the application assertion.

4.2.220.6 tooth_depth

The `tooth_depth` specifies the depth from the crest of a tooth to the point where two teeth intersect. See 4.3.249 for the application assertion.

4.2.221 Value_Limit

???

4.2.221.1 limit**4.2.221.2 limit_qualifier****4.2.222 Value_Range**

???

4.2.222.1 lower_limit**4.2.222.2 upper_limit****4.2.223 Value_With_Unit**

???

4.2.223.1 unit_component**4.2.223.2 significant_digits****4.2.224 Vee_profile**

A Vee_profile is a type of Open_profile (see 4.2.124) that is a shape bounded by two lines that connect at a point and extends infinitely. The enclosed angle is less than 180 degrees. The intersection of the two lines need not be blended with a radius. The profile is positioned with the opening in the direction of the Y axis. The Y-axis intersects the angle between the two sides.

The data associated with a Vee_profile are the following:

- profile_angle;
- profile_radius;
- tilt_angle.

4.2.224.1 profile_angle

The profile_angle specifies the size of the angle between the two sides of the Vee_profile. The angle shall be greater than 0 and not more than 180 degrees. See 4.3.250 for the application assertion.

4.2.224.2 profile_radius

The profile_radius specifies the size of the blend radius at the point of the V, or where the two sides come together. See 4.3.250 for the application assertion.

4.2.224.3 tilt_angle

The `tilt_angle` specifies the size of the angle between one side of the `Vee_profile` and the x-axis of the local coordinate system that defines the `Vee_profile` orientation on the part. See 4.3.250 for the application assertion.

4.2.225 Woodruff_slot_end_type

A `Woodruff_slot_end_type` is a type of `Slot_end_type` (see 4.2.190) that is an end condition of a slot that shall be a radius tangent to the Slot bottom, and curved upward about an axis.

NOTE - illustrates the `Woodruff_slot_end_type`.

The data associated with a `Woodruff_slot_end_type` are the following:

— radius.

4.2.225.1 radius

The radius specifies the size of the radius swept about an axis, tangent to the Slot bottom and the end of a Slot. See 4.3.251 for the application assertion.

4.3 Application assertions

This subclause specifies the application assertions for the Mechanical product definition for process planning using machining features application protocol. Application assertions specify the relationships between application objects, the cardinality of the relationships, and the rules required for the integrity and validity of the application objects and UoFs. The application assertions and their definitions are given below.

4.3.1 Angle_taper to Numeric_parameter

Each `Angle_taper` has the angle defined by exactly one `Numeric_parameter`. Each `Numeric_parameter` defines the angle for zero, one, or many `Angle_taper` objects.

4.3.2 Angularity_tolerance to Datum

Each `Angularity_tolerance` has the `geometric_reference` defined by exactly one `Datum`. Each `Datum` is the `geometric_reference` for zero, one, or many `Angularity_tolerance` objects.

4.3.3 Bevel_gear to Numeric_parameter

Each `Bevel_gear` has the `reference_helix_angle` defined by exactly one `Numeric_parameter`. Each `Numeric_parameter` defines the `reference_helix_angle` for zero, one, or many `Bevel_gear` objects.

4.3.4 Block_base_shape to Numeric_parameter

Each `Block_base_shape` has the `width` defined by exactly one `Numeric_parameter`. Each `Numeric_parameter` defines the `width` for zero, one, or many `Block_base_shape` objects.

Each `Block_base_shape` has the `height` defined by exactly one `Numeric_parameter`. Each `Numeric_parameter` defines the `height` for zero, one, or many `Block_base_shape` objects.

4.3.5 Boss to Boss_top_condition

Each `Boss` has the `top_condition` defined by exactly one `Boss_top_condition`. Each `Boss_top_condition` defines the `top_condition` for zero, one or many `Boss` objects.

4.3.6 Boss to Linear_path

Each `Boss` has the `boss_height` defined by exactly one `Linear_path`. Each `Linear_path` defines the `boss_height` for zero, one, or many `Boss` objects.

4.3.7 Boss to Numeric_parameter

Each `Boss` has the `fillet_radius` defined by zero or one `Numeric_parameter`. Each `Numeric_parameter` defines the `fillet_radius` for zero, one, or many `Boss` objects.

Each `Boss` has the `top_radius` defined by zero or one `Numeric_parameter`. Each `Numeric_parameter` defines the `top_radius` for zero, one, or many `Boss` objects.

4.3.8 B-rep_model_element to B-rep_model

Each `B-rep_model_element` defines an element of exactly one `B-rep_model`. Each `B-rep_model` defines the element for zero, one, or many `B-rep_model_element` objects.

4.3.9 B-rep_shape_aspect_representation to B-rep_model

Each `B-rep_shape_aspect_representation` has the `shape_definition` defined by exactly one `B-rep_model`. Each `B-rep_model` defines the `shape_definition` for zero, one, or many `B-rep_shape_aspect_representation` objects.

4.3.10 B-rep_shape_representation to B-rep_model

Each `B-rep_shape_representation` has the `shape_definition` defined by exactly one `B-rep_model`. Each `B-rep_model` defines the `shape_definition` for zero, one, or many `B-rep_shape_representation` objects.

4.3.11 Catalogue_gear to Specification

Each `Catalogue_gear` has `documentation` defined by exactly one `Specification`. Each `Specification` defines the `documentation` for zero, one, or many `Catalogue_gear` objects.

4.3.12 Catalogue_knurl to Specification

Each Catalogue_knurl has documentation defined by exactly one Specification. Each Specification defines the documentation for zero, one, or many Catalogue_knurl objects.

4.3.13 Catalogue_marking to Specification

Each Catalogue_marking has documentation defined by exactly one Specification. Each Specification defines the documentation for zero, one, or many Catalogue_marking objects.

4.3.14 Catalogue_thread to Specification

Each Catalogue_thread has documentation defined by exactly one Specification. Each Specification defines the documentation for zero, one, or many Catalogue_thread objects.

4.3.15 Chamfer to Face_shape_element

Each Chamfer has the chamfer_face identified by exactly one Face_shape_element. Each Face_shape_element is the chamfer_face shape for zero, one, or many Chamfer objects.

4.3.16 Chamfer to First_offset

Each Chamfer has the first_face_offset defined by exactly one First_offset. Each First_offset defines the first_face_offset for zero, one, or many Chamfer objects.

4.3.17 Chamfer to Second_chamfer_offset

Each Chamfer has the second_face_offset defined by exactly one Second_chamfer_offset. Each Second_chamfer_offset defines the second_face_offset for zero, one, or many Chamfer objects.

4.3.18 Chamfer_angle to Numeric_parameter

Each Chamfer_angle has the angle_amount defined by exactly one Numeric_parameter. Each Numeric_parameter defines the angle_amount for zero, one, or many Chamfer_angle objects.

4.3.19 Circular_boss to Circular_closed_profile

Each Circular_boss has the circular_profile defined by exactly one Circular_closed_profile. Each Circular_closed_profile defines the circular_profile for zero, one, or many Circular_boss objects.

4.3.20 Circular_boss to Angle_taper

Each Circular_boss has the change_in_diameter defined by zero or one Angle_taper. Each Angle_taper defines the change_in_diameter for zero, one, or many Circular_boss objects.

NOTE - This assertion is established through Taper_select.

4.3.21 Circular_boss to Diameter_taper

Each Circular_boss has the change_in_diameter defined by zero or one Diameter_taper. Each Diameter_taper defines the change_in_diameter for zero, one, or many Circular_boss objects.

NOTE - This assertion is established through Taper_select.

4.3.22 Circular_boss to Directed_taper

Each Circular_boss has the change_in_diameter defined by zero or one Directed_taper. Each Directed_taper defines the change_in_diameter for zero, one, or many Circular_boss objects.

NOTE - This assertion is established through Taper_select.

4.3.23 Circular_closed_profile to Numeric_parameter

Each Circular_closed_profile has the diameter defined by exactly one Numeric_parameter. Each Numeric_parameter defines the diameter for zero, one, or many Circular_closed_profile objects.

4.3.24 Circular_closed_shape_profile to Circular_closed_profile

Each Circular_closed_shape_profile has the closed_boundary defined by exactly one Circular_closed_profile. Each Circular_closed_profile defines the closed_boundary for zero, one, or many Circular_closed_shape_profile objects.

4.3.25 Circular_cutout to Circular_closed_profile

Each Circular_cutout has the closed_boundary defined by exactly one Circular_closed_profile. Each Circular_closed_profile defines the closed_boundary for zero, one, or many Circular_cutout objects.

4.3.26 Circular_offset_pattern to Numeric_parameter

Each Circular_offset_pattern has the angular_offset defined by exactly one Numeric_parameter. Each Numeric_parameter defines the angular_offset for zero, one, or many Circular_offset_pattern objects.

Each Circular_offset_pattern has the index_number defined by exactly one Numeric_parameter. Each Numeric_parameter defines the index_number for zero, one, or many Circular_offset_pattern objects.

4.3.27 Circular_omit_pattern to Numeric_parameter

Each Circular_omit_pattern has the omit_index defined by exactly one Numeric_parameter. Each Numeric_parameter defines the omit_index for zero, one, or many Circular_omit_pattern objects.

4.3.28 Circular_path to Numeric_parameter

Each Circular_path has the radius defined by exactly one Numeric_parameter. Each Numeric_parameter defines the radius for zero, one, or many Circular_path objects.

4.3.29 Circular_pattern to Circular_offset_pattern

Each Circular_pattern has the relocated_base_feature defined by zero, one, or many Circular_offset_pattern objects. Each Circular_offset_pattern defines the relocated_base_feature for one or more Circular_pattern objects.

4.3.30 Circular_pattern to Circular_omit_pattern

Each Circular_pattern has the missing_base_feature defined by zero, one, or many Circular_omit_pattern objects. Each Circular_omit_pattern defines the missing_base_feature for one or more Circular_pattern objects.

4.3.31 Circular_pattern to Numeric_parameter

Each Circular_pattern has the angular_spacing defined by exactly one Numeric_parameter. Each Numeric_parameter defines the angular_spacing for zero, one, or many Circular_pattern objects.

Each Circular_pattern has the base_feature_diameter defined by zero or one Numeric_parameter. Each Numeric_parameter defines the base_feature_diameter for zero, one, or many Circular_pattern objects.

Each Circular_pattern has the base_feature_rotation defined by exactly one Numeric_parameter. Each Numeric_parameter defines the base_feature_rotation for zero, one, or many Circular_pattern objects.

Each Circular_pattern has the number_of_features defined by exactly one Numeric_parameter. Each Numeric_parameter defines the number_of_features for zero, one, or many Circular_pattern objects.

4.3.32 Circular_runout_tolerance to Datum

Each Circular_runout_tolerance has the geometric_reference defined by one or two Datum objects. Each Datum defines the geometric_reference for zero, one, or many Circular_runout_tolerance objects.

4.3.33 Compound_datum to Datum_feature

Each Compound_datum has the element defined by two or more Datum_feature objects. Each Datum_feature defines the element for zero, one, or many Compound_datum objects.

4.3.34 Compound_feature to Compound_feature_element

Each Compound_feature has the element defined by two or more Compound_feature_element objects. Each Compound_feature_element defines the element for zero, one, or many Compound_feature objects.

4.3.35 Compound_feature_element to Machining_feature

Each Compound_feature_element has the element defined by exactly one Machining_feature. Each Machining_feature defines the element for zero, one, or many Compound_feature_element objects.

NOTE - This assertion is established through Compound_feature_select.

4.3.36 Compound_feature_element to Transition_feature

Each Compound_feature_element has the element defined by exactly one Transition_feature. Each Transition_feature defines the element for zero, one, or many Compound_feature_element objects.

NOTE - This assertion is established through Compound_feature_select.

4.3.37 Compound_feature_relationship to Compound_feature_element

Each Compound_feature_relationship has the successor defined by exactly one Compound_feature_element. Each Compound_feature_element defines the successor for zero, one, or many Compound_feature_relationship objects.

Each Compound_feature_relationship has the predecessor defined by exactly one Compound_feature_element. Each Compound_feature_element defines the predecessor for zero, one, or many Compound_feature_relationship objects.

4.3.38 Concentricity_tolerance to Datum

Each Concentricity_tolerance has the geometric_reference defined by exactly one Datum. Each Datum is the geometric_reference for zero, one, or many Concentricity_tolerance objects.

4.3.39 Conical_hole_bottom to Numeric_parameter

Each Conical_hole_bottom has the tip_angle defined by exactly one Numeric_parameter. Each Numeric_parameter defines the tip_angle for zero, one, or many Conical_hole_bottom objects.

Each Conical_hole_bottom has the tip_radius defined by zero or one Numeric_parameter. Each Numeric_parameter defines the tip_radius for zero, one, or many Conical_hole_bottom objects.

4.3.40 Constant_radius_edge_round to Numeric_parameter

Each Constant_radius_edge_round has the first_face_offset defined by zero or one Numeric_parameter. Each Numeric_parameter defines the first_face_offset for zero, one, or many Constant_radius_edge_round objects.

Each Constant_radius_edge_round has the second_face_offset defined by zero or one Numeric_parameter. Each Numeric_parameter defines the second_face_offset for zero, one, or many Constant_radius_edge_round objects.

Each Constant_radius_edge_round has the radius defined by exactly one Numeric_parameter. Each Numeric_parameter defines the radius for zero, one, or many Constant_radius_edge_round objects.

4.3.41 Constant_radius_fillet to Numeric_parameter

Each Constant_radius_fillet has the first_face_offset defined by zero or one Numeric_parameter. Each Numeric_parameter defines the first_face_offset for zero, one, or many Constant_radius_fillet objects.

Each Constant_radius_fillet has the second_face_offset defined by zero or one Numeric_parameter. Each Numeric_parameter defines the second_face_offset for zero, one, or many Constant_radius_fillet objects. Each Constant_radius_fillet has the radius defined by exactly one Numeric_parameter. Each Numeric_parameter defines the radius for zero, one, or many Constant_radius_fillet objects.

4.3.42 Counterbore_hole to Round_hole

Each Counterbore_hole has the smaller_hole defined by exactly one Round_hole. Each Round_hole defines the smaller_hole for zero, one, or many Counterbore_hole objects.

Each Counterbore_hole has the larger_hole defined by exactly one Round_hole. Each Round_hole defines the larger_hole for zero, one, or many Counterbore_hole objects.

4.3.43 Countersunk_hole to Round_hole

Each Countersunk_hole has the constant_diameter_hole defined by exactly one Round_hole. Each Round_hole defines the constant_diameter_hole for zero, one, or many Countersunk_hole objects.

Each Countersunk_hole has the tapered_hole defined by exactly one Round_hole. Each Round_hole defines the tapered_hole for zero, one, or many Countersunk_hole objects.

4.3.44 Cutout to Through_pocket_bottom_condition

Each Cutout has the bottom_condition defined by exactly one Through_pocket_bottom_condition. Each Through_pocket_bottom_condition defines the bottom_condition for zero, one, or many Cutout objects.

4.3.45 Cylindrical_base_shape to Numeric_parameter

Each Cylindrical_base_shape has the diameter defined by exactly one Numeric_parameter. Each Numeric_parameter defines the diameter for zero, one, or many Cylindrical_base_shape objects.

4.3.46 Datum_feature to Material_condition_modifier

Each Datum has the modifier defined by zero or one Material_condition_modifier. Each Material_condition_modifier defines the modifier for zero, one, or many Datum objects.

4.3.47 Datum_feature to Datum_target_set

Each Datum_feature has the datum_representation defined by exactly one Datum_target_set. Each Datum_target_set defines the datum_representation for zero, one, or many Datum_feature objects.

NOTE - This assertion is established through Datum_representation_select.

4.3.48 Datum_feature to Shape_element

Each Datum_feature has the datum_representation defined by exactly one Shape_element. Each Shape_element defines the datum_representation for zero, one, or many Datum_feature objects.

NOTE - This assertion is established through Datum_representation_select.

4.3.49 Datum_target_set to Datum_target

Each Datum_target_set has the target_shape defined by one or many Datum_target objects. Each Datum_target defines the target_shape for zero, one, or many Datum_target_set objects.

4.3.50 Defined_marking to Descriptive_parameter

Each Defined_marking has the special_instructions defined by zero or one Descriptive_parameter. Each Descriptive_parameter defines special_instructions for zero, one, or many Defined_marking objects.

Each Defined_marking has the font_name defined by zero or one Descriptive_parameter. Each Descriptive_parameter defines font_name for zero, one, or many Defined_marking objects.

4.3.51 Defined_marking to Numeric_parameter

Each Defined_marking has the character_height defined by zero or one Numeric_parameter. Each Numeric_parameter defines the character_height for zero, one, or many Defined_marking objects.

Each Defined_marking has the character_spacing defined by zero or one Numeric_parameter. Each Numeric_parameter defines the character_spacing for zero, one, or many Defined_marking objects.

4.3.52 Defined_thread to Numeric_parameter

Each Defined_thread has the crest defined by zero or one Numeric_parameter. Each Numeric_parameter defines the crest for zero, one, or many Defined_thread objects.

Each Defined_thread has the minor_diameter defined by zero or one Numeric_parameter. Each Numeric_parameter defines the minor_diameter for zero, one, or many Defined_thread objects.

Each Defined_thread has the pitch_diameter defined exactly one Numeric_parameter. Each Numeric_parameter defines the pitch_diameter for zero, one, or many Defined_thread objects.

4.3.53 Diagonal_knurl to Descriptive_parameter

Each Diagonal_knurl has the helix_hand defined by exactly one Descriptive_parameter. Each Descriptive_parameter defines the helix_hand for zero, one, or many Diagonal_knurl objects.

4.3.54 Diagonal_knurl to Numeric_parameter

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Each `Diagonal_knurl` has the `helix_angle` defined by exactly one `Numeric_parameter`. Each `Numeric_parameter` defines the `helix_angle` for zero, one, or many `Diagonal_knurl` objects.

4.3.55 Diameter_taper to Numeric_parameter

Each `Diameter_taper` has the `final_diameter` defined by exactly one `Numeric_parameter`. Each `Numeric_parameter` defines the `final_diameter` for zero, one, or many `Diameter_taper` objects.

4.3.56 Diamond_knurl to Numeric_parameter

Each `Diamond_knurl` has the `helix_angle` defined by exactly one `Numeric_parameter`. Each `Numeric_parameter` defines the `helix_angle` for zero, one, or many `Diamond_knurl` objects.

4.3.57 Dimensional_tolerance to Tolerance_value

Each `Dimensional_tolerance` has the `limit` defined by zero or one `Tolerance_value`. Each `Tolerance_value` defines the `limit` for zero, one, or many `Dimensional_tolerance` objects.

4.3.58 Directed_taper to Direction_element

Each `Directed_taper` has the `direction` defined by exactly one `Direction_element`. Each `Direction_element` defines the `direction` for zero, one, or many `Directed_taper` objects.

4.3.59 Directed_taper to Numeric_parameter

Each `Directed_taper` has the `angle` defined by exactly one `Numeric_parameter`. Each `Numeric_parameter` defines the `angle` for zero, one, or many `Directed_taper` objects.

4.3.60 Distance_along_curve_tolerance to Shape_aspect

Each `Distance_along_curve_tolerance` has a `path` defined by exactly one `Shape_aspect`. Each `Shape_aspect` defines the `path` for zero, one, or many `Distance_along_curve_tolerance` objects.

4.3.61 Edge_round to Face_shape_element

Each `Edge_round` has the `edge_round_face` defined by exactly one `Face_shape_element`. Each `Face_shape_element` defines the `edge_round_face` for zero, one, or many `Edge_round` objects.

Each `Edge_round` has the `first_face_shape` defined by exactly one `Face_shape_element`. Each `Face_shape_element` defines the `first_face_shape` for zero, one, or many `Edge_round` objects.

Each `Edge_round` has the `second_face_shape` defined by exactly one `Face_shape_element`. Each `Face_shape_element` defines the `second_face_shape` for zero, one, or many `Edge_round` objects.

4.3.62 Explicit_base_shape_representation to B-rep_shape_representation

Each Explicit_base_shape_representation has the B-rep_form defined by exactly one B-rep_shape_representation. Each B-rep_shape_representation defines the B-rep_form for zero, one, or many Explicit_base_shape_representation objects.

4.3.63 Face_shape_element_relationship to Face_shape_element

Each Face_shape_element_relationship has the predecessor defined by exactly one Face_shape_element. Each Face_shape_element defines the predecessor for zero, one, or many Face_shape_element_relationship objects.

Each Face_shape_element_relationship has the successor defined by exactly one Face_shape_element. Each Face_shape_element defines the successor for zero, one, or many Face_shape_element_relationship objects.

4.3.64 Fillet to Face_shape_element

Each Fillet has the fillet_face defined by exactly one Face_shape_element. Each Face_shape_element defines the fillet_face for zero, one, or many Fillet objects.

Each Fillet has the first_face_shape defined by exactly one Face_shape_element. Each Face_shape_element defines the first_face_shape for zero, one, or many Fillet objects.

Each Fillet has the second_face_shape defined by exactly one Face_shape_element. Each Face_shape_element defines the second_face_shape for zero, one, or many Fillet objects.

4.3.65 First_offset to Face_shape_element

Each First_offset has the face_shape defined by exactly one Face_shape_element. Each Face_shape_element defines the face_shape for zero, one, or many First_offset objects.

4.3.66 First_offset to Numeric_parameter

Each First_offset has the offset_amount defined by exactly one Numeric_parameter. Each Numeric_parameter defines the offset_amount for zero, one, or many First_offset objects.

4.3.67 Flat_slot_end_type to Numeric_parameter

Each Flat_slot_end_type has the first_radius defined by exactly one Numeric_parameter. Each Numeric_parameter defines the first_radius for zero, one, or many Flat_slot_end_type objects.

Each Flat_slot_end_type has the second_radius defined by exactly one Numeric_parameter. Each Numeric_parameter defines the second_radius for zero, one, or many Flat_slot_end_type objects.

4.3.68 Flat_with_radius_hole_bottom to Numeric_parameter

Each Flat_with_radius_hole_bottom has the corner_radius defined by exactly one Numeric_parameter. Each Numeric_parameter defines the corner_radius for zero, one, or many Flat_with_radius_hole_bottom objects.

objects.

4.3.69 Flat_with_taper_hole_bottom to Numeric_parameter

Each Flat_with_taper_hole_bottom has the taper_diameter defined by exactly one Numeric_parameter. Each Numeric_parameter defines the taper_diameter for zero, one, or many Flat_with_taper_hole_bottom objects.

Each Flat_with_taper_hole_bottom has the final_diameter defined by exactly one Numeric_parameter. Each Numeric_parameter defines the final_diameter for zero, one, or many Flat_with_taper_hole_bottom objects.

4.3.70 Gear to Shape_element

Each Gear has the applied_shape defined by exactly one Shape_element. Each Shape_element defines the applied_shape for zero, one, or many Gear objects.

4.3.71 Gear to Numeric_parameter

Each Gear has the face_width defined by exactly one Numeric_parameter. Each Numeric_parameter defines the face_width for zero, one, or many Gear objects.

Each Gear has the nominal_tool_depth defined by exactly one Numeric_parameter. Each Numeric_parameter defines the nominal_tool_depth for zero, one, or many Gear objects.

Each Gear has the normal_attribute defined by exactly one Numeric_parameter. Each Numeric_parameter defines the normal_attribute for zero, one, or many Gear objects.

Each Gear has the number_of_teeth defined by exactly one Numeric_parameter. Each Numeric_parameter defines the number_of_teeth for zero, one, or many Gear objects.

Each Gear has the rake_shift_factor defined by exactly one Numeric_parameter. Each Numeric_parameter defines the rake_shift_factor for zero, one, or many Gear objects.

Each Gear has the reference_pressure_angle defined by exactly one Numeric_parameter. Each Numeric_parameter defines the reference_pressure_angle for zero, one, or many Gear objects.

Each Gear has the tip_angle defined by exactly one Numeric_parameter. Each Numeric_parameter defines the tip_angle for zero, one, or many Gear objects.

4.3.72 General_boss to Closed_profile

Each General_boss has enclosed_boundary defined by exactly one Closed_profile. Each Closed_profile defines the enclosed_boundary for zero, one, or many General_boss objects.

4.3.73 General_boss to Angle_taper

Each General_boss has the change_in_boundary defined by zero or one Angle_taper. Each Angle_taper defines the change_in_boundary for zero, one, or many General_boss objects.

NOTE - This assertion is established through Angle_or_directed_taper_select.

4.3.74 General_boss to Directed_taper

Each General_boss has the change_in_boundary defined by zero or one Directed_taper. Each Directed_taper defines the change_in_boundary for zero, one, or many General_boss objects.

NOTE - This assertion is established through Angle_or_directed_taper_select.

4.3.75 General_closed_profile to Path_element

Each General_closed_profile has the closed_profile_shape defined by exactly one Path_element. Each Path_element defines the closed_profile_shape for zero, one, or many General_closed_profile objects.

4.3.76 General_cutout to Profile

Each General_cutout has the boundary defined by exactly one Profile. Each Profile defines the boundary for zero, one, or many General_cutout objects.

4.3.77 General_open_profile to Path_element

Each General_open_profile has enclosed_boundary defined by exactly one Path_element. Each Path_element identifies the enclosed_boundary for zero, one, or many General_open_profile objects.

4.3.78 General_outside_profile to Profile

Each General_outside_profile has boundary defined by exactly one Profile. Each Profile defines outside boundary for zero, one, or many General_outside_profile objects.

4.3.79 General_path to Path_element

Each General_path has the sweep_path defined by exactly one Path_element. Each Path_element defines the sweep_path for zero, one, or many General_path objects.

4.3.80 General_pattern to Orientation

Each General_pattern has the feature_placement defined by one or more Orientation. Each Orientation defines the feature_placement for zero, one, or many General_pattern objects.

4.3.81 General_pocket to Profile

Each General_pocket has the boundary defined by exactly one Profile. Each Profile defines the boundary for zero, one, or many General_pocket objects.

4.3.82 General_pocket to Boss

Each General_pocket has the volume_not_removed defined by zero, one or many Boss objects. Each Protrusion defines the volume_not_removed for zero, one, or many General_pocket objects.

NOTE - This assertion is established through Volume_select.

4.3.83 General_pocket to Protrusion

Each General_pocket has the volume_not_removed defined by zero, one or many Protrusion objects. Each Protrusion defines the volume_not_removed for zero, one, or many General_pocket objects.

NOTE - This assertion is established through Volume_select.

4.3.84 General_pocket_bottom_condition to Face_shape_element

Each General_pocket_bottom_condition has the floor defined by exactly one Face_shape_element. Each Face_shape_element defines the floor for zero, one, or many General_pocket_bottom_condition objects.

4.3.85 General_pocket_bottom_condition to Numeric_parameter

Each General_pocket_bottom_condition has the floor_radius defined by zero or one Numeric_parameter. Each Numeric_parameter defines the floor_radius for zero, one, or many General_pocket_bottom_condition objects.

4.3.86 General_profile_floor to Face_shape_element

Each General_profile_floor has the floor defined by exactly one Face_shape_element. Each Face_shape_element defines the floor for zero, one, or many General_profile_floor objects.

4.3.87 General_removal_volume to Shape_element

Each General_removal_volume has the removal_volume defined by one or more Shape_element objects. Each Shape_element defines the removal_volume for zero, one, or many General_removal_volume objects.

4.3.88 General_revolution to General_open_profile

Each General_revolution has the outer_edge_shape defined by exactly one General_open_profile. Each General_open_profile defines outer_edge_shape for zero, one, or many General_revolution objects.

4.3.89 General_rib_top_floor to Face_shape_element

Each General_rib_top_floor has the rib_top_face defined by one or more Ordered_face_element objects. Each Ordered_face_element defines the rib_top_floor for zero, one, or many General_rib_top_floor

objects.

4.3.90 General_shape_profile to Profile

Each General_shape_profile has the profile_boundary defined by exactly one Profile. Each Profile defines the profile_boundary for zero, one, or many General_shape_profile objects.

4.3.91 General_top_condition to Face_shape_element

Each General_top_condition has the top_face defined by exactly one Face_shape_element. Each Face_shape_element defines the top_face for zero, one, or many General_top_condition objects.

4.3.92 Geometric_tolerance to Material_condition_modifier

Each Geometric_tolerance has the modifier_control defined by zero or one Material_condition_modifier. Each Material_condition_modifier defines the modifier_control for zero, one, or many Geometric_tolerance objects.

4.3.93 Geometric_tolerance to Shape_aspect

Each Geometric_tolerance has the applied_shape defined by one or more Shape_aspect objects. Each Shape_aspect defines the applied_shape for zero, one, or many Geometric_tolerance objects.

4.3.94 Geometric_tolerance to Tolerance_zone

Each Geometric_tolerance has the zone_definition defined by zero or one Tolerance_zone. Each Tolerance_zone defines the zone_definition for zero, one, or many Geometric_tolerance objects.

4.3.95 Geometric_tolerance_precedence_relationship to Geometric_tolerance

Each Geometric_tolerance_precedence_relationship has the base_shape_tolerance defined by exactly one Geometric_tolerance. Each Geometric_tolerance defines the base_shape_tolerance for zero, one, or many Geometric_tolerance_precedence_relationship objects.

Each Geometric_tolerance_precedence_relationship has the pattern_shape_tolerance defined by exactly one Geometric_tolerance. Each Geometric_tolerance defines the pattern_shape_tolerance for zero, one, or many Geometric_tolerance_precedence_relationship objects.

4.3.96 Groove to Open_profile

Each Groove has a sweep defined by exactly one Open_profile. Each Open_profile defines the sweep for zero, one, or many Groove objects.

4.3.97 Implicit_base_shape_representation to Numeric_parameter

Each Implicit_base_shape_representation has the base_shape_length defined by exactly one Numeric_parameter. Each Numeric_parameter defines the base_shape_length for zero, one, or many

Implicit_base_shape_representation objects.

4.3.98 Implicit_base_shape_representation to Orientation

Each Implicit_base_shape_representation has placement defined by exactly one orientation. Each Orientation defines the placement for zero, one, or many Implicit_base_shape_representation objects.

4.3.99 Knurl to Partial_area_definition

Each Knurl has the partial_profile defined by zero or one Partial_area_definition. Each Partial_area_definition defines the partial_profile for zero, one, or many Knurl objects.

4.3.100 Knurl to Shape_element

Each Knurl has the applied_shape defined by exactly one Shape_element. Each Shape_element defines the applied_shape for zero, one, or many Knurl objects.

4.3.101 Linear_path to Numeric_parameter

Each Linear_path has the distance defined by exactly one Numeric_parameter. Each Numeric_parameter defines the distance for zero, one, or many Linear_path objects.

4.3.102 Linear_path to Direction_element

Each Linear_path has the direction defined by exactly one Direction_element. Each Direction_element defines the direction for zero, one, or many Linear_path objects.

4.3.103 Linear_profile to Numeric_parameter

Each Linear_profile has the profile_length defined by exactly one Numeric_parameter. Each Numeric_parameter defines the profile_length for zero, one, or many Linear_profile objects.

4.3.104 Linear_profile_tolerance to Datum

Each Linear_profile_tolerance has the geometric_reference defined by zero, one, two, or three Datum objects. Each Datum defines the geometric_reference for zero, one, or many Linear_profile_tolerance objects.

4.3.105 Linear_profile_tolerance to Orientation

Each Linear_profile_tolerance has an affected_plane defined by zero or one Orientation. Each Orientation defines an affected plane for zero, one, or many Linear_profile_tolerance objects.

4.3.106 Location_dimension_tolerance to Orientation

Each Location_dimension_tolerance has the plane and direction defined by zero or one Shape_aspect. Each Orientation defines the plane and direction for zero, one, or many Location_dimension_tolerance objects.

4.3.107 Location_tolerance to Shape_element

Each Location_tolerance has the termination_shape defined by exactly one Shape_element. Each Shape_element defines the termination_shape for zero, one, or many Location_dimension objects.

Each Location_dimension has the origin_shape defined by exactly one Shape_element. Each Shape_element defines the origin_shape for zero, one, or many Location_dimension objects.

4.3.108 Machining_feature to Orientation

Each Machining_feature has placement defined by exactly one Orientation. Each Orientation defines the placement for zero, one, or many Machining_feature objects.

4.3.109 Manufacturing_feature_group to Manufacturing_feature

Each Manufacturing_feature_group has the feature_groups defined by two or more Manufacturing_feature objects. Each Manufacturing_feature defines the feature_groups for zero, one, or many Manufacturing_-feature_group objects.

NOTE - This assertion is established through Manufacturing_group_select.

4.3.110 Manufacturing_feature_group to Manufacturing_feature_group

Each Manufacturing_feature_group has the feature_groups defined by two or more Manufacturing_feature_group objects. Each Manufacturing_feature_group defines the feature_groups for zero, one, or many Manufacturing_feature_group objects.

NOTE - This assertion is established through Manufacturing_group_select.

4.3.111 Marking to Descriptive_parameter

Each Marking has text defined by exactly one Descriptive_parameter. Each Descriptive_parameter defines text for zero, one, or many Marking objects.

4.3.112 Marking to Shape_element

Each Marking has an applied_to_shape defined by exactly one Shape_element. Each Shape_element defines the applied_to_shape for zero, one, or many Marking objects.

4.3.113 Multi_axis_feature to Planar_element

Each Multi_axis_feature has maximum_feature_limit defined by zero, one or many Planar_element. Each Planar_element defines the maximum_feature_limit for zero, one, or many Multi_axis_feature

objects.

4.3.114 Ngon_base_shape to Numeric_parameter

Each Ngon_base_shape has the number_of_sides defined by exactly one Numeric_parameter. Each Numeric_parameter defines the number_of_sides for zero, one, or many Ngon_base_shape objects.

Each Ngon_base_shape has the diameter defined by exactly one Numeric_parameter. Each Numeric_parameter defines the diameter for zero, one, or many Ngon_base_shape objects.

Each Ngon_base_shape has the corner_radius defined by exactly one Numeric_parameter. Each Numeric_parameter defines the corner_radius for zero, one, or many Ngon_base_shape objects.

4.3.115 Ngon_profile to Numeric_parameter

Each Ngon_profile has the number_of_sides defined by exactly one Numeric_parameter. Each Numeric_parameter defines the number_of_sides for zero, one, or many Ngon_profile objects.

Each Ngon_profile has the diameter defined by exactly one Numeric_parameter. Each Numeric_parameter defines the diameter for zero, one, or many Ngon_profile objects.

Each Ngon_profile has the corner_radius defined by zero or one Numeric_parameter. Each Numeric_parameter defines the corner_radius for zero, one, or many Ngon_profile objects.

4.3.116 Numeric_parameter_with_tolerance to Plus_minus_value

Each Numeric_parameter_with_tolerance has the implicit_tolerance defined by exactly one Plus_minus_value. Each Plus_minus_value defines the implicit_tolerance for zero, one, or many Numeric_parameter_with_tolerance objects.

NOTE - This assertion is established through the Numeric_parameter_tolerance_select.

4.3.117 Numeric_parameter_with_tolerance to Tolerance_limit

Each Numeric_parameter_with_tolerance has the implicit_tolerance defined by exactly one Tolerance_limit. Each Tolerance_limit defines the implicit_tolerance for zero, one, or many Numeric_parameter_with_tolerance objects.

NOTE - This assertion is established through the Numeric_parameter_tolerance_select.

4.3.118 Open_profile to Planar_element

Each Open_profile has the profile_limit defined by zero or one Planar_element. Each Planar_element defines the profile_limit for zero, one, or many Open_profile objects.

4.3.119 Outer_diameter to Numeric_parameter

Each Outer_diameter has the diameter defined by exactly one Numeric_parameter. Each Numeric_parameter defines the diameter for zero, one, or many Outer_diameter objects.

Each Outer_diameter has the feature_length defined by exactly one Numeric_parameter. Each Numeric_parameter defines the feature_length for zero, one, or many Outer_diameter objects.

4.3.120 Outer_diameter to Angle_taper

Each Outer_diameter has the reduced_size defined by zero or one Angle_taper. Each Angle_taper defines the reduced_size for zero, one, or many Outer_diameter objects.

NOTE - This assertion is established through Taper_select.

4.3.121 Outer_diameter to Diameter_taper

Each Outer_diameter has the reduced_size defined by zero or one Diameter_taper. Each Diameter_taper defines the reduced_size for zero, one, or many Outer_diameter objects.

NOTE - This assertion is established through Taper_select.

4.3.122 Outer_diameter to Directed_taper

Each Outer_diameter has the reduced_size defined by zero or one Directed_taper. Each Directed_taper defines the reduced_size for zero, one, or many Outer_diameter objects.

NOTE - This assertion is established through Taper_select.

4.3.123 Outer_diameter_to_shoulder to Numeric_parameter

Each Outer_diameter_to_shoulder has the diameter defined by exactly one Numeric_parameter. Each Numeric_parameter defines the diameter for zero, one, or many Outer_diameter_to_shoulder objects.

Each Outer_diameter_to_shoulder has the feature_length defined by exactly one Numeric_parameter. Each Numeric_parameter defines the feature_length for zero, one, or many Outer_diameter_to_shoulder objects.

4.3.124 Outer_diameter_to_shoulder to Vee_profile

Each Outer_diameter_to_shoulder has the v_shape_boundary defined by exactly one Vee_profile. Each Vee_profile defines the v_shape_boundary for zero, one, or many Outer_diameter_to_shoulder objects.

4.3.125 Parallelism_tolerance to Datum

Each Parallelism_tolerance has the geometric_reference defined by exactly one Datum. Each Datum defines the geometric_reference for zero, one, or many Parallelism_tolerance objects.

4.3.126 Parallelism_tolerance to Orientation

Each Parallelism_tolerance has an affected_plane defined by zero or one Orientation. Each Orientation defines the affected_plane for zero, one, or many Parallelism_tolerance objects.

4.3.127 Partial_area_definition to Numeric_parameter

Each Partial_area_definition has the effective_length defined by exactly one Numeric_parameter. Each Numeric_parameter defines the effective_length for zero, one, or many Partial_area_definition objects.

Each Partial_area_definition has the maximum_length defined by zero or one Numeric_parameter. Each Numeric_parameter defines the maximum_length for zero, one, or many Partial_area_definition objects.

4.3.128 Partial_area_definition to Orientation

Each Partial_area_definition has the placement defined by exactly one Orientation. Each Orientation defines the placement for zero, one, or many Partial_area_definition objects.

4.3.129 Partial_circular_path to Numeric_parameter

Each Partial_circular_path has the sweep_angle defined by exactly one Numeric_parameter. Each Numeric_parameter defines the sweep_angle for zero, one, or many Partial_circular_path objects.

4.3.130 Partial_circular_profile to Numeric_parameter

Each Partial_circular_profile has the radius defined by exactly one Numeric_parameter. Each Numeric_parameter defines the radius for zero, one, or many Partial_circular_profile objects.

Each Partial_circular_profile has the sweep_angle defined by exactly one Numeric_parameter. Each Numeric_parameter defines the sweep_angle for zero, one, or many Partial_circular_profile objects.

4.3.131 Partial_circular_shape_profile to Partial_circular_profile

Each Partial_circular_shape_profile has the open_boundary defined by exactly one Partial_circular_profile. Each Partial_circular_profile defines the open_boundary for zero, one, or many Partial_circular_shape_profile objects.

4.3.132 Path to Orientation

Each Circular_path has the placement defined by exactly one Orientation. Each Orientation defines the placement for zero, one, or many Circular_path objects.

4.3.133 Perpendicularity_tolerance to Datum

Each Perpendicularity_tolerance has the geometric_reference defined by exactly one Datum. Each Datum defines the geometric_reference for zero, one, or many Perpendicularity_tolerance objects.

4.3.134 Perpendicularity_tolerance to Orientation

Each Perpendicularity_tolerance has the affected_plane defined by zero or one Orientation. Each Orientation defines the affected_plane for zero, one, or many Perpendicularity_tolerance objects.

4.3.135 Placed_target to Orientation

Each Placed_target has the placement defined by exactly one Orientation. Each Orientation defines placement for zero, one, or many Placed_target objects.

4.3.136 Planar_element to Direction_element

Each Planar_element has the normal defined by exactly one Direction_element. Each Direction_element defines the normal for zero, one, or many Planar_element objects.

4.3.137 Planar_element to Location_element

Each Planar_element has the location defined by exactly one Location_element. Each Location_element defines the location for zero, one, or many Planar_element objects.

4.3.138 Planar_face to Closed_profile

Each Planar_face has the face_boundary defined by zero or one Closed_profile object. Each Closed_profile defines the face_boundary for zero, one, or many Planar_face objects.

4.3.139 Planar_face to Direction_element

Each Planar_face has the removal_direction defined by exactly one Direction_element. Each Direction_element defines the removal_direction for zero, one, or many Planar_face objects.

4.3.140 Planar_face to Linear_path

Each Planar_face has the course_of_travel defined by exactly one Linear_path. Each Linear_path defines the course_of_travel for zero, one, or many Planar_face objects.

4.3.141 Planar_face to Linear_profile

Each Planar_face has the removal_boundary defined by exactly one Linear_profile. Each Linear_profile defines the removal_boundary for zero, one, or many Planar_face objects.

4.3.142 Planar_face to Boss

Each Planar_face has the defined by zero, one or many Bose objects. Each Profile defines the for zero, one, or many Planar_face objects.

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NOTE - This assertion is established through Volume_select.

4.3.143 Planar_face to Protrusion

Each Planar_face has the volume_not_removed defined by zero, one or many Bose objects. Each Profile defines the volume_not_removed for zero, one, or many Planar_face objects.

NOTE - This assertion is established through Volume_select.

4.3.144 Planar_pocket_bottom_condition to Direction_element

Each Planar_pocket_bottom_condition has the floor_normal defined by exactly one Direction_element. Each Direction_element defines floor_normal for zero, one, or many Planar_pocket_bottom_condition objects.

4.3.145 Planar_pocket_bottom_condition to Location_element

Each Planar_pocket_bottom_condition has the floor_location defined by exactly one Location_element. Each Location_element defines the floor_location for zero, one, or many Planar_pocket_bottom_condition objects.

4.3.146 Planar_pocket_bottom_condition to Numeric_parameter

Each Planar_pocket_bottom_condition has the floor_radius defined by zero or one Numeric_parameter. Each Numeric_parameter defines the floor_radius for zero, one, or many Planar_pocket_bottom_condition objects.

4.3.147 Planar_profile_floor to Planar_element

Each Planar_profile_floor has the floor defined by exactly one Planar_element. Each Planar_element defines the floor for zero, one, or many Planar_profile_floor objects.

4.3.148 Planar_rib_top_floor to Closed_profile

Each Planar_rib_top_floor has the boundary defined by exactly one Closed_profile. Each Closed_profile defines the boundary for zero, one, or many Planar_rib_top_floor elements.

4.3.149 Planar_rib_top_floor to Planar_element

Each Planar_rib_top_floor has the floor_face defined by exactly one Planar_element. Each Planar_element defines the floor_face for zero, one, or many Planar_rib_top_floor elements.

4.3.150 Planar_top_condition to Direction_element

Each Planar_top_condition has the top_normal defined by exactly one Direction_element. Each Direction_element defines the top_normal direction for zero, one, or many Planar_top_condition objects.

4.3.151 Planar_top_condition to Location_element

Each Planar_top_condition has the top_location defined by exactly one Location_element. Each Location_element defines the top_location for zero, one, or many Planar_top_condition objects.

4.3.152 Pocket to Angle_taper

Each Pocket has the change_in_boundary defined by zero or one Angle_taper. Each Angle_taper defines the change_in_boundary for zero, one, or many Pocket objects.

NOTE - This assertion is established through Angle_or_directed_taper_select.

4.3.153 Pocket to Directed_taper

Each Pocket has the change_in_boundary defined by zero or one Directed_taper. Each Directed_taper defines the change_in_boundary for zero, one, or many Pocket objects.

NOTE - This assertion is established through Angle_or_directed_taper_select.

4.3.154 Pocket to Linear_path

Each Pocket has the pocket_depth defined by exactly one Linear_path. Each Linear_path defines the pocket_depth for zero, one, or many Pocket objects.

4.3.155 Pocket to Numeric_parameter

Each Pocket has the base_radius defined by zero or one Numeric_parameter. Each Numeric_parameter defines the base_radius for zero, one, or many Pocket objects.

4.3.156 Pocket to Pocket_bottom_condition

Each Pocket has the bottom_condition defined by exactly one Pocket_bottom_condition. Each Pocket_bottom_condition defines the bottom_condition for zero, one, or many Pocket objects.

4.3.157 Pocket to Through_pocket_bottom_condition

Each Pocket has the bottom_condition defined by exactly one Through_pocket_bottom_condition. Each Through_pocket_bottom_condition defines the bottom_condition for zero, one, or many Pocket objects.

4.3.158 Position_tolerance to Datum

Each Position_tolerance has the geometric_reference defined by one, two, or three Datum objects. Each Datum defines the geometric_reference for zero, one, or many Position_tolerance objects.

4.3.159 Position_tolerance to Orientation

Each Position_tolerance has the affected_plane defined by zero or one Orientation. Each Orientation

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defines the `affected_plane` for zero, one, or many `Position_tolerance` objects.

4.3.160 Profile to Orientation

Each `Profile` has the placement defined by exactly one `orientation`. Each `Orientation` defines the placement for zero, one, or many `Profile` objects.

4.3.161 Profile_feature to Linear_path

Each `Profile_feature` has the `profile_swept_shape` defined by exactly one `Linear_path`. Each `Linear_path` defines the `profile_swept_shape` for zero, one, or many `Profile_feature` objects.

4.3.162 Profile_floor to Numeric_parameter

Each `Profile_floor` has the `floor_radius` defined by zero or one `Numeric_parameter`. Each `Numeric_parameter` defines the `floor_radius` for zero, one, or many `Planar_floor` objects.

4.3.163 Projection to Shape_element

Each `Projection` has the `projection_end` defined by exactly one `Shape_element`. Each `Shape_element` defines the `projection_end` for zero, one, or many `Projection` objects.

4.3.164 Protrusion to Shape_element

Each `Protrusion` has the `shape_volume` defined by one or more `Shape_element` objects. Each `Shape_element` defines the `shape_volume` for zero, one, or many `Protrusion` objects.

4.3.165 Recess to Profile

Each `Recess` has the `fillet_boundary` defined by exactly one `Profile`. Each `Profile` defines the `fillet_boundary` for zero, one, or many `Recess` objects.

4.3.166 Recess to Pocket_bottom_condition

Each `Recess` has the `bottom_condition` defined by exactly one `Pocket_bottom_condition`. Each `Pocket_bottom_condition` defines the `bottom_condition` for zero, one, or many `Recess` objects.

4.3.167 Recess to Boss

Each `Recess` has the `volume_not_removed` defined by zero, one or many `Boss` objects. Each `Boss` defines the `volume_not_removed` for zero, one, or many `Recess` objects.

NOTE - This assertion is established through `Volume_select`.

4.3.168 Recess to Protrusion

Each Recess has the volume_not_removed defined by zero, one or many Protrusion objects. Each Protrusion defines the volume_not_removed for zero, one, or many Recess objects.

NOTE - This assertion is established through Volume_select.

4.3.169 Rectangular_boss to Angle_taper

Each Rectangular_boss has the change_in_boundary defined by zero or one Angle_taper. Each Angle_taper defines the change_in_boundary for zero, one, or many Rectangular_boss objects.

NOTE - This assertion is established through Angle_or_directed_taper_select.

4.3.170 Rectangular_boss to Directed_taper

Each Rectangular_boss has the change_in_boundary defined by zero or one Directed_taper. Each Directed_taper defines the change_in_boundary for zero, one, or many Rectangular_boss objects.

NOTE - This assertion is established through Angle_or_directed_taper_select.

4.3.171 Rectangular_boss to Rectangular_closed_profile

Each Rectangular_boss has the rectangular_profile defined by exactly one Rectangular_closed_profile. Each Rectangular_closed_profile defines the rectangular_profile for zero, one, or many Rectangular_boss objects.

4.3.172 Rectangular_closed_pocket to Rectangular_closed_profile

Each Rectangular_closed_pocket has a closed_boundary defined by exactly one Rectangular_closed_profile. Each Rectangular_closed_profile identifies a closed_boundary for zero, one, or many Rectangular_closed_pocket objects.

4.3.173 Rectangular_closed_pocket to Boss

Each Rectangular_closed_pocket has the volume_not_removed defined by zero, one or many Boss objects. Each Boss defines the volume_not_removed for zero, one, or many Rectangular_closed_pocket objects.

NOTE - This assertion is established through Volume_select.

4.3.174 Rectangular_closed_pocket to Protrusions

Each Rectangular_closed_pocket has the volume_not_removed defined by zero, one or many Protrusions objects. Each Protrusions defines the volume_not_removed for zero, one, or many Rectangular_closed_pocket objects.

NOTE - This assertion is established through Volume_select.

4.3.175 Rectangular_closed_profile to Numeric_parameter

Each Rectangular_closed_profile has the profile_width defined by exactly one Numeric_parameter. Each Numeric_parameter defines the profile_width for zero, one, or many Rectangular_closed_profile objects. Each Rectangular_closed_profile has the profile_length defined by exactly one Numeric_parameter. Each Numeric_parameter defines the profile_length for zero, one, or many Rectangular_closed_profile objects.

Each Rectangular_closed_profile has the corner_radius defined by zero or one Numeric_parameter. Each Numeric_parameter defines the corner_radius for zero, one, or many Rectangular_closed_profile objects.

4.3.176 Rectangular_closed_shape_profile to Rectangular_closed_profile

Each Rectangular_closed_shape_profile has the closed_boundary defined by exactly one Rectangular_closed_profile. Each Rectangular_closed_profile defines the closed_boundary for zero, one, or many Rectangular_closed_shape_profile objects.

4.3.177 Rectangular_offset_pattern to Direction_element

Each Rectangular_offset_pattern has the offset_direction defined by exactly one Direction_element. Each Direction_element defines the offset_direction for zero, one, or many Rectangular_offset_pattern objects.

4.3.178 Rectangular_offset_pattern to Numeric_parameter

Each Rectangular_offset_pattern has the column_index defined by exactly one Numeric_parameter. Each Numeric_parameter defines the column_index for zero, one, or many Rectangular_offset_pattern objects.

Each Rectangular_offset_pattern has the offset_distance defined by exactly one Numeric_parameter. Each Numeric_parameter defines the offset_distance for zero, one, or many Rectangular_offset_pattern objects.

Each Rectangular_offset_pattern has the row_index defined by exactly one Numeric_parameter. Each Numeric_parameter defines the row_index for zero, one, or many Rectangular_offset_pattern objects.

4.3.179 Rectangular_omit_pattern to Numeric_parameter

Each Rectangular_omit_pattern has the row_index defined by exactly one Numeric_parameter. Each Numeric_parameter defines the row_index for zero, one, or many Rectangular_omit_pattern objects.

Each Rectangular_omit_pattern has the column_index defined by exactly one Numeric_parameter. Each Numeric_parameter defines the column_index for zero, one, or many Rectangular_omit_pattern objects.

4.3.180 Rectangular_open_pocket to Boss

Each Rectangular_open_pocket has the volume_not_removed defined by zero, one or many Boss objects. Each Boss defines the volume_not_removed for zero, one, or many Rectangular_open_pocket objects.

NOTE - This assertion is established through Volume_select.

4.3.181 Rectangular_open_pocket to Protrusion

Each Rectangular_open_pocket has the volume_not_removed defined by zero, one or many Protrusions objects. Each Protrusions defines the volume_not_removed for zero, one, or many Rectangular_open_pocket objects

NOTE - This assertion is established through Volume_select.

4.3.182 Rectangular_open_pocket to Square_U_profile

Each Rectangular_open_pocket has the open_boundary defined by exactly one Square_U__profile. Each Square_U_profile defines the open_boundary for zero, one, or many Rectangular_open_pocket objects.

4.3.183 Rectangular_open_shape_profile to Square_U_profile

Each Rectangular_open_shape_profile has the open_boundary defined by exactly one Square_U_profile. Each Square_U_profile defines the open_boundary for zero, one, or many Rectangular_open_shape_profile objects.

4.3.184 Rectangular_pattern to Direction_element

Each Rectangular_pattern has the row_layout_direction defined by exactly one Direction_element. Each Direction_element defines the row_layout_direction for zero, one, or many Rectangular_pattern objects. Each Rectangular_pattern has the column_layout_direction defined by exactly one Direction_element. Each Direction_element defines the column_layout_direction for zero, one, or many Rectangular_pattern objects.

4.3.185 Rectangular_pattern to Numeric_parameter

Each Rectangular_pattern has the rows defined by exactly one Numeric_parameter. Each Numeric_parameter defines the rows for zero, one, or many Rectangular_pattern objects.

Each Rectangular_pattern has the columns defined by exactly one Numeric_parameter. Each Numeric_parameter defines the columns for zero, one, or many Rectangular_pattern objects.

Each Rectangular_pattern has the row_spacing defined by exactly one Numeric_parameter. Each Numeric_parameter defines the row_spacing for zero, one, or many Rectangular_pattern objects.

Each Rectangular_pattern has the column_spacing defined by exactly one Numeric_parameter. Each Numeric_parameter defines the column_spacing for zero, one, or many Rectangular_pattern objects.

4.3.186 Rectangular_pattern to Rectangular_offset_pattern

Each Rectangular_pattern has the relocated_base_feature defined by zero, one, or many

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Rectangular_offset_pattern objects. Each Rectangular_offset_pattern defines the relocated_base_feature for one or more Rectangular_pattern objects.

4.3.187 Rectangular_pattern to Rectangular_omit_pattern

Each Rectangular_pattern has the missing_base_feature defined by zero, one, or many Rectangular_omit_pattern objects. Each Rectangular_omit_pattern defines the missing_base_feature for one or more Rectangular_pattern objects.

4.3.188 Replicate_base to Machining_feature

Each Replicate_base has the base_feature defined by exactly one Machining_feature. Each Machining_feature defines the base_feature for zero, one, or many Replicate_base objects.

NOTE - This assertion is established through Replicate_base_select.

4.3.189 Replicate_base to Replicate_feature

Each Replicate_base has the base_feature defined by exactly one Replicate_feature. Each Replicate_feature defines the base_feature for zero, one, many Replicate_base objects.

NOTE - This assertion is established through Replicate_base_select.

4.3.190 Replicate_feature to Orientation

Each Replicate_feature has placement defined by exactly one Orientation. Each Orientation defines the placement for zero, one, or many Replicate_feature objects.

4.3.191 Replicate_feature to Replicate_base

Each Replicate_feature has the replicate_base_feature defined by exactly one Replicate_base. Each Replicate_base defines the replicate_base_feature for one or more Replicate_feature objects.

4.3.192 Revolved_feature to Numeric_parameter

Each Revolved_feature has the radius defined by exactly one Numeric_parameter. Each Numeric_parameter defines the radius for zero, one, or many Revolved_feature objects.

4.3.193 Revolved_feature to Direction_element

Each Revolved_feature has the material_side defined by exactly one Direction_element. Each Direction_element defines the material_side for zero, one, or many Revolved_feature objects.

4.3.194 Revolved_flat to Linear_profile

Each Revolved_flat has the flat_edge_shape defined by exactly one Linear_profile. Each Linear_profile

defines the flat_edge_shape for zero, one, or many Revolved_flat objects.

4.3.195 Revolved_round to Partial_circular_profile

Each Revolved_round has the rounded_edge_shape defined by exactly one Partial_circular_profile. Each Partial_circular_profile defines the rounded_edge_shape for zero, one, or many Revolved_round objects.

4.3.196 Rib_top to Direction_element

Each Rib_top has the removal_direction defined by exactly one Direction_element. Each Direction_element defines the removal_direction for zero, one or many Rib_top objects.

4.3.197 Rib_top to Rib_top_floor

Each Rib_top has the floor_condition defined by exactly one Rib_top_floor. Each Rib_top_floor defines the floor_condition for zero, one, or many Rib_top objects.

4.3.198 Round_hole to Blind_bottom_condition

Each Round_hole has the bottom_condition defined by exactly one Blind_bottom_condition. Each Blind_bottom_condition defines the bottom_condition for zero, one, or many Round_hole objects.

NOTE - This assertion is established through Hole_bottom_condition_select.

4.3.199 Round_hole to Through_bottom_condition

Each Round_hole has the bottom_condition defined by exactly one Through_bottom_condition. Each Through_bottom_condition defines the bottom_condition for zero, one, or many Round_hole objects.

NOTE - This assertion is established through Hole_bottom_condition_select.

4.3.200 Round_hole to Circular_closed_profile

Each Round_hole has the diameter defined by exactly one Circular_closed_profile. Each Circular_closed_profile defines the diameter for zero, one, or many Round_hole objects.

4.3.201 Round_hole to Linear_path

Each Round_hole has the hole_depth defined by exactly one Linear_path. Each Linear_path defines the hole_depth for zero, one, or many Round_hole objects.

4.3.202 Round_hole to Angle_taper

Each Round_hole has the change_in_diameter defined by zero or one Angle_taper. Each Angle_taper defines change_in_diameter for zero, one, or many Round_hole objects.

NOTE - This assertion is established through Taper_select.

4.3.203 Round_hole to Diameter_taper

Each Round_hole has the change_in_diameter defined by zero or one Diameter_taper. Each Diameter_taper defines change_in_diameter for zero, one, or many Round_hole objects.

NOTE - This assertion is established through Taper_select.

4.3.204 Round_hole to Directed_taper

Each Round_hole has the change_in_directed defined by zero or one Diameter_taper. Each Directed_taper defines change_in_diameter for zero, one, or many Round_hole objects.

NOTE - This assertion is established through Taper_select.

4.3.205 Rounded_end to Linear_path

Each Rounded_end has the course_of_travel defined by exactly one Linear_path. Each Linear_path defines the course_of_travel for zero, one, or many Rounded_end objects.

4.3.206 Rounded_end to Partial_circular_profile

Each Rounded_end has the partial_circular_boundary defined by exactly one Partial_circular_profile. Each Partial_circular_profile defines a partial_circular_boundary for zero, one, or many Rounded_end objects.

4.3.207 Rounded_U_profile to Numeric_parameter

Each Rounded_U_profile has the width defined by exactly one Numeric_parameter. Each Numeric_parameter defines the width for zero, one, or many Rounded_U_profile objects.

4.3.208 Second_chamfer_offset to Face_shape_element

Each Second_chamfer_offset has the second_face defined by exactly one Face_shape_element. Each Face_shape_element defines the second_face for zero, one, or many Second_chamfer_offset objects.

4.3.209 Second_offset to Numeric_parameter

Each Second_offset has the offset_amount defined by exactly one Numeric_parameter. Each Numeric_parameter defines the offset_amount for zero, one, or many Second_offset objects.

4.3.210 Shape to Base_shape

Each Shape has the base_shape_definition defined by zero or one Base_shape. Each Base_shape defines the base_shape_definition for exactly one Shape.

4.3.211 Shape to B-rep_shape_representation

Each Shape has the B-rep_form defined by zero, one, or many B-rep_shape_representation objects. Each B-rep_shape_representation defines the B-rep_form for exactly one Shape.

4.3.212 Shape to Shape_aspect

Each Shape has the element defined by zero, one, or many Shape_aspect objects. Each Shape_aspect defines the element for zero, one, or many Shape objects.

4.3.213 Shape_aspect to B-rep_model_element

Each Shape_aspect has the B-rep_shape defined by zero, one, or many B-rep_model_element objects. Each B-rep_model_element defines the B-rep_shape for exactly one Shape_aspect.

4.3.214 Shape_aspect to B-rep_shape_aspect_representation

Each Shape_aspect has the B-rep_form defined by zero, one, or many B-rep_shape_aspect_representation objects. Each B-rep_shape_aspect_representation defines the B-rep_form for exactly one Shape_aspect.

4.3.215 Shape_aspect to Shape_element

Each Shape_aspect has the element defined by zero or one Shape_element. Each Shape_element defines the element for exactly one Shape_aspect.

4.3.216 Shape_profile to Direction_element

Each Shape_profile has the removal_direction defined by exactly one Direction_element. Each Direction_element defines the removal_direction for zero, one or many Shape_profile objects.

4.3.217 Shape_profile to Profile_floor

Each Shape_profile has the floor_condition defined by exactly one Profile_floor. Each Profile_floor defines the floor_condition for zero, one, or many Shape_profile objects.

NOTE - This assertion is established through Profile_select.

4.3.218 Shape_profile to Through_profile_floor

Each Shape_profile has the floor_condition defined by exactly one Profile_floor. Each Profile_floor defines the floor_condition for zero, one, or many Shape_profile objects.

NOTE - This assertion is established through Profile_select.

4.3.219 Size_tolerance to Shape_element

Each Size_tolerance has the applied_shape defined exactly one Shape_element. Each Shape_element defines the applied_shape for zero, one, or many Size_dimension objects.

4.3.220 Slot to Open_profile

Each Slot has the sweep_shape defined by exactly one Open_profile. Each Open_profile defines the sweep_shape for zero, one, or many Slot objects.

4.3.221 Slot to Path

Each Slot has the course_of_travel defined by exactly one Path. Each Path defines the course_of_travel for zero, one, or many Slot objects.

4.3.222 Slot to Slot_end_type

Each Slot has the end_conditions defined by exactly two Slot_end_type objects. Each Slot_end_type defines the end_condition for zero, one, or many Slot objects.

4.3.223 Specification to Specification_usage_constraint

Each Specification has the constraint defined by zero, one, or many Specification_usage_constraint objects. Each Specification_usage_constraint defines the constraint for exactly one Specification.

4.3.224 Spherical_cap to Numeric_parameter

Each Spherical_cap has the internal_angle defined by exactly one Numeric_parameter. Each Numeric_parameter defines the internal_angle for zero, one, or many Spherical_cap objects.

Each Spherical_cap has the radius defined by exactly one Numeric_parameter. Each Numeric_parameter defines the radius for zero, one, or many Spherical_cap objects.

4.3.225 Spherical_hole_bottom to Numeric_parameter

Each Spherical_hole_bottom has the radius defined by exactly one Numeric_parameter. Each Numeric_parameter defines the radius for zero, one, or many Spherical_hole_bottom objects.

4.3.226 Square_U_profile to Numeric_parameter

Each Square_U_profile has the first_angle defined by exactly one Numeric_parameter. Each Numeric_parameter defines the first_angle for zero, one, or many Square_U_profile objects.

Each Square_U_profile has the first_radius defined by zero or one Numeric_parameter. Each Numeric_parameter defines the first_radius for zero, one, or many Square_U_profile objects.

Each Square_U_profile has the second_angle defined by exactly one Numeric_parameter. Each Numeric_parameter defines the second_angle for zero, one, or many Square_U_profile objects.

Each Square_U_profile has the second_radius defined by zero or one Numeric_parameter. Each

Numeric_parameter defines the second_radius for zero, one, or many Square_U_profile objects.

Each Square_U_profile has the width defined by exactly one Numeric_parameter. Each Numeric_parameter defines the width for zero, one, or many Square_U_profile objects.

4.3.227 Step to Vee_profile

Each Step has the removal_boundary defined by exactly one Vee_profile. Each Vee_profile defines the removal_boundary for zero, one, or many Step objects.

4.3.228 Step to Linear_path

Each Step has the course_of_travel defined by exactly one Linear_path. Each Linear_path defines the course_of_travel for zero, one, or many Step objects.

4.3.229 Step to Boss

Each Step has the volume_not_removed defined by zero, one or many Boss objects. Each Boss defines the volume_not_removed for zero, one, or many Step objects.

NOTE - This assertion is established through Volume_select.

4.3.230 Step to Protrusion

Each Step has the volume_not_removed defined by zero, one or many Protrusions objects. Each Protrusions defines the volume_not_removed for zero, one, or many Step objects.

NOTE - This assertion is established through Volume_select.

4.3.231 Straightness_tolerance to Orientation

Each Straightness_tolerance has the affected_plane defined by zero or one Orientation. Each Orientation defines the affected_plane for zero, one, or many Straightness_tolerance objects.

4.3.232 Surface_profile_tolerance to Datum

Each Surface_profile has the geometric_reference defined by zero, one, two, or three Datum objects. Each Datum defines the geometric_reference for zero, one, or many Surface_profile objects.

4.3.233 Symmetry_tolerance to Datum

Each Symmetry_tolerance has the geometric_reference defined by one, two, or three Datum objects. Each Datum defines the geometric_reference for zero, one, or many Symmetry_tolerance objects.

4.3.234 Symmetry_tolerance to Orientation

Each Symmetry_tolerance has the affected_plane defined by zero or one Orientation. Each Orientation

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defines the `affected_plane` for zero, one, or many `Symmetry_tolerance` objects.

4.3.235 `Target_area` to `Shape_element`

Each `Target_area` has the `area_shape` defined by exactly one `Shape_element`. Each `Shape_element` defines the `area_shape` by zero, one, or many `Shape_element` objects.

4.3.236 `Tee_profile` to `Numeric_parameter`

Each `Tee_profile` has the `cross_bar_depth` defined by exactly one `Numeric_parameter`. Each `Numeric_parameter` defines the `cross_bar_depth` for zero, one, or many `Tee_profile` objects.

Each `Tee_profile` has the `cross_bar_width` defined by exactly one `Numeric_parameter`. Each `Numeric_parameter` defines the `cross_bar_width` for zero, one, or many `Tee_profile` objects.

Each `Tee_profile` has the `depth` defined by exactly one `Numeric_parameter`. Each `Numeric_parameter` defines the `depth` for zero, one, or many `Tee_profile` objects.

Each `Tee_profile` has the `first_angle` defined by exactly one `Numeric_parameter`. Each `Numeric_parameter` defines the `first_angle` for zero, one, or many `Tee_profile` objects.

Each `Tee_profile` has the `first_offset` defined by exactly one `Numeric_parameter`. Each `Numeric_parameter` defines the `first_offset` for zero, one, or many `Tee_profile` objects.

Each `Tee_profile` has the `second_angle` defined by exactly one `Numeric_parameter`. Each `Numeric_parameter` defines the `second_angle` for zero, one, or many `Tee_profile` objects.

Each `Tee_profile` has the `second_offset` defined by exactly one `Numeric_parameter`. Each `Numeric_parameter` defines the `second_offset` for zero, one, or many `Tee_profile` objects.

Each `Tee_profile` has the `radius` defined by zero or one `Numeric_parameter`. Each `Numeric_parameter` defines the `radius` for zero, one, or many `Tee_profile` objects.

Each `Tee_profile` has the `width` defined by exactly one `Numeric_parameter`. Each `Numeric_parameter` defines the `width` for zero, one, or many `Tee_profile` objects.

4.3.237 `Thread` to `Descriptive_parameter`

Each `Thread` has the `fit_class` defined by exactly one `Descriptive_parameter`. Each `Descriptive_parameter` defines the `fit_class` for zero, one, or many `Thread` objects.

Each `Thread` has the `form` defined by exactly one `Descriptive_parameter`. Each `Descriptive_parameter` defines the `form` for zero, one, or many `Thread` objects.

Each `Thread` has the `qualifier` defined by zero or one `Descriptive_parameter`. Each `Descriptive_parameter` defines the `qualifier` for zero, one, or many `Thread` objects.

Each `Thread` has the `thread_hand` defined by exactly one `Descriptive_parameter`. Each

Descriptive_parameter defines the thread_hand for zero, one, or many Thread objects.

4.3.238 Thread to Numeric_parameter

Each Thread has the major_diameter defined by exactly one Numeric_parameter. Each Numeric_parameter defines the major_diameter for zero, one, or many Thread objects.

Each Thread has the number_of_threads defined by exactly one Numeric_parameter. Each Numeric_parameter defines the number_of_threads for zero, one, or many Thread objects.

4.3.239 Thread to Partial_area_definition

Each Thread has the partial_profile defined by exactly one Partial_area_definition. Each Partial_area_definition defines the partial_profile for zero, one, or many Thread objects.

4.3.240 Thread to Shape_element

Each Thread has the applied_shape defined by exactly one Shape_element. Each Shape_element defines the applied_shape for zero, one, or many Thread objects.

4.3.241 Tolerance_value to Limits_and_fits

Each Tolerance_value has the defined_value by zero or one Limit_and_fits. Each Limits_and_fits defines the defined_value for zero, one, or many Tolerance_value objects.

NOTE - This assertion is established through Tolerance_definition_select.

4.3.242 Tolerance_value to Plus_minus_value

Each Tolerance_value has the defined_value by zero or one Plus_minus_value. Each Plus_minus_value defines the defined_values for zero, one, or many Tolerance_value objects.

NOTE - This assertion is established through Tolerance_definition_select.

4.3.243 Tolerance_value to Tolerance_limit

Each Tolerance_value has the defined_value by zero or one tolerance_limit. Each tolerance_limit defines the defined_value for zero, one, or many Tolerance_value objects.

NOTE - This assertion is established through Tolerance_definition_select.

4.3.244 Tolerance_value to Tolerance_range

Each Tolerance_value has the defined_value by zero or one tolerance_range. Each tolerance_range defines the defined_value for zero, one, or many Tolerance_value objects.

NOTE - This assertion is established through Tolerance_definition_select.

4.3.245 Tolerance_zone to Tolerance_zone_definition

Each Tolerance_zone has zone_definition defined by exactly one Tolerance_zone_definition. Each Tolerance_zone_definition defines zone_definition for zero, one, or many Tolerance_zone objects.

4.3.246 Tolerance_zone to Projection

Each Tolerance_zone has extended_shape defined by zero, one, two, or three Projection objects. Each Projection defines extended_shape for zero, one, or many Tolerance_zone objects.

4.3.247 Tolerance_zone_definition to Shape_element

Each Tolerance_zone_definition has the first_element defined by exactly one Shape_element. Each Shape_element defines the first_element for zero, one, or many Tolerance_zone_definition objects.

Each Tolerance_zone_definition has the second_element defined by zero or one Shape_element. Each Shape_element defines the second_element for zero, one, or many Tolerance_zone_definition objects.

4.3.248 Total_runout_tolerance to Datum

Each Total_runout_tolerance has the geometric_reference defined by one or two Datum objects. Each Datum defines the geometric_reference for zero, one, or many Total_runout_tolerance objects.

4.3.249 Turned_knurl to Numeric_parameter

Each Turned_knurl has the tooth_depth defined by zero or one Numeric_parameter. Each Numeric_parameter defines the tooth_depth for zero, one, or many Turned_knurl objects.

Each Turned_knurl has the root_fillet defined by zero or one Numeric_parameter. Each Numeric_parameter defines the root_fillet for zero, one, or many Turned_knurl objects.

Each Turned_knurl has the major_diameter defined by exactly one Numeric_parameter. Each Numeric_parameter defines the major_diameter for zero, one, or many Turned_knurl objects.

Each Turned_knurl has the nominal_diameter defined by exactly one Numeric_parameter. Each Numeric_parameter defines the nominal_diameter for zero, one, or many Turned_knurl objects.

Each Turned_knurl has the number_of_teeth defined by zero or one Numeric_parameter. Each Numeric_parameter defines the number_of_teeth for zero, one, or many Turned_knurl objects.

Each Turned_knurl has the diametral_pitch defined by exactly one Numeric_parameter. Each Numeric_parameter defines the diametral_pitch for zero, one, or many Turned_knurl objects.

4.3.250 Vee_profile to Numeric_parameter

Each Vee_profile has the profile_radius defined by zero or one Numeric_parameter. Each

Numeric_parameter defines the profile_radius for zero, one, or many Vee_profile objects.

Each Vee_profile has the profile_angle defined by exactly one Numeric_parameter. Each Numeric_parameter defines the profile_angle for zero, one, or many Vee_profile objects.

Each Vee_profile has the tilt_angle defined by exactly one Numeric_parameter. Each Numeric_parameter defines the tilt_angle for zero, one, or many Vee_profile objects.

4.3.251 Woodruff_slot_end_type to Numeric_parameter

Each Woodruff_slot_end_type has the radius defined by exactly one Numeric_parameter. Each Numeric_parameter defines the radius for zero, one, or many Woodruff_slot_end_type objects.

5 Application interpreted model

5.1 Mapping specification

This clause contains the mapping table that shows how each UoF and application object of this part of ISO 10303 (see clause 4) maps to one or more AIM constructs (see annex A). The mapping table is organized in five columns.

Column 1) Application element: Name of an application element as it appears in the application object definition in 4.2. Application object names are written in uppercase. Attribute names and assertions are listed after the application object to which they belong and are written in lower case.

Column 2) AIM element: Name of an AIM element as it appears in the AIM (see annex A), the term “IDENTICAL MAPPING”, or the term “PATH”. AIM entities are written in lower case. Attribute names of AIM entities are referred to as <entity name>.<attribute name>. The mapping of an application element may result in several related AIM elements. Each of these AIM elements requires a line of its own in the table. The term “IDENTICAL MAPPING” indicates that both application objects of an application assertion map to the same AIM element. The term “PATH” indicates that the application assertion maps to the entire reference path.

Column 3) Source: For those AIM elements that are interpreted from the integrated resources or the application interpreted constructs, this is the number of the corresponding part of ISO 10303. For those AIM elements that are created for the purpose of this part of ISO 10303, this is the number of this part. Entities or types that are defined within the integrated resources have an AIC as the source reference if the use of the entity or type for the mapping is within the scope of the AIC.

Column 4) Rules: One or more numbers may be given that refer to rules that apply to the current AIM element or reference path. For rules that are derived from relationships between application objects, the same rule is referred to by the mapping entries of all the involved AIM elements. The expanded names of the rules are listed after the table.

Column 5) Reference path: To describe fully the mapping of an application object, it may be necessary to specify a reference path through several related AIM elements. The reference path column documents the

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role of an AIM element relative to the AIM element in the row succeeding it. Two or more such related AIM elements define the interpretation of the integrated resources that satisfies the requirement specified by the application object. For each AIM element that has been created for use within this part of ISO 10303, a reference path up to its supertype from an integrated resource is specified. For the expression of reference paths and the relationships between AIM elements the following notational conventions apply:

- a) `[]`: enclosed section constrains multiple AIM elements or sections of the reference path are required to satisfy an information requirement;
- b) `()`: enclosed section constrains multiple AIM elements or sections of the reference path are identified as alternatives within the mapping to satisfy an information requirement;
- c) `{ }`: enclosed section constrains the reference path to satisfy an information requirement;
- d) `<>`: enclosed section constrains at one or more required reference path;
- e) `||`: enclosed section constrains the supertype entity;
- f) `->`: attribute references the entity or select type given in the following row;
- g) `<-`: entity or select type is referenced by the attribute in the following row;
- h) `[i]`: attribute is an aggregation of which a single member is given in the following row;
- i) `[n]`: attribute is an aggregation of which member n is given in the following row;
- j) `=>`: entity is a supertype of the entity given in the following row;
- k) `<=`: entity is a subtype of the entity given in the following row;
- l) `=`: the string, select, or enumeration type is constrained to a choice or value;
- m) `\`: the reference path expression continues on the next line.
- n) `*`: used in conjunction with braces to indicate that any number of relationship entity data types may be assembled in a relationship tree structure

5.1.1 Part UoF

5.1.1.1 Part

AIM element: product_definition_formation
 Source: ISO 10303-41
 Rules: 5.2.4.5
 Reference Path: product_definition_formation<-
 product_definition.formation
 product_definition
 product_definition.frame_of_reference->
 product_definition_context<=
 application_context_element
 application_context_element.name='part definition'

5.1.1.1.1 part_description

AIM element: product.description
 Source: ISO 10303-41
 Rules: 5.2.4.4
 Reference Path: product_definition_formation
 product_definition_formation.of_product ->
 product
 product.description

5.1.1.1.2 part_id

AIM element: product.id
 Source: ISO 10303-41
 Rules: 5.2.4.4
 Reference Path: product_definition_formation
 product_definition_formation.of_product ->
 product
 product.id

5.1.1.1.3 part_name

AIM element: product.name
 Source: ISO 10303-41
 Rules: 5.2.4.4
 Reference Path: product_definition_formation
 product_definition_formation.of_product ->
 product
 product.name

5.1.1.1.4 part_revision_id

AIM element: product_definition_formation.id

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Source: ISO 10303-41

5.1.1.1.5 security_classification

AIM element: security_classification
Source: ISO 10303-41
Rules: 5.2.4.5,5.2.4.6,5.2.4.8
Reference Path: product_definition_formation
applied_classified_item = product_definition_formation
applied_classified_item <-
applied_security_classification_assignment.items[i]
applied_security_classification_assignment <=
security_classification_assignment
security_classification_assignment.assigned_security_classification ->
security_classification

5.1.1.1.6 serial_number_DML

AIM element: serial_numbered_effectivity.effectivity_start_id
Source: ISO 10303-41
Reference Path: product_definition_formation
effectivity_item= product_definition_formation
effectivity_item<-
applied_effectivity_assignment.items[i]
applied_effectivity_assignment<=
effectivity_assignment
effectivity_assignment,assigned_effectivity->
effectivity=>
serial_numbered_effectivity
serial_numbered_effectivity.effectivity_start_id

5.1.1.1.7 lot_number_DML

AIM element: lot_effectivity.effectivity_lot_id
Source: ISO 10303-41
Rule: Write rule about lot size equal to one.
Reference Path: product_definition_formation
effectivity_item= product_definition_formation
effectivity_item<-
applied_effectivity_assignment.items[i]
applied_effectivity_assignment<=
effectivity_assignment
effectivity_assignment,assigned_effectivity->
effectivity=>
lot_effectivity
lot_effectivity.effectivity_lot_id

5.1.1.1.8 vendor_DML

AIM element: product_definition_formation.description
 Source: ISO 10303-41

5.1.1.1.9 part to shape (as physical_form)

AIM element: PATH
 Reference Path: product_definition_formation <-
 product_definition.formation
 product_definition
 characterized_product_definition = product_definition
 characterized_product_definition
 characterized_definition = characterized_product_definition
 characterized_definition <-
 property_definition.definition
 property_definition =>
 product_definition_shape

5.1.2 Shape UoF**5.1.2.1 Base_shape**

AIM element: product_definition_shape
 Source: ISO 10303-41
 Reference Path: {product_definition_shape <=
 property_definition
 property_definition.definition ->
 characterized_definition <-
 material_designation.definitions[i]}

5.1.2.2 Block_base_shape

AIM element: block_shape_representation
 Source: ISO 10303-219
 Rules: 5.2.4.1, 5.2.4.8, 5.2.4.11
 Reference Path: block_shape_representation <=
 shape_representation_with_parameters <=
 shape_representation

5.1.2.2.1 block_base_shape to numeric_parameter (as height)

AIM element: PATH
Reference Path: block_shape_representation <=
shape_representation_with_parameters <=
shape_representation <=
representation
representation.items[i] ->
{representation_item
representation_item.name = 'height'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.2.2.2 block_base_shape to numeric_parameter (as width)

AIM element: PATH
Reference Path: block_shape_representation <=
shape_representation_with_parameters <=
shape_representation <=
representation
representation.items[i] ->
{representation_item
representation_item.name = 'width'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.2.3 Cylindrical_base_shape

AIM element: cylindrical_shape_representation
Source: ISO 10303-224
Rules: 5.2.4.1, 5.2.4.8, 5.2.4.11
Reference Path: cylindrical_shape_representation <=
shape_representation_with_parameters <=
shape_representation

5.1.2.3.1 cylindrical_base_shape to numeric_parameter (as diameter)

AIM element: PATH
 Reference Path: cylindrical_shape_representation <=
 shape_representation_with_parameters <=
 shape_representation <=
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'diameter'}
 representation_item =>
 measure_representation_item
 { measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit }

5.1.2.4Implicit_base_shape_representation

AIM element: shape_representation_with_parameters
 Source: ISO 10303-522
 Rules: 5.2.4.1, 5.2.4.8, 5.2.4.11
 Reference Path: shape_representation_with_parameters <=
 shape_representation

5.1.2.4.1 implicit_base_shape_representation to numeric_parameter (as base_shape_length)

AIM element: PATH
 Reference Path: shape_representation_with_parameters <=
 shape_representation <=
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'length'}
 representation_item =>
 measure_representation_item
 { measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit }

5.1.2.4.2 implicit_base_shape_representation to orientation (as placement)

AIM element: PATH
Reference Path: shape_representation_with_parameters <=
shape_representation <=
representation
representation.items[i] ->
{representation_item
representation_item.name = 'orientation'}
representation_item =>
geometric_representation_item =>
placement

5.1.2.5Ngon_base_shape

AIM element: ngon_shape_representation
Source: ISO 10303-224
Rules: 5.2.4.1, 5.2.4.8, 5.2.4.11
Reference Path: ngon_shape_representation <=
shape_representation_with_parameters <=
shape_representation

5.1.2.5.1 circumscribed_or_across_flats

AIM element: (representation_item.name = 'circumscribed diameter')
(representation_item.name =
'diameter across flats')
Source: ISO 10303-43
Reference Path: ngon_shape_representation <=
shape_representation_with_parameters <=
shape_representation <=
representation
representation.items[i] ->
representation_item
(representation_item.name = 'circumscribed diameter')
(representation_item.name = 'diameter across flats')

5.1.2.5.2 ngon_base_shape to numeric_parameter (as corner_radius)

AIM element: PATH

Reference Path: ngon_shape_representation <=
 shape_representation_with_parameters <=
 shape_representation <=
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'corner radius'}
 representation_item =>
 measure_representation_item
 { measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit }

5.1.2.5.3 ngon_base_shape to numeric_parameter (as diameter)

AIM element: PATH

Reference Path: ngon_shape_representation <=
 shape_representation_with_parameters <=
 shape_representation <=
 representation
 representation.items[i] ->
 {representation_item
 (representation_item.name = 'circumscribed diameter')
 (representation_item.name = 'diameter across flats')}
 representation_item =>
 measure_representation_item
 { measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit }

5.1.2.5.4 ngon_base_shape to numeric_parameter (as number_of_sides)

AIM element: PATH

Reference Path: ngon_shape_representation <=
shape_representation_with_parameters <=
shape_representation <=
representation
representation.items[i] ->
{representation_item
representation_item.name = 'number of sides'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit
measure_with_unit.value_component ->
measure_value
measure_value = count_measure
count_measure}

5.1.2.6B-rep_model_element

AIM element: (geometric_representation_item)

(topological_representation_item)

Source: ISO 10303-42

5.1.2.6.1 B-rep_model_element to B-rep_model (as element)

AIM element: PATH

Reference Path: (geometric_representation_item =>
surface <=
face_surface.face_geometry
face_surface <=
face <-)
(topological_representation_item =>
face <-)
connected_face_set.cfs_faces[i]
connected_face_set =>
closed_shell <=
manifold_solid_brep.outer
manifold_solid_brep

5.1.2.7B-rep_shape_aspect_representation

AIM element: advanced_brep_shape_representation
 Source: ISO 10303-514
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: advanced_brep_shape_representation <=
 shape_representation

5.1.2.7.1 B-rep_shape_aspect_representation to B-rep_model (as shape-definition)

AIM element: PATH
 Reference Path: advanced_brep_shape_representation <=
 shape_representation <=
 representation
 representation.items[i] ->
 representation_item =>
 geometric_representation_item =>
 solid_model =>
 manifold_solid_brep

5.1.2.8B-rep_shape_representation

AIM element: advanced_brep_shape_representation
 Source: ISO 10303-514
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: advanced_brep_shape_representation <=
 shape_representation

5.1.2.8.1 B-rep_shape_representation to B-rep_model (as shape_definition)

AIM element: PATH
 Reference Path: advanced_brep_shape_representation <=
 shape_representation <=
 representation
 representation.items[i] ->
 representation_item =>
 geometric_representation_item =>
 solid_model =>
 manifold_solid_brep

5.1.2.9Explicit_base_shape_representation

AIM element: shape_representation
 Source: ISO 10303-41
 Rules: 5.2.4.1

5.1.2.9.1 explicit_base_shape_representation to B-rep_shape_representation (as B-rep_form)

AIM element: IDENTICAL MAPPING

5.1.2.10Shape

AIM element: product_definition_shape

Source: ISO 10303-41

5.1.2.10.1 shape to base_shape (as base_shape_definition)

AIM element: PATH

Reference Path: product_definition_shape <=
property_definition
property_definition.definition ->
characterized_definition
characterized_definition = characterized_product_definition
characterized_product_definition
characterized_product_definition = product_definition
product_definition <=
product_definition_relationship.relying_product_definition
{product_definition_relationship =>
product_definition_usage =>
make_from_usage_option}
product_definition_relationship
product_definition_relationship.related_product_definition ->
product_definition
characterized_product_definition = product_definition
characterized_product_definition
characterized_definition = characterized_product_definition
{characterized_definition <=
material_designation.definitions[i]
material_designation}
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape

5.1.2.10.2 shape to B-rep_shape_representation (as B-rep_form)

AIM element: PATH
 Rules: 5.2.4.1,5.2.4.7,5.2.4.11
 Reference Path: product_definition_shape <=
 property_definition
 representation_definition=property_definition<-
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 representation =>
 shape_representation =>
 advanced_brep_shape_representation

5.1.2.10.3 shape to shape_aspect (as element)

AIM element: PATH
 Reference Path: product_definition_shape <-
 shape_aspect.of_shape
 shape_aspect

5.1.2.11 Shape_aspect

AIM element: shape_aspect
 Source: ISO 10303-41
 Rules: 5.2.4.9

5.1.2.11.1 shape_aspect to B-rep_model_element (as B-rep_shape)

AIM element: PATH
 Reference Path: shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <-
 property_definition.definition
 property_definition
 representation_definition=property_definition<-
 property_definition_representation.definition
 property_definition_representation
 property_definition_representation.used_representation ->
 representation
 representation.items[i] ->
 representation_item =>
 (geometric_representation_item)
 (topological_representation_item)

5.1.2.11.2 shape_aspect to B-rep_shape_aspect_representation (as B-rep-form)

AIM element: PATH
Rules: 5.2.4.1,5.2.4.7,5.2.4.11
Reference Path: shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <-
property_definition.definition
property_definition
representation_definition=property_definition<-
property_definition_representation.definition
property_definition_representation
property_definition_representation.used_representation ->
representation =>
shape_representation =>
advanced_brep_shape_representation

5.1.2.11.3 shape_aspect to shape_element (as element)

AIM element: IDENTICAL MAPPING

5.1.2.12 Shape_element

AIM element: shape_aspect
Source: ISO 10303-41
Rules: 5.2.4.9
Reference Path: {shape_aspect
shape_aspect.product_definitional = TRUE}
(shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <-
property_definition.definition
property_definition
representation_definition=property_definition<-
property_definition_representation.definition
property_definition_representation
property_definition_representation.used_representation ->
representation =>
shape_representation)

5.1.3 Geometric UoF

5.1.3.1 B-rep_model

AIM element: manifold_solid_brep
Source: ISO 10303-42

5.1.3.2 Cartesian_coordinate_space

AIM element: geometric_representation_context
Source: ISO 10303-42

5.1.3.2.1 units

AIM element: geometric_representation_context.coordinate_space_dimension
Source: ISO 10303-42

5.1.3.3 Geometric_model

AIM element: shape_representation
Source: ISO 10303-41
Reference Path: shape_representation<=
representation

5.1.3.3.1 accuracy

AIM element: descriptive_representation_item.description
Source: ISO 10303-41
Reference Path: shape_representation<=
representation
representation.items[i]->
representation_item<=
{representation_item.name='accuracy'}
descriptive_representation_item
descriptive_representation_item.description

5.1.3.3.2 description

AIM element: representation.description
Source: ISO 10303-41
Reference Path: shape_representation<=
representation
representation.description

5.1.3.3.3 model_extent

AIM element: representation.name
Source: ISO 10303-41
Reference Path: shape_representation<=
representation
representation.name

5.1.3.3.4 model_id

AIM element: representation.id
Source: ISO 10303-41
Reference Path: shape_representation<=
representation
representation.id

5.1.3.3.5 role

AIM element: description_attribute.attributer_value
Source: ISO 10303-41
Reference Path: shape_representation<=
representation
description_attribute_select=representation
description_attribute_select<-
description_attribute_described_item
description_attribute
description_attribute.attributer_value

5.1.3.3.6 version_id

AIM element: id_attribute.attributer_value
Source: ISO 10303-41
Reference Path: shape_representation<=
representation
id_attribute_select=representation
id_attribute_select<-
id_attribute_identified_item
id_attribute
id_attribute.attributer_value

5.1.3.3.7 geometric_model to Cartesian_coordinate_space (as is_defined_in)

AIM element: PATH
 Reference Path: shape_representation<=
 representation
 representation.context_of_items
 representation_context=>
 geometric_representation_context

5.1.4 Orientation UoF**5.1.4.1 Orientation**

AIM element: placement
 Source: ISO 10303-42

5.1.4.1.1 axis

AIM element: (axis1_placement.axis)
 ((axis2_placement_3d.axis)
 (axis2_placement_3d.ref_direction))
 Source: ISO 10303-42
 Reference Path: placement =>
 (axis1_placement
 axis1_placement.axis)
 (axis2_placement_3d
 (axis2_placement_3d.axis)
 (axis2_placement_3d.ref_direction))

5.1.4.1.2 location

AIM element: placement.location
 Source: ISO 10303-42

5.1.5 Property_parameter UoF**5.1.5.1 Property_parameter**

AIM element: representation_item
 Source: ISO 10303-43

5.1.5.1.1 parameter_name

AIM element: representation_item.name
 Source: ISO 10303-43

5.1.5.2Descriptive_parameter

AIM element: descriptive_representation_item
Source: ISO 10303-45

5.1.5.2.1 descriptive_string

AIM element: descriptive_representation_item.description
Source: ISO 10303-45

5.1.5.3Numeric_parameter

AIM element: measure_representation_item
Source: ISO 10303-45

5.1.5.3.1 Numeric_parameter to Numerical_value (as parametric_value)

AIM element: PATH
Reference Path: measure_representation_item <=
 measure_with_unit

5.1.5.3.2 Numeric_parameter to Value_limitation (as parametric_tolerance)

AIM element: PATH
Reference Path: IDENTICAL MAPPING

5.1.6 Value_with_unit UoF

5.1.6.1Numeric_value

AIM element: measure_with_unit
Source: ISO 10303-45

5.1.6.1.1 value_component

AIM element: length_measure
Source: ISO 10303-41
Reference Path: measure_with_unit
 measure_with_unit.value_component ->
 measure_value=length_measure
 length_measure

5.1.6.2 Value_with_unit

AIM element: measure_with_unit
Source: ISO 10303-45

5.1.6.2.1 unit_component

AIM element: named_unit
Source: ISO 10303-41
Reference Path: measure_with_unit
 measure_with_unit.unit_component ->
 unit
 unit = named_unit
 named_unit

5.1.6.2.2 significant_digits

AIM element: precision_qualifier.precision_value
Source: ISO 10303-45
Rules: ???
Reference Path: measure_with_unit=>
 measure_representation_item
 representation_item =>
 qualified_representation_item
 qualified_representation_item.qualifiers[1] ->
 value_qualifier
 value_qualifier = precision_qualifier
 precision_qualifier
 precision_qualifier.precision_value

5.1.6.3 Value_range

AIM element: measure_with_unit
Source: ISO 10303-45

5.1.6.3.1 upper_limit

AIM element: length_measure
Source: ISO 10303-41
Reference Path: measure_with_unit
(measure_with_unit<=
measure_representation_item<=
representation_item
representation_item.name = 'upper limit')
measure_with_unit.value_component ->
measure_value=length_measure
length_measure

5.1.6.3.2 lower_limit

AIM element: length_measure
Source: ISO 10303-41
Reference Path: measure_with_unit
(measure_with_unit<=
measure_representation_item<=
representation_item
representation_item.name = 'lower limit')
measure_with_unit.value_component ->
measure_value=length_measure
length_measure

5.1.6.4 Value_limit

AIM element: measure_with_unit
Source: ISO 10303-45

5.1.6.4.1 limit

AIM element: length_measure
Source: ISO 10303-41
Reference Path: measure_with_unit
{ measure_with_unit<=
measure_qualification.qualified_measure
measure_qualification
measure_qualification.qualifiers[I]->
value_qualifier = type_qualifier
type_qualifier
type_qualifier.name='limit' }
measure_with_unit.value_component ->
measure_value=length_measure
length_measure

5.1.6.4.2 limit_qualifier

AIM element: type_qualifier
 Source: ISO 10303-45
 Reference Path: measure_with_unit<-
 measure_qualification.qualified_measure
 measure_qualification
 measure_qualification.qualifiers[I]->
 value_qualifier = type_qualifier
 type_qualifier

5.1.7 Shape_element_feature UoF

5.1.7.1 Direction_element

AIM element: direction_shape_representation
 Source: ISO 10303-522
 Rules: 5.2.4.7
 Reference Path: direction_shape_representation <=
 shape_representation<=
 representation
 {representation.items[i]->
 representation_item=>
 geometric_representation_item=>
 direction}

5.1.7.2 Face_shape_element

AIM element: face_shape_representation
 Source: ISO 10303-522
 Rules: 5.2.4.7
 Reference Path: face_shape_representation <=
 shape_representation<=
 representation
 representation.items[i] ->
 representation_item =>
 geometric_representation_item =>
 (face_surface)
 (oriented_face)

5.1.7.3 Location_element

AIM element: location_shape_representation
 Source: ISO 10303-522
 Rules: 5.2.4.7
 Reference Path: location_shape_representation <=
 shape_representation<=

ISO/CD 10303-219:2003(E)

```
representation
representation.items[i] ->
{representation_item
representation_item.name = 'orientation'}
{representation_item =>
geometric_representation_item =>
point=>
cartesian_point}
```

5.1.7.4 Path_element

AIM element: path_shape_representation
Source: ISO 10303-522
Rules: 5.2.4.7
Reference Path: path_shape_representation <=
shape_representation<=
representation
representation.items[i] ->
{representation_item
representation_item.name = 'profile shape'}
representation_item =>
(geometric_representation_item =>
curve=>
bounded_curve)
(topological_representation_item=>
edge=>
edge_curve)

5.1.7.5 Planar_element

AIM element: planar_shape_representation
 Source: ISO 10303-522
 Reference Path: planar_shape_representation <=
 shape_representation <=
 representation

5.1.7.5.1 location

AIM element: cartesian_point
 Source: ISO 10303-42
 Reference Path: planar_shape_representation <=
 shape_representation <=
 representation
 representation.items[i] ->
 representation_item =>
 geometric_representation_item =>
 surface=>
 elementary_surface
 {elementary_surface=>
 plane}
 elementary_surface.position->
 axis2_placement_3d<=
 placement
 placement.location->
 cartesian_point

5.1.7.5.2 normal

AIM element: direction
 Source: ISO 10303-42
 Reference Path: planar_shape_representation <=
 shape_representation <=
 representation
 representation.items[i] ->
 representation_item =>
 geometric_representation_item =>
 surface=>
 elementary_surface
 {elementary_surface=>
 plane}
 elementary_surface.position->
 axis2_placement_3d.axis->
 direction

5.1.7.6 Feature

Reference Path: shape_aspect
Source: ISO 10303-41
Reference Path: shape_aspect

5.1.7.6.1 label

AIM element: shape_aspect.description
Source: ISO 10303-41
Reference Path: shape_aspect
shape_aspect.description

5.1.7.6.2 feature to orientation (as placement)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <-
property_definition.definition
{property_definition=>
product_definition_shape}
property_definition
representation_definition=property_definition<-
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'orientation'}
representation_item =>
geometric_representation_item =>
placement

5.1.8 Manufacturing_feature UoF

5.1.8.1 Manufacturing_feature

AIM element: characterized_object
Source: ISO 10303-41

5.1.8.2 Machining_feature

AIM element: instanced_feature
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: instanced_feature <=
[shape_aspect]
[feature_definition <=
characterized_object]

5.1.8.3 Manufacturing_feature_group

AIM element: group
Source: ISO 10303-41

5.1.8.3.1 group_description

AIM element: group.description
Source: ISO 10303-41

5.1.8.3.2 group_name

AIM element: group.name
Source: ISO 10303-41

5.1.8.3.3 manufacturing_feature_group to manufacturing_feature (as feature groups)

AIM element: PATH
Reference Path: group<-
group_assignment.assigned_group
group_assignment=>
applied_group_assignment
applied_group_assignment.items->
group_item
(group_item=instanced_feature)
(group_item=replicate_feature)
(group_item=transition_feature)

5.1.8.3.4 manufacturing_feature_group to manufacturing_feature_group (as feature groups)

AIM element: PATH
Reference Path: group<-
group_relationship.related_group
group_relationship
group_relationship.relying_group->
group

5.1.8.4 Replicate_base

AIM element: feature_component_relationship
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.13, 5.2.4.14
Reference Path: feature_component_relationship <=
shape_aspect_relationship

5.1.8.4.1 replicate_base to machining_feature (as base_feature)

AIM element: PATH
Reference Path: feature_component_relationship <=
shape_aspect_relationship
shape_aspect_relationship.related_shape_aspect ->
shape_aspect =>
instanced_feature

5.1.8.4.2 replicate_base to replicate_feature (as base_feature)

AIM element: PATH
Reference Path: feature_component_relationship <=
shape_aspect_relationship
shape_aspect_relationship.related_shape_aspect ->
shape_aspect =>
instanced_feature<=
feature_definition<=
replicate_feature

5.1.8.5 Replicate_feature

AIM element: replicate_feature
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: replicate_feature <=
{feature_definition<=
instanced_feature}

feature_definition<=
characterized_object

5.1.8.5.1 replicate_feature to replicate_base (as replicate_base_feature)

AIM element: PATH
 Rules: 5.2.4.3, 5.2.4.13, 5.2.4.14
 Reference Path: replicate_feature <=
 feature_definition=>
 instanced_feature<=
 shape_aspect <-
 shape_aspect_relationship.relate_shape_aspect
 shape_aspect_relationship =>
 feature_component_relationship
 {shape_aspect_relationship.name='pattern basis'}

5.1.8.6 Transition_feature

AIM element: transition_feature
 Source: ISO 10303-522
 Rules: 5.2.4.9, 5.2.4.13, 5.2.4.14
 Reference Path: transition_feature <=
 shape_aspect

5.1.9 Replicate_feature UoF

5.1.9.1 Circular_offset_pattern

AIM element: shape_aspect
 Source: ISO 10303-41
 Rules: 5.2.4.10
 Reference Path: [shape_aspect <-
 shape_aspect_relationship.related_shape_aspect
 shape_aspect_relationship =>
 feature_component_relationship =>
 pattern_offset_membership]
 [shape_aspect <-
 shape_aspect_relationship.related_shape_aspect
 {shape_aspect_relationship =>
 feature_component_relationship}
 shape_aspect_relationship.relate_shape_aspect->
 shape_aspect=>
 modified_pattern]

5.1.9.1.1 circular_offset_pattern to numeric_parameter (as angular_offset)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <-
property_definition.definition
property_definition <-
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = offset'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
plane_angle_measure_with_unit}

5.1.9.1.2 circular_offset_pattern to numeric_parameter (as index_number)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path:


```

shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <-
property_definition.definition
property_definition <-
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'offset index'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit
measure_with_unit.value_component ->
measure_value
measure_value = count_measure
count_measure}
    
```

5.1.9.2 Circular_omit_pattern

AIM element: shape_aspect
Source: ISO 10303-41
Rules: 5.2.4.10
Reference Path: [shape_aspect <-
shape_aspect_relationship.related_shape_aspect
shape_aspect_relationship =>
feature_component_relationship =>
pattern_omit_membership]
[shape_aspect <-
shape_aspect_relationship.related_shape_aspect
{ shape_aspect_relationship =>
feature_component_relationship }
shape_aspect_relationship.relatng_shape_aspect->
shape_aspect=>
modified_pattern]

5.1.9.2.1 circular_omit_pattern to numeric_parameter (as omit_index)

AIM element: PATH

Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11

Reference Path: shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <-
 property_definition.definition
 property_definition <-
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'omit_index'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit
 measure_with_unit.value_component ->
 measure_value
 measure_value = count_measure
 count_measure}

5.1.9.3 Circular_pattern

AIM element: circular_pattern

Source: ISO 10303-522

Rules: 5.2.4.9

Reference Path: circular_pattern <=
 replicate_feature <=
 {feature_definition=>
 instanced_feature}
 feature_definition<=
 characterized_object

5.1.9.3.1 circular_pattern to circular_offset_pattern (as relocated_base_-feature)

AIM element: PATH
Rules: 5.2.4.10
Reference Path: circular_pattern <=
 replicate_feature <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 [shape_aspect <=
 shape_aspect_relationship.relate_shape_aspect
 {shape_aspect_relationship =>
 feature_component_relationship =>
 pattern_offset_membership}
 shape_aspect_relationship
 shape_aspect_relationship.related_shape_aspect ->
 shape_aspect]
 [shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 {shape_aspect_relationship =>
 feature_component_relationship}
 {shape_aspect_relationship.description='base pattern'}
 shape_aspect_relationship.relate_shape_aspect->
 shape_aspect<=
 {shape_aspect=>
 modified_pattern}
 shape_aspect_relationship.relate_shape_aspect
 {shape_aspect_relationship =>
 feature_component_relationship}
 {shape_aspect_relationship.description='modified pattern'}
 shape_aspect_relationship.related_shape_aspect->
 shape_aspect]

5.1.9.3.2 circular_pattern to circular_omit_pattern (as missing_base_feature)

AIM element: PATH
 Rules: 5.2.4.10, 5.2.4.9
 Reference Path: circular_pattern <=
 replicate_feature <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 [shape_aspect <=
 shape_aspect_relationship.relate_shape_aspect
 { shape_aspect_relationship =>
 feature_component_relationship =>
 pattern_omit_membership}
 shape_aspect_relationship
 shape_aspect_relationship.related_shape_aspect ->
 shape_aspect]
 [shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 { shape_aspect_relationship =>
 feature_component_relationship}
 { shape_aspect_relationship.description='base pattern'}
 shape_aspect_relationship.relate_shape_aspect->
 shape_aspect<=
 { shape_aspect=>
 modified_pattern}
 shape_aspect_relationship.relate_shape_aspect
 { shape_aspect_relationship =>
 feature_component_relationship}
 { shape_aspect_relationship.description='modified pattern'}
 shape_aspect_relationship.related_shape_aspect->
 shape_aspect]

5.1.9.3.3 circular_pattern to numeric_parameter (as angular_spacing)

AIM element: PATH
Rules: 5.2.4.10, 5.2.4.9
Reference Path: circular_pattern <=
 replicate_feature <=
 feature_definition <=
 characterized_object
 shape_definition = characterized_object
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'angular spacing'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 plane_angle_measure_with_unit}

5.1.9.3.4 circular_pattern to numeric_parameter (as base_feature_diameter)

AIM element: PATH
 Rules: 5.2.4.10, 5.2.4.9
 Reference Path:


```

circular_pattern <=
  replicate_feature <=
  feature_definition <=
  characterized_object
  shape_definition = characterized_object
  shape_definition
  characterized_definition = shape_definition
  characterized_definition <-
  property_definition.definition
  property_definition
  representation_definition=property_definition<-
  property_definition_representation.definition
  {property_definition_representation =>
  shape_definition_representation}
  property_definition_representation
  property_definition_representation.used_representation ->
  {representation =>
  shape_representation =>
  shape_representation_with_parameters}
  representation
  representation.items[i] ->
  {representation_item
  representation_item.name = 'diameter'}
  representation_item =>
  measure_representation_item
  {measure_representation_item <=
  measure_with_unit =>
  length_measure_with_unit}
    
```

5.1.9.3.5 circular_pattern to numeric_parameter (as base_feature_rotation)

AIM element: PATH
Rules: 5.2.4.10, 5.2.4.9
Reference Path: circular_pattern <=
 replicate_feature <=
 feature_definition <=
 characterized_object
 shape_definition = characterized_object
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'base feature rotation'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 plane_angle_measure_with_unit}

5.1.9.3.6 circular_pattern to numeric_parameter (as number_of_features)

AIM element: PATH
 Rules: 5.2.4.10, 5.2.4.9
 Reference Path: circular_pattern <=
 replicate_feature <=
 feature_definition <=
 characterized_object
 shape_definition = characterized_object
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'number of features'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit
 measure_with_unit.value_component ->
 measure_value
 measure_value = count_measure
 count_measure}

5.1.9.4 General_pattern

AIM element: feature_pattern
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: feature_pattern <=
 replicate_feature <=
 {feature_definition=>
 instanced_feature}
 feature_definition <=
 characterized_object

5.1.9.4.1 general_pattern to orientation (as feature_placement)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: feature_pattern <=
replicate_feature <=
feature_definition<=
characterized_object
characterized_definition=characterized_object
characterized_definition<=
property_definition.definition
property_definition
{property_definition=>
product_definition_shape}
representation_definition=property_definition<=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'base feature placement'}
representation_item =>
geometric_representation_item =>
placement

5.1.9.5 Rectangular_offset_pattern

AIM element: shape_aspect
 Source: ISO 10303-41
 Rules: 5.2.4.10
 Reference Path: [shape_aspect <-
 shape_aspect_relationship.related_shape_aspect
 shape_aspect_relationship =>
 feature_component_relationship =>
 pattern_offset_membership]
 [shape_aspect <-
 shape_aspect_relationship.related_shape_aspect
 { shape_aspect_relationship =>
 feature_component_relationship }
 shape_aspect_relationship.relate_shape_aspect->
 shape_aspect=>
 modified_pattern]

5.1.9.5.1 rectangular_offset_pattern to direction_element (as offset_direction)

AIM element: PATH
 Source: ISO 10303-522
 Rules: 5.2.4.7
 Reference Path: shape_aspect <-
 shape_definition = shape_aspect
 shape_definition <-
 property_definition.definition
 property_definition
 { property_definition=>
 product_definition_shape }
 representation_definition=property_definition<-
 property_definition_representation.definition
 property_definition_representation
 property_definition_representation.used_representation ->
 { representation
 representation.name = 'offset direction'}
 representation =>
 shape_representation=>
 direction_shape_representation

5.1.9.5.2 rectangular_offset_pattern to numeric_parameter (as column_index)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <-
 property_definition.definition
 property_definition
 representation_definition=property_definition<-
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'column index'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit
 measure_with_unit.value_component ->
 measure_value
 measure_value = count_measure
 count_measure}

5.1.9.5.3 rectangular_offset_pattern to numeric_parameter (as offset-distance)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path:


```

shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <-
property_definition.definition
property_definition
representation_definition=property_definition<-
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'offset distance'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}
    
```

5.1.9.5.4 rectangular_offset_pattern to numeric_parameter (as row_index)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <-
property_definition.definition
property_definition
representation_definition=property_definition<-
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'row index'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit
measure_with_unit.value_component ->
measure_value
measure_value = count_measure}

5.1.9.6 Rectangular_omit_pattern

AIM element: shape_aspect
Source: ISO 10303-41
Rules: 5.2.4.10
Reference Path: [shape_aspect <-
shape_aspect_relationship.related_shape_aspect
shape_aspect_relationship =>
feature_component_relationship =>
pattern_omit_membership]
[shape_aspect <-
shape_aspect_relationship.related_shape_aspect
{ shape_aspect_relationship =>
feature_component_relationship }
shape_aspect_relationship.relatng_shape_aspect->
shape_aspect=>
modified_pattern]

5.1.9.6.1 rectangular_omit_pattern to numeric_parameter (as column_index)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <-
 property_definition.definition
 property_definition
 representation_definition=property_definition<-
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'column index'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit
 measure_with_unit.value_component ->
 measure_value
 measure_value = count_measure
 count_measure}

5.1.9.6.2 rectangular_omit_pattern to numeric_parameter (as row_index)

AIM element: PATH

Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11

Reference Path: shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <-
 property_definition.definition
 property_definition
 representation_definition=property_definition<-
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'row index'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit
 measure_with_unit.value_component ->
 measure_value
 measure_value = count_measure
 count_measure}

5.1.9.7 Rectangular_pattern

AIM element: rectangular_pattern

Source: ISO 10303-522

Rules: 5.2.4.9

Reference Path: rectangular_pattern <=
 replicate_feature <=
 {feature_definition=>
 instanced_feature}
 feature_definition<=
 characterized_object

5.1.9.7.1 rectangular_pattern to direction_element (as column_layout_direction)

AIM element: PATH
Rules: 5.2.4.7
Reference Path: rectangular_pattern <=
replicate_feature <=
feature_definition <=
characterized_object
shape_definition = characterized_object
shape_definition <=
property_definition.definition
property_definition
{property_definition=>
product_definition_shape}
representation_definition=property_definition<=
property_definition_representation.definition
property_definition_representation
property_definition_representation.used_representation ->
{representation
representation.name = 'column layout direction'}
representation =>
shape_representation=>
direction_shape_representation

5.1.9.7.2 rectangular_pattern to direction_element (as row_layout_direction)

AIM element: PATH
 Rules: 5.2.4.7
 Reference Path:


```

rectangular_pattern <=
  replicate_feature <=
  feature_definition <=
  characterized_object
  shape_definition = characterized_object
  shape_definition <-
  property_definition.definition
  property_definition
  {property_definition=>
  product_definition_shape}
  representation_definition=property_definition<-
  property_definition_representation.definition
  property_definition_representation
  property_definition_representation.used_representation ->
  {representation
  representation.name = 'row layout direction'}
  representation =>
  shape_representation=>
  direction_shape_representation
    
```

5.1.9.7.3 rectangular_pattern to numeric_parameter (as column_spacing)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: rectangular_pattern <=
 replicate_feature <=
 feature_definition <=
 characterized_object
 shape_definition = characterized_object
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'column spacing'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.9.7.4 rectangular_pattern to numeric_parameter (as columns)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path:


```

rectangular_pattern <=
  replicate_feature <=
  feature_definition <=
  characterized_object
  shape_definition = characterized_object
  shape_definition
  characterized_definition = shape_definition
  characterized_definition <-
  property_definition.definition
  property_definition
  representation_definition=property_definition<-
  property_definition_representation.definition
  {property_definition_representation =>
  shape_definition_representation}
  property_definition_representation
  property_definition_representation.used_representation ->
  {representation =>
  shape_representation =>
  shape_representation_with_parameters}
  representation
  representation.items[i] ->
  {representation_item
  representation_item.name = 'number of columns'}
  representation_item =>
  measure_representation_item
  {measure_representation_item <=
  measure_with_unit
  measure_with_unit.value_component ->
  measure_value
  measure_value = count_measure
  count_measure}
    
```

5.1.9.7.5 rectangular_pattern to numeric_parameter (as row_spacing)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: rectangular_pattern <=
 replicate_feature <=
 feature_definition <=
 characterized_object
 shape_definition = characterized_object
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'row spacing'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.9.7.6 rectangular_pattern to numeric_parameter (as rows)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path:


```

rectangular_pattern <=
  replicate_feature <=
  feature_definition <=
  characterized_object
  shape_definition = characterized_object
  shape_definition
  characterized_definition = shape_definition
  characterized_definition <-
  property_definition.definition
  property_definition
  representation_definition=property_definition<-
  property_definition_representation.definition
  {property_definition_representation =>
  shape_definition_representation}
  property_definition_representation
  property_definition_representation.used_representation ->
  {representation =>
  shape_representation =>
  shape_representation_with_parameters}
  representation
  representation.items[i] ->
  {representation_item
  representation_item.name = 'number of rows'}
  representation_item =>
  measure_representation_item
  {measure_representation_item <=
  measure_with_unit
  measure_with_unit.value_component ->
  measure_value
  measure_value = count_measure
  count_measure}
    
```

5.1.9.7.7 rectangular_pattern to rectangular_offset_pattern (as relocated_base_feature)

AIM element: PATH
Rules: 5.2.4.10
Reference Path: rectangular_pattern <=
 replicate_feature <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 [shape_aspect <=
 shape_aspect_relationship.relate_shape_aspect
 {shape_aspect_relationship =>
 feature_component_relationship =>
 pattern_offset_membership}
 shape_aspect_relationship
 shape_aspect_relationship.related_shape_aspect ->
 shape_aspect]
 [shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 {shape_aspect_relationship =>
 feature_component_relationship}
 {shape_aspect_relationship.description='base pattern'}
 shape_aspect_relationship.relate_shape_aspect->
 shape_aspect<=
 {shape_aspect=>
 modified_pattern}
 shape_aspect_relationship.relate_shape_aspect
 {shape_aspect_relationship =>
 feature_component_relationship}
 {shape_aspect_relationship.description='modified pattern'}
 shape_aspect_relationship.related_shape_aspect->
 shape_aspect]

5.1.9.7.8 rectangular_pattern to rectangular_omit_pattern (as missing_base_feature)

AIM element: PATH
 Rules: 5.2.4.10
 Reference Path: rectangular_pattern <=
 replicate_feature <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 [shape_aspect <=
 shape_aspect_relationship.relate_shape_aspect
 {shape_aspect_relationship =>
 feature_component_relationship =>
 pattern_omit_membership}
 shape_aspect_relationship
 shape_aspect_relationship.related_shape_aspect ->
 shape_aspect]
 [shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 {shape_aspect_relationship =>
 feature_component_relationship}
 {shape_aspect_relationship.description='base pattern'}
 shape_aspect_relationship.relate_shape_aspect->
 shape_aspect<=
 {shape_aspect=>
 modified_pattern}
 shape_aspect_relationship.relate_shape_aspect
 {shape_aspect_relationship =>
 feature_component_relationship}
 {shape_aspect_relationship.description='modified pattern'}
 shape_aspect_relationship.related_shape_aspect->
 shape_aspect]

5.1.9.8 Replicate_base

AIM element: feature_component_relationship
 Source: ISO 10303-522
 Rules: 5.2.4.3, 5.2.4.9, 5.2.4.10
 Reference Path: feature_component_relationship <=
 shape_aspect_relationship

5.1.9.8.1 replicate_base to machining_feature (as base_feature)

AIM element: PATH
Reference Path: feature_component_relationship <=
shape_aspect_relationship
shape_aspect_relationship.related_shape_aspect ->
shape_aspect =>
instanced_feature

5.1.9.8.2 replicate_base to replicate_feature (as base_feature)

AIM element: PATH
Reference Path: feature_component_relationship <=
shape_aspect_relationship
shape_aspect_relationship.related_shape_aspect ->
shape_aspect =>
instanced_feature<=
feature_definition<=
replicate_feature

5.1.9.9 Replicate_feature

AIM element: replicate_feature
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: replicate_feature <=
{feature_definition<=
instanced_feature}
feature_definition<=
characterized_object

5.1.9.9.1 replicate_feature to orientation (as placement)

AIM element: PATH

Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11

Reference Path: replicate_feature <=
 feature_definition=>
 instanced_feature<=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'orientation'}
 representation_item =>
 geometric_representation_item =>
 placement

5.1.9.9.2 replicate_feature to replicate_base (as replicate_base_feature)

AIM element: PATH

Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11

Reference Path: replicate_feature <=
 feature_definition=>
 instanced_feature<=
 shape_aspect <=
 shape_aspect_relationship.relateing_shape_aspect
 shape_aspect_relationship =>
 feature_component_relationship
 {shape_aspect_relationship.name='pattern basis'}

5.1.10 Transition_feature UoF

5.1.10.1 Chamfer

AIM element: chamfer
Source: ISO 10303-522
Rules: 5.2.4.10, 5.2.4.13, 5.2.4.14
Reference Path: chamfer <=
 transition_feature <=
 shape_aspect

5.1.10.1.1 chamfer to face_shape_element (as chamfer_face)

AIM element: PATH
Rules: 5.2.4.7
Reference Path: chamfer <=
 transition_feature <=
 shape_aspect
 shape_definition=shape_aspect
 shape_definition
 characterized_definition=shape_definition
 characterized_definition<-
 property_definition.definition
 property_definition
 represented_definition=property_definition
 represented_definition<-
 property_definition_representation.definition
 property_definition_representation
 {property_definition_representation=shape_definition_representation}
 property_definition_representation.used_representation->
 representation
 {representation.name= 'chamfer face'}
 representation=>
 shape_representation=>
 face_shape_representation

5.1.10.1.2 chamfer to first_offset (as first_face_offset)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path: chamfer <=
 transition_feature <=
 shape_aspect <=
 shape_aspect_relationship.relate_shape_aspect
 {shape_aspect_relationship =>
 feature_component_relationship}
 shape_aspect_relationship
 shape_aspect_relationship.related_shape_aspect ->
 {shape_aspect
 shape_aspect.description = 'first offset'}
 shape_aspect =>
 chamfer_offset

5.1.10.1.3 chamfer to second_chamfer_offset (as second_face_offset)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path: chamfer <=
 transition_feature <=
 shape_aspect <=
 shape_aspect_relationship.relate_shape_aspect
 {shape_aspect_relationship =>
 feature_component_relationship}
 shape_aspect_relationship
 shape_aspect_relationship.related_shape_aspect ->
 {shape_aspect
 shape_aspect.description = 'second offset'}
 shape_aspect =>
 chamfer_offset

5.1.10.2 Chamfer_angle

AIM element: chamfer_offset
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: chamfer_offset <=
 shape_aspect
 {shape_aspect
 shape_aspect.description = 'second offset'}

5.1.10.2.1 chamfer_angle to numeric_parameter (as angle_amount)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: chamfer_offset <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition
representation_definition=property_definition<=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'offset angle'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
plane_angle_measure_with_unit}

5.1.10.3 Constant_radius_edge_round

AIM element: edge_round
Source: ISO 10303-522
Rules: 5.2.4.9, 5.2.4.13, 5.2.4.14
Reference Path: edge_round <=
transition_feature <=
shape_aspect
{shape_aspect
shape_aspect.description = 'constant radius'}

5.1.10.3.1 constant_radius_edge_round to numeric_parameter (as first_face_-offset)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: edge_round <=
 transition_feature <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'first offset'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.10.3.2 constant_radius_edge_round to numeric_parameter (as radius)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: edge_round <=
 transition_feature <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'radius'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.10.3.3 constant_radius_edge_round to numeric_parameter (as second_face_offset)

AIM element: PATH

Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11

Reference Path: edge_round <=
 transition_feature <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'second offset'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.10.4 Constant_radius_fillet

AIM element: fillet

Source: ISO 10303-522

Rules: 5.2.4.9, 5.2.4.13, 5.2.4.14

Reference Path: fillet <=
 transition_feature <=
 shape_aspect
 {shape_aspect
 shape_aspect.description = 'constant radius'}

5.1.10.4.1 constant_radius_fillet to numeric_parameter (as first_face_offset)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: fillet <=
 transition_feature <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'first offset'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.10.4.2 constant_radius_fillet to numeric_parameter (as radius)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: fillet <=
 transition_feature <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'radius'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.10.4.3 constant_radius_fillet to numeric_parameter (as second_face_offset)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: fillet <=
transition_feature <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition
representation_definition=property_definition<=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'second offset'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.10.5 Edge_round

AIM element: edge_round
Source: ISO 10303-522
Rules: 5.2.4.9, 5.2.4.13, 5.2.4.14
Reference Path: edge_round <=
transition_feature <=
shape_aspect

5.1.10.5.1 edge_round to face_shape_element (as edge_round_face)

AIM element: PATH
 Rules: 5.2.4.7
 Reference Path: edge_round <=
 transition_feature <=
 shape_aspect
 shape_definition=shape_aspect
 shape_definition
 characterized_definition=shape_definition
 characterized_definition<-
 property_definition.definition
 property_definition
 represented_definition=property_definition
 represented_definition<-
 property_definition_representation.definition
 property_definition_representation
 {property_definition_representation=shape_definition_representation}
 property_definition_representation.used_representation->
 representation
 {representation.name= 'edge round face'}
 representation=>
 shape_representation=>
 face_shape_representation

5.1.10.5.2 edge_round to face_shape_element (as first_face_shape)

AIM element: PATH
 Rules: 5.2.4.7
 Reference Path: edge_round <=
 transition_feature <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition <-
 property_definition.definition
 property_definition
 {property_definition=>
 product_definition_shape}
 representation_definition=property_definition<-
 property_definition_representation.definition
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation
 representation.name = 'first face shape'}
 representation =>
 shape_representation=>
 face_shape_representation

5.1.10.5.3 edge_round to face_shape_element (as second_face_shape)

AIM element: PATH
Rules: 5.2.4.7
Reference Path: edge_round <=
transition_feature <=
shape_aspect
shape_definition = shape_aspect
shape_definition <=
property_definition.definition
property_definition
{property_definition=>
product_definition_shape}
representation_definition=property_definition<=
property_definition_representation.definition
property_definition_representation
property_definition_representation.used_representation ->
{representation
representation.name = 'second face shape'}
representation =>
shape_representation=>
face_shape_representation

5.1.10.6 Fillet

AIM element: fillet
Source: ISO 10303-522
Rules: 5.2.4.9, 5.2.4.13, 5.2.4.14
Reference Path: fillet <=
transition_feature <=
shape_aspect

5.1.10.6.1 fillet to face_shape_element (as fillet_face)

AIM element: PATH
 Rules: 5.2.4.7
 Reference Path: fillet <=
 transition_feature <=
 shape_aspect
 shape_definition=shape_aspect
 shape_definition
 characterized_definition=shape_definition
 characterized_definition<-
 property_definition.definition
 property_definition
 represented_definition=property_definition
 represented_definition<-
 property_definition_representation.definition
 property_definition_representation
 {property_definition_representation=shape_definition_representation}
 property_definition_representation.used_representation->
 representation
 {representation.name= 'fillet face'}
 representation=>
 shape_representation=>
 face_shape_representation

5.1.10.6.2 fillet to face_shape_element (as first_face_shape)

AIM element: PATH
 Rules: 5.2.4.7
 Reference Path: fillet <=
 transition_feature <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition <-
 property_definition.definition
 property_definition
 {property_definition=>
 product_definition_shape}
 representation_definition=property_definition<-
 property_definition_representation.definition
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation
 representation.name = 'first face shape'}
 representation =>
 shape_representation=>
 face_shape_representation

5.1.10.6.3 fillet to face_shape_element (as second_face_shape)

AIM element: PATH
Rules: 5.2.4.7
Reference Path: fillet <=
 transition_feature <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition <=
 property_definition.definition
 property_definition
 {property_definition=>
 product_definition_shape}
 representation_definition=property_definition<=
 property_definition_representation.definition
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation
 representation.name = 'second face shape'}
 representation =>
 shape_representation=>
 face_shape_representation

5.1.10.7 First_offset

AIM element: chamfer_offset
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: chamfer_offset <=
 shape_aspect
 {shape_aspect
 shape_aspect.description = 'first offset'}

5.1.10.7.1 first_offset to face_shape_element (as face_shape)

AIM element: PATH
Rules: 5.2.4.7
Reference Path: chamfer_offset <=
shape_aspect
shape_definition = shape_aspect
shape_definition <=
property_definition.definition
property_definition
representation_definition=property_definition<=
property_definition_representation.definition
property_definition_representation
property_definition_representation.used_representation ->
{representation
representation.name = 'first face shape'}
representation =>
shape_representation=>
face_shape_representation

5.1.10.7.2 first_offset to numeric_parameter (as offset_amount)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: chamfer_offset <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition
representation_definition=property_definition<=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'offset amount'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.10.8 Second_chamfer_offset

AIM element: chamfer_offset
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: chamfer_offset <=
shape_aspect
{shape_aspect
shape_aspect.description = 'second offset'}

5.1.10.8.1 second_chamfer_offset to face_shape_element (as second_face)

AIM element: PATH
 Rules: 5.2.4.7
 Reference Path: chamfer_offset <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation
 representation.name = 'second face shape'}
 representation =>
 shape_representation=>
 face_shape_representation

5.1.10.9 Second_offset

AIM element: chamfer_offset
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: chamfer_offset <=
 shape_aspect
 {shape_aspect
 shape_aspect.description = 'second offset'}

5.1.10.9.1 second_offset to numeric_parameter (as offset_amount)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: chamfer_offset <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition
representation_definition=property_definition<=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'offset amount'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.11 Specification UoF

5.1.11.1 Specification

AIM element: document
Source: ISO 10303-41

5.1.11.1.1 specification_class

AIM element: document_with_class.class
Source: ISO 10303-41
Reference Path: document=>
document_with_class

5.1.11.1.2 specification_description

AIM element: document.description
 Source: ISO 10303-41
 Reference Path: document
 document.description

5.1.11.1.3 specification_id

AIM element: document.id
 Source: ISO 10303-41
 Reference Path: document
 document.id

5.1.11.1.4 specification to specification_usage_constraint (as constraint)

AIM element: PATH
 Reference Path: document <-
 document_usage_constraint.source
 document_usage_constraint

5.1.11.2 Specification_usage_constraint

AIM element: document_usage_constraint
 Source: ISO 10303-41

5.1.11.2.1 class_id

AIM element: document_usage_constraint.subject_element_value
 Source: ISO 10303-41

5.1.11.2.2 element

AIM element: document_usage_constraint.subject_element
 Source: ISO 10303-41

5.1.12 Profile UoF**5.1.12.1 Circular_closed_profile**

AIM element: circular_closed_profile
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: circular_closed_profile <=
 shape_aspect

5.1.12.1.1 circular_closed_profile to numeric_parameter (as diameter)

AIM element: PATH
Source: ISO 10303-522
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: circular_closed_profile <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition
representation_definition=property_definition<=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'diameter'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.12.2 Closed_profile

AIM element: (circular_closed_profile)
(closed_path_profile)
(ngon_closed_profile)
(rectangular_closed_profile)
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: (circular_closed_profile <=)
(closed_path_profile <=)
(ngon_closed_profile <=)
(rectangular_closed_profile <=)
shape_aspect

5.1.12.3 General_closed_profile

AIM element: closed_path_profile
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: closed_path_profile <=
 shape_aspect

5.1.12.3.1 general_closed_profile to path_element (as closed_profile_shape)

AIM element: PATH
 Source: ISO 10303-522
 Rules: 5.2.4.7
 Reference Path: closed_path_profile <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 property_definition_representation
 property_definition_representation.used_representation ->
 representation =>
 shape_representation=>
 path_shape_representation

5.1.12.4General_open_profile

AIM element: open_path_profile
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: open_path_profile <=
 shape_aspect

5.1.12.4.1 general_open_profile to path_element (as enclosed_boundary)

AIM element: PATH
Source: ISO 10303-522
Rules: 5.2.4.7
Reference Path: open_path_profile <=
shape_aspect
shape_definition = shape_aspect
shape_definition <=
property_definition.definition
property_definition
representation_definition=property_definition<=
property_definition_representation.definition
property_definition_representation
property_definition_representation.used_representation ->
representation =>
shape_representation=>
path_shape_representation

5.1.12.5Linear_profile

AIM element: linear_profile
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: linear_profile <=
shape_aspect

5.1.12.5.1 linear_profile to numeric_parameter (as profile_length)

AIM element: PATH
 Source: ISO 10303-522
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: linear_profile <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'profile length'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.12.6Ngon_profile

AIM element: ngon_closed_profile
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: ngon_closed_profile <=
 shape_aspect

5.1.12.6.1 circumscribed_or_across_flats

AIM element: (representation_item.name = 'circumscribed diameter')
(representation_item.name =
'diameter across flats')

Source: ISO 10303-522

Reference Path: ngon_closed_profile <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition
representation_definition=property_definition<=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
representation_item
(representation_item.name = 'circumscribed diameter')
(representation_item.name = 'diameter across flats')

5.1.12.6.2 ngon_profile to numeric_parameter (as diameter)

AIM element: PATH
 Source: ISO 10303-522
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: ngon_closed_profile <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 (representation_item.name = 'circumscribed diameter')
 (representation_item.name = 'diameter across flats')}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.12.6.3 ngon_profile to numeric_parameter (as corner_radius)

AIM element: PATH
Source: ISO 10303-522
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: ngon_closed_profile <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition
representation_definition=property_definition<=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'corner radius'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.12.6.4 ngon_profile to numeric_parameter (as number_of_sides)

AIM element: PATH
 Source: ISO 10303-522
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: ngon_closed_profile <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'number of sides'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit
 measure_with_unit.value_component ->
 measure_value
 measure_value = count_measure
 count_measure}

5.1.12.7Open_profile

AIM element: (linear_profile)
(open_path_profile)
(partial_circular_profile)
(rounded_u_profile)
(square_u_profile)
(tee_profile)
(vee_profile)
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: (linear_profile <=)
(open_path_profile <=)
(partial_circular_profile <=)
(rounded_u_profile <=)
(square_u_profile <=)
(tee_profile <=)
(vee_profile <=)
shape_aspect

5.1.12.7.1 open_profile to planar_element (as profile_limit)

AIM element: PATH
Source: ISO 10303-522
Reference Path: (rounded_u_profile <=)
(square_u_profile <=)
(open_path_profile <=)
(tee_profile <=)
(vee_profile <=)
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <-
property_definition.definition
property_definition
representation_definition=property_definition<-
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
representation=>
{representation.name='profile limit'}
shape_representation=>
planar_shape_representation

5.1.12.8 Partial_circular_profile

AIM element: partial_circular_profile
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: partial_circular_profile <=
 shape_aspect

5.1.12.8.1 partial_circular_profile to numeric_parameter (as radius)

AIM element: PATH
 Source: ISO 10303-522
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: partial_circular_profile <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'radius'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.12.8.2 partial_circular_profile to numeric_parameter (as sweep_angle)

AIM element: PATH
Source: ISO 10303-522
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: partial_circular_profile <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition
representation_definition=property_definition<=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'sweep angle'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
plane_angle_measure_with_unit}

5.1.12.9 Profile

AIM element: (circular_closed_profile)
 (closed_path_profile)
 (ngon_closed_profile)
 (rectangular_closed_profile)
 (linear_profile)
 (open_path_profile)
 (partial_circular_profile)
 (rounded_u_profile)
 (square_u_profile)
 (tee_profile)
 (vee_profile)
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: (circular_closed_profile <=)
 (closed_path_profile <=)
 (ngon_closed_profile <=)
 (rectangular_closed_profile <=)
 (linear_profile <=)
 (open_path_profile <=)
 (partial_circular_profile <=)
 (rounded_u_profile <=)
 (square_u_profile <=)
 (tee_profile <=)
 (vee_profile <=)
 shape_aspect
 { shape_aspect
 shape_aspect.of_shape->
 product_definition_shape<=
 property_definition
 property_definition.definition->
 characterized_definition=characterized_object
 characterized_object=>
 feature_component_definition}

5.1.12.9.1 profile to orientation (as placement)

AIM element: PATH
Source: ISO 10303-522
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: (circular_closed_profile <=)
(closed_path_profile <=)
(ngon_closed_profile <=)
(rectangular_closed_profile <=)
(linear_profile <=)
(open_path_profile <=)
(partial_circular_profile <=)
(rounded_u_profile <=)
(square_u_profile <=)
(tee_profile <=)
(vee_profile <=)
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <-
property_definition.definition
property_definition
representation_definition=property_definition<-
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'orientation'}
representation_item =>
geometric_representation_item =>
placement

5.1.12.10 Rectangular_closed_profile

AIM element: rectangular_closed_profile
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: rectangular_closed_profile <=
shape_aspect

5.1.12.10.1 rectangular_closed_profile to numeric_parameter (as corner-radius)

AIM element: PATH
 Source: ISO 10303-522
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: rectangular_closed_profile <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'corner radius'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.12.10.2 rectangular_closed_profile to numeric_parameter (as profile_length)

AIM element: PATH
Source: ISO 10303-522
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: rectangular_closed_profile <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition
representation_definition=property_definition<=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'length'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.12.10.3 rectangular_closed_profile to numeric_parameter (as profile_width)

AIM element: PATH
 Source: ISO 10303-522
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: rectangular_closed_profile <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'width'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.12.11 Rounded_u_profile

AIM element: rounded_u_profile
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: rounded_u_profile <=
 shape_aspect

5.1.12.11.1 rounded_u_profile to numeric_parameter (as width)

AIM element: PATH
Source: ISO 10303-522
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: rounded_u_profile <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition
representation_definition=property_definition<=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'width'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.12.12 Square_u_profile

AIM element: square_u_profile
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: square_u_profile <=
shape_aspect

5.1.12.12.1 square_u_profile to numeric_parameter (as first_angle)

AIM element: PATH
 Source: ISO 10303-522
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: square_u_profile <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'first_angle'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 plane_angle_measure_with_unit}

5.1.12.12.2 square_u_profile to numeric_parameter (as first_radius)

AIM element: PATH
Source: ISO 10303-522
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: square_u_profile <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition
representation_definition=property_definition<=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'first radius'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.12.12.3 square_u_profile to numeric_parameter (as second_angle)

AIM element: PATH
 Source: ISO 10303-522
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: square_u_profile <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'second angle'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 plane_angle_measure_with_unit}

5.1.12.12.4 square_u_profile to numeric_parameter (as second_radius)

AIM element: PATH
Source: ISO 10303-522
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: square_u_profile <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition
representation_definition=property_definition<=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'second radius'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.12.12.5 square_u_profile to numeric_parameter (as width)

AIM element: PATH
 Source: ISO 10303-522
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: square_u_profile <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'width'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.12.13 Tee_profile

AIM element: tee_profile
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: tee_profile <=
 shape_aspect

5.1.12.13.1 tee_profile to numeric_parameter (as cross_bar_depth)

AIM element: PATH
Source: ISO 10303-522
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: tee_profile <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition
representation_definition=property_definition<=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'cross bar depth'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.12.13.2 tee_profile to numeric_parameter (as cross_bar_width)

AIM element: PATH
 Source: ISO 10303-522
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: tee_profile <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'cross bar width'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.12.13.3 tee_profile to numeric_parameter (as depth)

AIM element: PATH
Source: ISO 10303-522
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: tee_profile <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition
representation_definition=property_definition<=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'depth'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.12.13.4 tee_profile to numeric_parameter (as first_angle)

AIM element: PATH
 Source: ISO 10303-522
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: tee_profile <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'first angle'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 plane_angle_measure_with_unit}

5.1.12.13.5 tee_profile to numeric_parameter (as first_offset)

AIM element: PATH
Source: ISO 10303-522
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: tee_profile <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition
representation_definition=property_definition<=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'first offset'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.12.13.6 tee_profile to numeric_parameter (as radius)

AIM element: PATH
 Source: ISO 10303-522
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: tee_profile <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'radius'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.12.13.7 tee_profile to numeric_parameter (as second_angle)

AIM element: PATH
Source: ISO 10303-522
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: tee_profile <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition
representation_definition=property_definition<=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'second angle'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
plane_angle_measure_with_unit}

5.1.12.13.8 tee_profile to numeric_parameter (as second_offset)

AIM element: PATH
 Source: ISO 10303-522
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: tee_profile <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'second offset'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.12.13.9 tee_profile to numeric_parameter (as width)

AIM element: PATH
Source: ISO 10303-522
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: tee_profile <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition
representation_definition=property_definition<=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'width'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.12.14 Vee_profile

AIM element: vee_profile
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: vee_profile <=
shape_aspect

5.1.12.14.1 vee_profile to numeric_parameter (as profile_angle)

AIM element: PATH
 Source: ISO 10303-522
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: vee_profile <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'profile angle'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 plane_angle_measure_with_unit}

5.1.12.14.2 vee_profile to numeric_parameter (as profile_radius)

AIM element: PATH
Source: ISO 10303-522
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: vee_profile <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition
representation_definition=property_definition<=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'profile radius'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.12.14.3 vee_profile to numeric_parameter (as tilt_angle)

AIM element: PATH
 Source: ISO 10303-522
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: vee_profile <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'tilt angle'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 plane_angle_measure_with_unit}

5.1.13 Path UoF**5.1.13.1 Circular_path**

AIM element: path_feature_component
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: path_feature_component <=
 shape_aspect
 {shape_aspect
 (shape_aspect.description = 'partial circular')
 (shape_aspect.description = 'complete circular')}

5.1.13.1.1 circular_path to numeric_parameter (as radius)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: path_feature_component <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition
representation_definition=property_definition<=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'radius'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.13.2 Complete_circular_path

AIM element: path_feature_component
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: path_feature_component <=
shape_aspect
{shape_aspect
shape_aspect.description = 'complete circular'}

5.1.13.3 General_path

AIM element: path_feature_component
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: path_feature_component <=
 shape_aspect
 { shape_aspect
 shape_aspect.description = 'complex' }

5.1.13.3.1 general_path to path_element (as sweep_path)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: path_feature_component <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 property_definition_representation
 property_definition_representation.used_representation ->
 { representation
 representation.name = 'sweep path' }
 representation =>
 shape_representation=>
 path_shape_representation

5.1.13.4 Linear_path

AIM element: path_feature_component
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: path_feature_component <=
 shape_aspect
 { shape_aspect
 shape_aspect.description = 'linear' }

5.1.13.4.1 linear_path to direction_element(as direction)

AIM element: PATH
Reference Path: path_feature_component <=
shape_aspect
shape_definition = shape_aspect
shape_definition <=
property_definition.definition
property_definition
representation_definition=property_definition<=
property_definition_representation.definition
property_definition_representation
property_definition_representation.used_representation ->
representation =>
shape_representation=>
direction_shape_representation

5.1.13.4.2 linear_path to numeric_parameter (as distance)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: path_feature_component <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition
representation_definition=property_definition<=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'distance'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.13.5 Partial_circular_path

AIM element: path_feature_component
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: path_feature_component <=
 shape_aspect
 { shape_aspect
 shape_aspect.description = 'partial circular' }

5.1.13.5.1 partial_circular_path to numeric_parameter (as sweep_angle)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: path_feature_component <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition
 representation_definition=property_definition<=
 property_definition_representation.definition
 { property_definition_representation =>
 shape_definition_representation }
 property_definition_representation
 property_definition_representation.used_representation ->
 { representation =>
 shape_representation_with_parameters }
 representation
 representation.items[i] ->
 { representation_item
 representation_item.name = 'sweep angle' }
 representation_item =>
 measure_representation_item
 { measure_representation_item <=
 measure_with_unit =>
 plane_angle_measure_with_unit }

5.1.13.6 Path

AIM element: path_feature_component
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: path_feature_component <=
shape_aspect
{shape_aspect
shape_aspect.of_shape->
product_definition_shape<=
property_definition
property_definition.definition->
characterized_definition=characterized_object
characterized_object=>
feature_component_definition}

5.1.13.6.1 path to orientation (as placement)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: path_feature_component <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition
representation_definition=property_definition<=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'orientation'}
representation_item =>
geometric_representation_item =>
placement

5.1.14 Machining_feature UoF

5.1.14.1 Bevel_gear

AIM element: gear
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: gear <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object
 {characterized_object
 characterized_object.description = 'bevel gear'}

5.1.14.2 Boss

AIM element: boss
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: boss <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object
 {characterized_object
 (characterized_object.description = 'circular')
 (characterized_object.description = 'complex')
 (characterized_object.description = 'rectangular')}

5.1.14.2.1 boss to boss_top_condition (as top_condition)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: boss <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{ shape_aspect
shape_aspect.description = 'top condition occurrence'}
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
{ [shape_aspect_relationship =>
feature_component_relationship]
[shape_aspect_relationship
shape_aspect_relationship.description = 'boss top usage']}
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
shape_aspect =>
boss_top

5.1.14.2.2 boss to linear_path (as boss_height)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path: boss <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'boss height occurrence'
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 { [shape_aspect_relationship =>
 shape_defining_relationship]
 [shape_aspect_relationship
 [shape_aspect_relationship.name = 'boss height'
 [shape_aspect_relationship.description = 'path feature component usage']]
 shape_aspect_relationship.relate_shape_aspect ->
 { shape_aspect
 shape_aspect.description = 'linear'
 shape_aspect =>
 path_feature_component

5.1.14.2.3 boss to numeric_parameter (as fillet_radius)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: boss <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
{property_definition=>
product_definition_shape}
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'fillet radius'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.14.3 Catalogue_gear

AIM element: externally_defined_feature_definition
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: externally_defined_feature_definition <=
[externally_defined_item
{externally_defined_item.item_id->
source_item
source_item=' external gear'}
{externally_defined_item.source->
external_source
external_source.source_id->
source_item
source_item=' external feature specification'}}
[{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object
{characterized_object
characterized_object.description = 'gear'}]]

5.1.14.3.1 catalogue_gear to specification (as documentation)

#1: (if specification has zero constraints)

AIM element: PATH
Reference Path : (externally_defined_feature_definition
document_reference_item = externally_defined_feature_definition
document_reference_item <-
applied_document_reference.items[i]
applied_document_reference <=
document_reference
document_reference.assigned_document ->
document)
{ document<-
document_representation_type.represented_document
document_representation_type}
{ document=>
document_file<=
characterized_object}

#2: (if specification has one or more constraints)

AIM element: PATH
Reference Path: (externally_defined_feature_definition
document_reference_item = externally_defined_feature_definition
document_reference_item <-
applied_document_usage_constraint_assignment.items[i]
applied_document_usage_constraint_assignment <=
document_usage_constraint_assignment
document_usage_constraint_assignment.assigned_document_usage ->
document_usage_constraint
document_usage_constraint.source->
document)
{ document<-
document_representation_type.represented_document
document_representation_type}
{ document=>
document_file<=
characterized_object}

5.1.14.4 Catalogue_knurl

AIM element: externally_defined_feature_definition
Source: ISO 10303-41
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: externally_defined_feature_definition <=
[externally_defined_item
{externally_defined_item.item_id->
source_item
source_item=' external knurl'}
{externally_defined_item.source->
external_source
external_source.source_id->
source_item
source_item=' external feature specification'}}
[{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object
{characterized_object
characterized_object.description = 'knurl'}}]

5.1.14.4.1 catalogue_knurl to specification (as documentation)

#1: (if specification has zero constraints)

AIM element: PATH
Reference Path: (externally_defined_feature_definition
document_reference_item = externally_defined_feature_definition
document_reference_item <-
applied_document_reference.items[i]
applied_document_reference <=
document_reference
document_reference.assigned_document ->
document)
{ document<-
document_representation_type.represented_document
document_representation_type}
{ document=>
document_file<=
characterized_object}

#2: (if specification has one or more constraints)

AIM element: PATH
Reference Path: (externally_defined_feature_definition
document_reference_item = externally_defined_feature_definition
document_reference_item <-
applied_document_usage_constraint_assignment.items[i]
applied_document_usage_constraint_assignment <=
document_usage_constraint_assignment
document_usage_constraint_assignment.assigned_document_usage ->
document_usage_constraint
document_usage_constraint.source->
document)
{ document<-
document_representation_type.represented_document
document_representation_type}
{ document=>
document_file<=
characterized_object}

5.1.14.5 Catalogue_marking

AIM element: externally_defined_feature_definition
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: externally_defined_feature_definition <=
[externally_defined_item
{externally_defined_item.item_id->
source_item
source_item=' external marking'}
{externally_defined_item.source->
external_source
external_source.source_id->
source_item
source_item=' external feature specification'}}
[{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object
{characterized_object
characterized_object.description = 'marking'}]]

5.1.14.5.1 catalogue_marking to specification (as documentation)

#1: (if specification has zero constraints)

AIM element: PATH
Reference Path: (externally_defined_feature_definition
document_reference_item = externally_defined_feature_definition
document_reference_item <-
applied_document_reference.items[i]
applied_document_reference <=
document_reference
document_reference.assigned_document ->
document)
{ document<-
document_representation_type.represented_document
document_representation_type}
{ document=>
document_file<=
characterized_object}

#2: (if specification has one or more constraints)

AIM element: PATH
Reference Path: (externally_defined_feature_definition
document_reference_item = externally_defined_feature_definition
document_reference_item <-
applied_document_usage_constraint_assignment.items[i]
applied_document_usage_constraint_assignment <=
document_usage_constraint_assignment
document_usage_constraint_assignment.assigned_document_usage ->
document_usage_constraint
document_usage_constraint.source->
document)
{ document<-
document_representation_type.represented_document
document_representation_type}
{ document=>
document_file<=
characterized_object}

5.1.14.6 Catalogue_thread

AIM element: externally_defined_feature_definition
 Source: ISO 10303-522
 Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
 Reference Path: externally_defined_feature_definition <=
 [externally_defined_item
 {externally_defined_item.item_id->
 source_item
 source_item=' external thread'}
 {externally_defined_item.source->
 external_source
 external_source.source_id->
 source_item
 source_item=' external feature specification'}}]
 [{ feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object
 {characterized_object
 characterized_object.description = 'thread'}}]

5.1.14.6.1 catalogue_thread to specification (as documentation)

#1: (if specification has zero constraints)

AIM element: PATH

```
Reference Path: ( externally_defined_feature_definition
    document_reference_item = externally_defined_feature_definition
    document_reference_item <-
    applied_document_reference.items[i]
    applied_document_reference <=
    document_reference
    document_reference.assigned_document ->
    document)
{ document<-
    document_representation_type.represented_document
    document_representation_type}
{ document=>
    document_file<=
    characterized_object}
```

#2: (if specification has one or more constraints)

AIM element: PATH

```
Reference Path: ( externally_defined_feature_definition
    document_reference_item = externally_defined_feature_definition
    document_reference_item <-
    applied_document_usage_constraint_assignment.items[i]
    applied_document_usage_constraint_assignment <=
    document_usage_constraint_assignment
    document_usage_constraint_assignment.assigned_document_usage ->
    document_usage_constraint
    document_usage_constraint.source->
    document)
{ document<-
    document_representation_type.represented_document
    document_representation_type}
{ document=>
    document_file<=
    characterized_object}
```

5.1.14.7 Circular_boss

AIM element: boss
 Source: ISO 10303-522
 Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
 Reference Path: boss <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object
 {characterized_object
 characterized_object.description = 'circular'}

5.1.14.7.1 circular_boss to angle_taper (as change_in_diameter)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path: boss <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'change in diameter occurrence'}
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 {[shape_aspect_relationship =>
 feature_component_relationship]
 [shape_aspect_relationship
 shape_aspect_relationship.description = 'taper usage']}
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 { shape_aspect
 shape_aspect.description = 'angle taper'}
 shape_aspect =>
 taper

5.1.14.7.2 circular_boss to diameter_taper (as change_in_diameter)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: boss <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{ shape_aspect
shape_aspect.description = 'change in diameter occurrence'}
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
{ [shape_aspect_relationship =>
feature_component_relationship]
[shape_aspect_relationship
shape_aspect_relationship.description = 'taper usage'] }
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
{ shape_aspect
shape_aspect.description = 'diameter taper'}
shape_aspect =>
taper

5.1.14.7.3 circular_boss to directed_taper (as change_in_diameter)

AIM element: PATH

Rules: 5.2.4.9, 5.2.4.10

Reference Path: boss <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'change in diameter occurrence'}
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 {[shape_aspect_relationship =>
 feature_component_relationship]
 [shape_aspect_relationship
 shape_aspect_relationship.description = 'taper usage']}
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 { shape_aspect
 shape_aspect.description = 'directed taper'}
 shape_aspect =>
 taper

5.1.14.7.4 circular_boss to circular_closed_profile (as circular_profile)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: boss <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{ shape_aspect
shape_aspect.description = 'circular profile occurrence'}
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
{ [shape_aspect_relationship =>
shape_defining_relationship]
[shape_aspect_relationship
shape_aspect_relationship.description = 'profile usage']}
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
shape_aspect =>
circular_closed_profile

5.1.14.8 Circular_closed_shape_profile

AIM element: outside_profile
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: outside_profile <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{ shape_aspect
shape_aspect.description = 'closed circular boundary occurrence'}

5.1.14.8.1 circular_closed_shape_profile to complete_circular_profile (as closed_boundary)

AIM element: PATH
 Rules: 5.2.4.7
 Reference Path: outside_profile <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 {shape_aspect
 shape_aspect.description = 'closed circular boundary occurrence'}
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 {shape_aspect_relationship =>
 shape_defining_relationship
 shape_aspect_relationship
 shape_aspect_relationship.description = 'profile usage'}
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 shape_aspect =>
 circular_closed_profile

5.1.14.9 Circular_cutout

AIM element: pocket
 Source: ISO 10303-522
 Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
 Reference Path: pocket <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object
 {characterized_object
 characterized_object.description = 'circular cutout'}

5.1.14.9.1 circular_cutout to circular_closed_profile (as circular_boundary)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: pocket <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{ shape_aspect
shape_aspect.description = 'enclosed boundary occurrence'}
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
{ [shape_aspect_relationship =>
shape_defining_relationship]
[shape_aspect_relationship
shape_aspect_relationship.description = 'profile usage']]
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
shape_aspect =>
circular_closed_profile

5.1.14.10 Compound_feature

AIM element: compound_feature
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: compound_feature <=
{ feature_definition=>
instanced_feature}
feature_definition<=
characterized_object
characterized_definition=characterized_object<=
property_definition.definition
property_definition
property_definition=>
product_definition_shape<=
shape_aspect.of_shape
shape_aspect
shape_aspect.name = 'compound feature in solid'

5.1.14.10.1 feature_description

AIM element: characterized_object.description
 Source: ISO 10303-41
 Reference Path: compound_feature <=
 feature_definition <=
 characterized_object
 characterized_object.description

5.1.14.10.2 feature_name

AIM element: characterized_object.name
 Source: ISO 10303-41
 Reference Path: compound_feature <=
 feature_definition <=
 characterized_object
 characterized_object.name

5.1.14.10.3 compound_feature to compound_feature_element (as element)

#1: as element except for thread

AIM element: PATH
 Rules: 5.2.4.3, 5.2.4.9, 5.2.4.10, 5.2.4.14
 Reference Path: compound_feature <=
 feature_definition <=
 characterized_object
 characterized_definition=characterized_object<-
 property_definition.definition
 property_definition
 property_definition=>
 product_definition_shape<-
 shape_aspect.of_shape
 shape_aspect
 { shape_aspect=>
 composite_shape_aspect}
 shape_aspect<-
 shape_aspect_relationship.relate_shape_aspect
 shape_aspect_relationship
 { shape_aspect_relationship=>
 feature_component_relationship}
 shape_aspect_relationship.related_shape_aspect->
 shape_aspect=>
 ((instanced_feature)
 (transition_feature))

ISO/CD 10303-219:2003(E)

#2: as element for thread only

AIM element: PATH
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.10, 5.2.4.14
Reference Path: compound_feature <=
 feature_definition <=
 characterized_object
 characterized_definition=characterized_object<-
 property_definition.definition
 property_definition
 property_definition=>
 product_definition_shape<-
 shape_aspect.of_shape
 shape_aspect
 {shape_aspect=>
 composite_shape_aspect}
 shape_aspect<-
 shape_aspect_relationship.relating_shape_aspect
 shape_aspect_relationship
 {shape_aspect_relationship=>
 feature_component_relationship}
 shape_aspect_relationship.related_shape_aspect->
 shape_aspect=>
 (applied_area)

5.1.14.11 Compound_feature_element

#1: as element except for thread

AIM element: (instanced_feature)
 (transition_feature)
 #2(applied_area)
 Source: ISO 10303-522
 Rules: 5.2.4.3, 5.2.4.9, 5.2.4.10, 5.2.4.14
 Reference Path: (instanced_feature <=
 [feature_definition <=
 characterized_object]
 [shape_aspect])
 (transition_feature <=
 shape_aspect)

#2: as element for thread only

AIM element: (applied_area)
 Source: ISO 10303-522
 Rules: 5.2.4.3, 5.2.4.9, 5.2.4.10, 5.2.4.14
 Reference Path: (applied_area <=
 shape_aspect)

5.1.14.11.1 compound_feature_element to machining_feature (as element)

AIM element: IDENTICAL MAPPING

5.1.14.11.2 compound_feature_element to transition_feature (as element)

AIM element: IDENTICAL MAPPING

5.1.14.12 Compound_feature_relationship

AIM element: shape_aspect_relationship
 Source: ISO 10303-41
 Reference Path: {shape_aspect_relationship
 shape_aspect_relationship.name = 'compound feature ordering'}

5.1.14.12.1 compound_feature_relationship to compound_feature_element (as predecessor)

AIM element: PATH
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.10, 5.2.4.14
Reference Path: shape_aspect_relationship
shape_aspect_relationship.related_shape_aspect ->
shape_aspect =>
(instanced_feature)
(transition_feature)

5.1.14.12.2 compound_feature_relationship to compound_feature_element (as successor)

AIM element: PATH
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.10, 5.2.4.14
Reference Path: shape_aspect_relationship
shape_aspect_relationship.relatng_shape_aspect ->
shape_aspect =>
(instanced_feature)
(transition_feature)

5.1.14.13 Counterbore_hole

AIM element: composite_hole
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: composite_hole <=
compound_feature <=
feature_definition=>
[feature_definition <=
characterized_object]
instanced_feature <=
[[[shape_aspect =>
composite_shape_aspect]
[shape_aspect
shape_aspect.description = 'counterbore']]
shape_aspect]

5.1.14.13.1 counterbore_hole to round_hole (as larger_hole)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.12
 Reference Path:


```

composite_hole <=
compound_feature <=
feature_definition <=
characterized_object
characterized_definition=characterized_object<-
property_definition.definition
property_definition
property_definition=>
product_definition_shape<-
shape_aspect.of_shape
shape_aspect
{shape_aspect=>
composite_shape_aspect}
shape_aspect<-
shape_aspect_relationship.relate_shape_aspect
{[shape_aspect_relationship =>
feature_component_relationship]
[shape_aspect_relationship
shape_aspect_relationship.name = 'large hole']}
shape_aspect_relationship
shape_aspect_relationship.related_shape_aspect ->
shape_aspect =>
instanced_feature <=
feature_definition =>
round_hole
    
```

5.1.14.13.2 counterbore_hole to round_hole (as smaller_hole)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.12
Reference Path: composite_hole <=
compound_feature <=
feature_definition <=
characterized_object
characterized_definition=characterized_object<-
property_definition.definition
property_definition
property_definition=>
product_definition_shape<-
shape_aspect.of_shape
shape_aspect
{shape_aspect=>
composite_shape_aspect}
shape_aspect<-
shape_aspect_relationship.relatng_shape_aspect
{[shape_aspect_relationship =>
feature_component_relationship]
[shape_aspect_relationship
shape_aspect_relationship.name = 'small hole']}
shape_aspect_relationship
shape_aspect_relationship.related_shape_aspect ->
shape_aspect =>
instanced_feature <=
feature_definition =>
round_hole

5.1.14.14 Countersunk_hole

AIM element: composite_hole
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: composite_hole <=
compound_feature <=
feature_definition=>
[feature_definition <=
characterized_object]
instanced_feature <=
[[[shape_aspect =>
composite_shape_aspect]
[shape_aspect
shape_aspect.description = 'countersunk']]
shape_aspect]

5.1.14.14.1 countersunk_hole to round_hole (as constant_diameter_hole)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.12
 Reference Path:


```

composite_hole <=
compound_feature <=
feature_definition <=
characterized_object
characterized_definition=characterized_object<-
property_definition.definition
property_definition
property_definition=>
product_definition_shape<-
shape_aspect.of_shape
shape_aspect
{shape_aspect=>
composite_shape_aspect}
shape_aspect<-
shape_aspect_relationship.related_shape_aspect
{[shape_aspect_relationship =>
feature_component_relationship]
[shape_aspect_relationship
shape_aspect_relationship.name = 'constant diameter hole']}
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
shape_aspect =>
instanced_feature <=
feature_definition =>
round_hole
    
```

5.1.14.14.2 countersunk_hole to round_hole (as tapered_hole)

AIM element: PATH

Rules: 5.2.4.9, 5.2.4.12

Reference Path: composite_hole <=
compound_feature <=
feature_definition <=
characterized_object
characterized_definition=characterized_object<-
property_definition.definition
property_definition
property_definition=>
product_definition_shape<-
shape_aspect.of_shape
shape_aspect
shape_aspect =>
instanced_feature <=
feature_definition =>
round_hole

{ round_hole <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <-
property_definition.definition
property_definition =>
product_definition_shape <-
shape_aspect.of_shape
{ shape_aspect
shape_aspect.description = 'change in diameter occurrence'
shape_aspect <-
shape_aspect_relationship.related_shape_aspect
{ [shape_aspect_relationship =>
feature_component_relationship]
[shape_aspect_relationship
shape_aspect_relationship.description = 'taper usage'] }
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
shape_aspect =>
taper }

5.1.14.15 Cutout

AIM element: pocket
 Source: ISO 10303-522
 Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
 Reference Path: pocket <=
 { feature_definition =>
 instanciated_feature}
 feature_definition <=
 characterized_object
 {characterized_object
 (characterized_object.description = 'circular cutout')
 (characterized_object.description = 'complex cutout')}

5.1.14.15.1 cutout to through_pocket_bottom_condition (as bottom_-condition)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path: pocket <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 {shape_aspect
 shape_aspect.description = 'bottom condition occurrence'}
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 {[shape_aspect_relationship =>
 feature_component_relationship]
 [shape_aspect_relationship
 shape_aspect_relationship.description = 'pocket bottom usage']}
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 {shape_aspect
 (shape_aspect.description = 'through')}
 shape_aspect =>
 pocket_bottom

5.1.14.16 Defined_gear

AIM element: gear
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: gear <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object

5.1.14.17 Defined_marking

AIM element: marking
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: marking <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object

5.1.14.17.1 defined_marking to descriptive_parameter (as font_name)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: marking <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'font name'}
 representation_item =>
 descriptive_representation_item

5.1.14.17.2 defined_marking to descriptive_parameter (as special_-instructions)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: marking <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'special instructions'}
representation_item =>
descriptive_representation_item

5.1.14.17.3 defined_marking to numeric_parameter (as character_height)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: marking <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'character height'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.14.17.4 defined_marking to numeric_parameter (as character_spacing)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: marking <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'character spacing'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.14.18 Defined_thread

AIM element: thread
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: thread <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object

5.1.14.18.1 defined_thread to numeric_parameter (as crest)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: thread <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'crest'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.14.18.2 defined_thread to numeric_parameter (as minor_diameter)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: thread <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'minor diameter'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.14.18.3 defined_thread to numeric_parameter (as pitch_diameter)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: thread <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'pitch diameter'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.14.19 Diagonal_knurl

AIM element: turned_knurl
 Source: ISO 10303-522
 Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
 Reference Path: turned_knurl <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object
 {characterized_object
 characterized_object.description = 'diagonal'}

5.1.14.19.1 diagonal_knurl to descriptive_parameter (as helix_hand)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: turned_knurl <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'helix hand'}
representation_item =>
descriptive_representation_item

5.1.14.19.2 diagonal_knurl to numeric_parameter (as helix_angle)

AIM element: PATH

Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11

Reference Path: turned_knurl <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'helix angle'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 plane_angle_measure_with_unit}

5.1.14.20 Diamond_knurl

AIM element: turned_knurl

Source: ISO 10303-522

Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12

Reference Path: turned_knurl <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object
 {characterized_object
 characterized_object.description = 'diamond'}

5.1.14.20.1 diamond_knurl to numeric_parameter (as helix_angle)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: turned_knurl <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'helix angle'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
plane_angle_measure_with_unit}

5.1.14.21 Gear

AIM element: (gear)
(externally_defined_feature_definition)
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9
Reference Path: (gear <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object)
(externally_defined_feature_definition <=
[externally_defined_item]
[{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object
{ characterized_object
(characterized_object.description = 'bevel gear')
(characterized_object.description = 'spur gear')
(characterized_object.description = 'helix gear') }])

5.1.14.21.1 module_or_diametral_pitch

AIM element: descriptive_representation_item.description
Source: ISO 10303-45
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: (gear <=)
(externally_defined_feature_definition <=)
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'pitch type'}
representation_item =>
descriptive_representation_item
descriptive_representation_item.description
{(descriptive_representation_item.description = 'module')
(descriptive_representation_item.description = 'diametral pitch')}

5.1.14.21.2 gear to numeric_parameter (as normal_attribute)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: (gear <=)
 (externally_defined_feature_definition <=)
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'normal_attribute'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.14.21.3 gear to numeric_parameter (as nominal_tooth_depth)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: (gear <=)
(externally_defined_feature_definition <=)
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'nominal tooth depth'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.14.21.4 gear to numeric_parameter (as reference_pressure_angle)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: (gear <=)
 (externally_defined_feature_definition <=)
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'reference pressure angle'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 plane_angle_measure_with_unit}

5.1.14.21.5 gear to numeric_parameter (as rake_shift_factor)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: (gear <=)
(externally_defined_feature_definition <=)
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'rake shift factor'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.14.21.6 gear to numeric_parameter (as number_of_teeth)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: (gear <=)
 (externally_defined_feature_definition <=)
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'number of teeth'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 ratio_measure_with_unit}

5.1.14.21.7 gear to numeric_parameter (as face_width)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: (gear <=)
(externally_defined_feature_definition <=)
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'face width'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.14.21.8 gear to numeric_parameter (as tip_diameter)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: (gear <=)
 (externally_defined_feature_definition <=)
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'tip diameter'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.14.21.9 gear to shape (as applied_shape)

AIM element: PATH
 Rules: 5.2.4.10
 Reference Path: (gear <=)
 (externally_defined_feature_definition <=)
 feature_definition =>
 characterized_object<=
 property_definition.definition
 property_definition=>
 product_definition_shape

5.1.14.22 General_boss

AIM element: boss
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: boss <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object
 { characterized_object
 characterized_object.description = 'complex'}

5.1.14.22.1 general_boss to angle_taper (as change_in_boundary)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: boss <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'change in boundary occurrence'}
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 { [shape_aspect_relationship =>
 feature_component_relationship]
 [shape_aspect_relationship
 shape_aspect_relationship.description = 'taper usage']}
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 { shape_aspect
 shape_aspect.description = 'angle taper'}
 shape_aspect =>
 taper

5.1.14.22.2 general_boss to directed_taper (as change_in_boundary)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path: boss <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'change in boundary occurrence'
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 { [shape_aspect_relationship =>
 feature_component_relationship]
 [shape_aspect_relationship
 shape_aspect_relationship.description = 'taper usage']
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 { shape_aspect
 shape_aspect.description = 'directed taper'
 shape_aspect =>
 taper

5.1.14.22.3 general_boss to closed_profile (as enclosed_boundary)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: boss <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{ shape_aspect
shape_aspect.description = 'enclosed boundary occurrence'}
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
{ [shape_aspect_relationship =>
shape_defining_relationship]
[shape_aspect_relationship
shape_aspect_relationship.description = 'profile usage']}
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
shape_aspect =>
(closed_path_profile)
(ngon_closed_profile)

5.1.14.23 General_cutout

AIM element: pocket
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: pocket <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object
{ characterized_object
characterized_object.description = 'complex cutout'}

5.1.14.23.1 general_cutout to profile (as boundary)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path:


```

pocket <=
  feature_definition <=
    characterized_object
    characterized_definition = characterized_object
    characterized_definition <-
      property_definition.definition
    property_definition =>
      product_definition_shape <-
        shape_aspect.of_shape
        { shape_aspect
          shape_aspect.description = 'boundary occurrence' }
    shape_aspect <-
      shape_aspect_relationship.related_shape_aspect
      { [shape_aspect_relationship =>
        shape_defining_relationship]
        [shape_aspect_relationship
          shape_aspect_relationship.description = 'profile usage']]
    shape_aspect_relationship
    shape_aspect_relationship.relate_shape_aspect ->
    shape_aspect =>
      ( circular_closed_profile)
      ( closed_path_profile)
      ( ngon_closed_profile)
      ( rectangular_closed_profile)
      ( linear_profile)
      ( open_path_profile)
      ( partial_circular_profile)
      ( rounded_u_profile)
      ( square_u_profile)
      ( tee_profile)
      ( vee_profile)
    
```

5.1.14.24 General_outside_profile

AIM element: outside_profile
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: outside_profile <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{ shape_aspect
shape_aspect.description = 'outside boundary' }

5.1.14.24.1 general_outside_profile to profile (as boundary)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path:


```

outside_profile <=
  feature_definition <=
    characterized_object
    characterized_definition = characterized_object
    characterized_definition <-
      property_definition.definition
    property_definition =>
      product_definition_shape <-
        shape_aspect.of_shape
        { shape_aspect
          shape_aspect.description = 'boundary occurrence' }
      shape_aspect <-
        shape_aspect_relationship.related_shape_aspect
        { [shape_aspect_relationship =>
          shape_defining_relationship]
          [shape_aspect_relationship
            shape_aspect_relationship.description = 'profile usage']]
        shape_aspect_relationship
        shape_aspect_relationship.relateing_shape_aspect ->
        { shape_aspect
          shape_aspect.description = 'outside boundary' }
        shape_aspect =>
        ( circular_closed_profile)
        ( closed_path_profile)
        ( ngon_closed_profile)
        ( rectangular_closed_profile)
        ( linear_profile)
        ( open_path_profile)
        ( partial_circular_profile)
        ( rounded_u_profile)
        ( square_u_profile)
        ( tee_profile)
        ( vee_profile)
    
```

5.1.14.25 General_pocket

AIM element: pocket
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: pocket <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object
 { characterized_object
 characterized_object.description = 'complex' }

5.1.14.25.1 general_pocket to boss (as volume_not_removed)

AIM element: PATH
Reference Path: pocket <=
 feature_definition <=
 characterized_object
 characterized_definition= characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape< -
 shape_aspect.of_shape
 { shape_aspect=>
 composite_shape_aspect}
 shape_aspect< -
 shape_aspect_relationship.relate_shape_aspect
 { shape_aspect_relationship.description= 'uncut area'
 { shape_aspect_relationship=>
 feature_component_relationship}
 shape_aspect_relationship
 shape_aspect_relationship.related_shape_aspect->
 shape_aspect=>
 instanced_feature=>
 feature_definition=>
 boss

5.1.14.25.2 general_pocket to protrusion(as volume_not_removed)

AIM element: PATH

Reference Path:

```

pocket <=
feature_definition <=
characterized_object
characterized_definition= characterized_object
characterized_definition <-
property_definition.definition
property_definition =>
product_definition_shape< -
shape_aspect.of_shape
{shape_aspect=>
composite_shape_aspect}
shape_aspect< -
shape_aspect_relationship.relate_shape_aspect
{shape_aspect_relationship.description= 'uncut area'}
{shape_aspect_relationship=>
feature_component_relationship}
shape_aspect_relationship
shape_aspect_relationship.related_shape_aspect->
shape_aspect=>
instanced_feature=>
feature_definition=>
protrusion

```

5.1.14.25.3 general_pocket to profile (as boundary)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: pocket <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{ shape_aspect
shape_aspect.description = 'boundary occurrence'}
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
{ [shape_aspect_relationship =>
shape_defining_relationship]
[shape_aspect_relationship
shape_aspect_relationship.description = 'profile usage']]
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
{ shape_aspect
shape_aspect.description = 'boundary'}
shape_aspect =>
(circular_closed_profile)
(closed_path_profile)
(ngon_closed_profile)
(rectangular_closed_profile)
(open_path_profile)
(partial_circular_profile)
(rounded_u_profile)
(square_u_profile)
(tee_profile)
(vee_profile)

5.1.14.26 General_removal_volume

AIM element: removal_volume
 Source: ISO 10303-522
 Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
 Reference Path: removal_volume <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object

5.1.14.26.1 general_removal_volume to shape_element (as removal_volume)

AIM element: PATH
 Rules: 5.2.4.10
 Reference Path: removal_volume <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'shape volume occurrence'
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 { [shape_aspect_relationship =>
 shape_defining_relationship]
 [shape_aspect_relationship
 shape_aspect_relationship.description = 'volume shape usage']
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 { shape_aspect
 shape_aspect.description = 'volume shape'
 shape_aspect

5.1.14.27 General_revolution

AIM element: revolved_profile
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: revolved_profile <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object
 { characterized_object
 characterized_object.description = 'open profile' }

5.1.14.27.1 general_revolution to general_open_profile (as outer_edge_shape)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: revolved_profile
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'outer edge shape occurrence' }
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 { [shape_aspect_relationship =>
 shape_defining_relationship]
 [shape_aspect_relationship
 shape_aspect_relationship.description = 'profile usage'] }
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 { shape_aspect
 shape_aspect.description = 'outer edge shape' }
 shape_aspect =>
 open_path_profile

5.1.14.28 General_shape_profile

AIM element: outside_profile
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: outside_profile <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'complex boundary occurrence'}

5.1.14.28.1 general_shape_profile to path (as profile_boundary)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: outside_profile <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{ shape_aspect
shape_aspect.description = 'complex boundary occurrence'}
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
{ shape_aspect_relationship =>
shape_defining_relationship
shape_aspect_relationship
shape_aspect_relationship.description = 'profile usage'}
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
{ shape_aspect
shape_aspect.description = 'boundary'}
shape_aspect =>
(circular_closed_profile)
(closed_path_profile)
(ngon_closed_profile)
(rectangular_closed_profile)
(open_path_profile)
(partial_circular_profile)
(rounded_u_profile)
(square_u_profile)
(tee_profile)
(vee_profile)

5.1.14.29 Groove

AIM element: revolved_profile
 Source: ISO 10303-522
 Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
 Reference Path: revolved_profile <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object
 {characterized_object
 characterized_object.description = 'groove'}

5.1.14.29.1 groove to open_profile (as sweep)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path: revolved_profile <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 {shape_aspect
 shape_aspect.description = 'sweep occurrence'}
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 {[shape_aspect_relationship =>
 shape_defining_relationship]
 [shape_aspect_relationship
 shape_aspect_relationship.description = 'profile usage']}
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 {shape_aspect
 shape_aspect.description = 'sweep'}
 shape_aspect =>
 (open_path_profile)
 (partial_circular_profile)
 (rounded_u_profile)
 (square_u_profile)
 (tee_profile)
 (vee_profile)

5.1.14.30 Helical_gear

AIM element: gear
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: gear <=
{ feature_definition =>
 instanced_feature}
feature_definition <=
 characterized_object
 { characterized_object
 characterized_object.description = 'helex gear'}

5.1.14.30.1 left_or_right_hand_tooth

AIM element: descriptive_representation_item.description
Source: ISO 10303-45
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: (gear <=)
(externally_defined_feature_definition <=)
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 { property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 { representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 { representation_item
 representation_item.name = 'pitch type'
 representation_item =>
 descriptive_representation_item
 descriptive_representation_item.description
 { (descriptive_representation_item.description = 'left hand tooth')
 (descriptive_representation_item.description = 'right hand tooth') }

5.1.14.30.2 helical_gear to numeric_parameter (as reference_helix_angle)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: (gear <=)
 (externally_defined_feature_definition <=)
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'reference helix angle'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 plane_angle_measure_with_unit}

5.1.14.31 Hole

AIM element: (round_hole)
(composite_hole)
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: (round_hole <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object)
(composite_hole <=
compound_feature <=
feature_definition=>
[feature_definition <=
characterized_object]
instanced_feature <=
[[shape_aspect =>
composite_shape_aspect]])

5.1.14.32 Knurl

AIM element: (turned_knurl)
(externally_defined_feature_definition)
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9
Reference Path: (turned_knurl <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object)
(externally_defined_feature_definition <=
[externally_defined_item]
[[feature_definition =>
instanced_feature}
feature_definition <=
characterized_object
{ characterized_object
characterized_object.description = 'knurl'}]])

5.1.14.32.1 knurl to partial_area_definition (as partial_profile)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path: (turned_knurl <=)
 (externally_defined_feature_definition <=)
 feature_definition <=
 characterized_object<-
 property_definition.definition
 property_definition=>
 product_definition_shape
 shape_aspect.of_shape->
 shape_aspect <-
 shape_aspect_relationship.related_shape_aspect
 {[shape_aspect_relationship =>
 shape_defining_relationship]
 [shape_aspect_relationship
 shape_aspect_relationship.description = 'applied area usage']}
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 shape_aspect =>
 applied_area

5.1.14.32.2 knurl to shape_element (as applied_shape)

AIM element: PATH
 Source: ISO 10303-522
 Rules: 5.2.4.10
 Reference Path: (turned_knurl <=)
 (externally_defined_feature_definition <=)
 feature_definition =>
 characterized_object<-
 property_definition.definition
 property_definition=>
 product_definition_shape
 shape_aspect.of_shape->
 shape_aspect <-
 shape_aspect_relationship.related_shape_aspect
 {[shape_aspect_relationship =>
 shape_defining_relationship]
 [shape_aspect_relationship
 shape_aspect_relationship.description = 'applied shape']}
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 shape_aspect

5.1.14.33 Marking

AIM element: (marking)
(externally_defined_feature_definition)
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9
Reference Path: (marking <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object)
(externally_defined_feature_definition <=
[externally_defined_item]
[{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object
{characterized_object
characterized_object.description = 'marking'}]))

5.1.14.33.1 marking to shape (as applied_to_shape)

AIM element: PATH
Rules: 5.2.4.10
Reference Path: (marking <=)
(externally_defined_feature_definition <=)
feature_definition =>
characterized_object<-
property_definition.definition
property_definition=>
product_definition_shape
shape_aspect.of_shape->
shape_aspect <-
shape_aspect_relationship.related_shape_aspect
{[shape_aspect_relationship =>
shape_defining_relationship]
[shape_aspect_relationship
shape_aspect_relationship.description = 'applied shape']}
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
shape_aspect

5.1.14.33.2 marking to descriptive_parameter (as text)

AIM element: PATH
 Reference Path: (marking <=)
 (externally_defined_feature_definition <=)
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation
 property_definition_representation.used_representation ->
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'marking text'}
 representation_item =>
 descriptive_representation_item

5.1.14.34 Multi_axis_feature

AIM element: instanced_feature
 Source: ISO 10303-522
 Reference Path: (boss<=)
 (outside_profile<=)
 (removal_volume<=)
 (round_hole<=)
 (flat_face<=)
 (pocket<=)
 (protrusion<=)
 (rib_top<=)
 (rounded_end<=)
 (slot<=)
 (step<=)
 instanced_feature

5.1.14.34.1 maximum_feature_limit

AIM element: PATH
Reference Path : instanced_feature <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
{property_definition=>
product_definition_shape}
property_definition <=
property_definition_representation.definition
property_definition_representation
{property_definition_representation =>
shape_definition_representation}
property_definition_representation .used_representation->
representation=>
{representation.name='maximum feature limit'}
shape_representation=>
planar_shape_representation

5.1.14.35 Outer_diameter

AIM element: outer_round
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: outer_round <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object
{characterized_object
characterized_object.description = 'outer diameter'}

5.1.14.35.1 outer_diameter to angle_taper (as reduced_size)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path:


```

outer_round <=
  feature_definition <=
    characterized_object
    characterized_definition = characterized_object
    characterized_definition <-
      property_definition.definition
    property_definition =>
      product_definition_shape <-
        shape_aspect.of_shape
        { shape_aspect
          shape_aspect.description = 'reduced size occurrence' }
      shape_aspect <-
        shape_aspect_relationship.related_shape_aspect
        { [shape_aspect_relationship =>
          feature_component_relationship]
          [shape_aspect_relationship
            [shape_aspect_relationship.name = 'reduced size']
            [shape_aspect_relationship.description = 'taper usage']] }
        shape_aspect_relationship
        shape_aspect_relationship.relate_shape_aspect ->
        { shape_aspect
          shape_aspect.description = 'angle taper' }
        shape_aspect =>
        taper
    
```

5.1.14.35.2 outer_diameter to diameter_taper (as reduced_size)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: outer_round <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{ shape_aspect
shape_aspect.description = 'reduced size occurrence' }
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
{ [shape_aspect_relationship =>
feature_component_relationship]
[shape_aspect_relationship
[shape_aspect_relationship.name = 'reduced size']
[shape_aspect_relationship.description = 'taper usage']] }
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
{ shape_aspect
shape_aspect.description = 'diameter taper' }
shape_aspect =>
taper

5.1.14.35.3 outer_diameter to directed_taper (as reduced_size)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path:


```

outer_round <=
  feature_definition <=
    characterized_object
    characterized_definition = characterized_object
    characterized_definition <-
      property_definition.definition
    property_definition =>
      product_definition_shape <-
        shape_aspect.of_shape
        { shape_aspect
          shape_aspect.description = 'reduced size occurrence' }
      shape_aspect <-
        shape_aspect_relationship.related_shape_aspect
        { [shape_aspect_relationship =>
          feature_component_relationship]
          [shape_aspect_relationship
            [shape_aspect_relationship.name = 'reduced size']
            [shape_aspect_relationship.description = 'taper usage']] }
        shape_aspect_relationship
        shape_aspect_relationship.relate_shape_aspect ->
        { shape_aspect
          shape_aspect.description = 'directed taper' }
        shape_aspect =>
        taper
    
```

5.1.14.35.4 outer_diameter to numeric_parameter (as diameter)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: outer_round <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'diameter'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.14.35.5 outer_diameter to numeric_parameter (as feature_length)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: outer_round <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'length'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.14.36 Outer_diameter_to_shoulder

AIM element: outer_round
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: outer_round <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object
{characterized_object
characterized_object.description = 'outer diameter to shoulder'}

5.1.14.36.1 outer_diameter_to_shoulder to numeric_parameter (as diameter)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: outer_round <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'diameter'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.14.36.2 outer_diameter_to_shoulder to numeric_parameter (as feature length)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path:


```

outer_round <=
  feature_definition <=
    characterized_object
    characterized_definition = characterized_object
    characterized_definition <-
      property_definition.definition
    property_definition <-
      property_definition_representation.definition
    {property_definition_representation =>
      shape_definition_representation}
    property_definition_representation
    property_definition_representation.used_representation ->
    {representation =>
      shape_representation =>
        shape_representation_with_parameters}
    representation
    representation.items[i] ->
    {representation_item
      representation_item.name = 'feature length'}
    representation_item =>
    measure_representation_item
    {measure_representation_item <=
      measure_with_unit =>
      length_measure_with_unit}
    
```

5.1.14.36.3 outer_diameter_to_shoulder to vee_profile (as v_shape_boundary)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: outer_round <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{ shape_aspect
shape_aspect.description = 'v-shape boundary occurrence' }
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
{ [shape_aspect_relationship =>
shape_defining_relationship]
[shape_aspect_relationship
shape_aspect_relationship.description = 'profile usage'] }
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
{ shape_aspect
shape_aspect.description = 'v-shape' }
shape_aspect =>
vee_profile

5.1.14.37 Outer_round

AIM element: outer_round
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: outer_round <=
{ feature_definition =>
instanced_feature }
feature_definition <=
characterized_object

5.1.14.38 Partial_circular_shape_profile

AIM element: outside_profile
 Source: ISO 10303-522
 Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
 Reference Path: outside_profile <=
 { feature_definition =>
 instanciated_feature}
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'partial circular boundary occurrence'}

5.1.14.38.1 partial_circular_shape_profile to partial_circular_profile (as open_boundary)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path: outside_profile <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'partial circular boundary occurrence'}
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 { shape_aspect_relationship =>
 shape_defining_relationship
 shape_aspect_relationship
 shape_aspect_relationship.description = 'profile usage'}
 shape_aspect_relationship
 shape_aspect_relationship.relatng_shape_aspect ->
 shape_aspect =>
 partial_circular_profile

5.1.14.39 Planar_face

AIM element: flat_face
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: flat_face <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object

5.1.14.39.1 planar_face to direction_element (as removal_direction)

AIM element: PATH
Rules: 5.2.4.7
Reference Path: flat_face <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
{property_definition=>
product_definition_shape}
property_definition_representation.definition
property_definition_representation
property_definition_representation.used_representation ->
{representation
representation.name = 'removal direction'}
representation =>
shape_representation=>
direction_shape_representation

5.1.14.39.2 planar_face to linear_path (as course_of_travel)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path: flat_face <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'course of travel occurrence'
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 { [shape_aspect_relationship =>
 shape_defining_relationship]
 [shape_aspect_relationship
 [shape_aspect_relationship.name = 'course of travel']
 [shape_aspect_relationship.description = 'path feature component usage']]
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 { shape_aspect
 shape_aspect.description = 'linear'
 shape_aspect =>
 path_feature_component

5.1.14.39.3 planar_face to linear_profile (as removal_boundary)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: flat_face <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'removal boundary occurrence'}
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 {[shape_aspect_relationship =>
 shape_defining_relationship]
 [shape_aspect_relationship
 [shape_aspect_relationship.name = 'removal boundary']
 [shape_aspect_relationship.description = 'profile usage']]}
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 shape_aspect =>
 linear_profile

5.1.14.39.4 planar_face to linear_profile (as face_boundary)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path: flat_face <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'enclosed boundary occurrence'
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 { [shape_aspect_relationship =>
 shape_defining_relationship]
 [shape_aspect_relationship
 [shape_aspect_relationship.name = 'boundary']
 [shape_aspect_relationship.description = 'profile usage']] }
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 shape_aspect =>
 (circular_closed_profile)
 (ngon_closed_profile)
 (rectangular_closed_profile)
 (closed_path_profile)

5.1.14.39.5 planar_face to boss (as volume_not_removed)

AIM element: PATH
Reference Path: flat_face <=
feature_definition <=
characterized_object
characterized_definition= characterized_object
characterized_definition <-
property_definition.definition
property_definition =>
product_definition_shape <-
shape_aspect.of_shape
{shape_aspect=>
composite_shape_aspect}
shape_aspect <-
shape_aspect_relationship.relate_shape_aspect
{shape_aspect_relationship.description= 'uncut area'}
{shape_aspect_relationship=>
feature_component_relationship}
shape_aspect_relationship
shape_aspect_relationship.related_shape_aspect->
shape_aspect=>
instanced_feature=>
feature_definition=>
boss

5.1.14.39.6 planar_face to protrusion(as volume_not_removed)

AIM element: PATH
 Reference Path: flat_face <=
 feature_definition <=
 characterized_object
 characterized_definition= characterized_object
 characterized_definition <-
 property_definition.definition
 property_definition =>
 product_definition_shape< -
 shape_aspect. of_shape
 {shape_aspect=>
 composite_shape_aspect}
 shape_aspect< -
 shape_aspect_relationship. relating_shape_aspect
 {shape_aspect_relationship. description= 'uncut area'}
 {shape_aspect_relationship=>
 feature_component_relationship}
 shape_aspect_relationship
 shape_aspect_relationship.related_shape_aspect->
 shape_aspect=>
 instanced_feature=>
 feature_definition=>
 protrusion

5.1.14.40 Pocket

AIM element: pocket
 Source: ISO 10303-522
 Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
 Reference Path: pocket <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object

5.1.14.40.1 pocket to numeric_parameter (as base_radius)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: pocket <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 {property_definition=>
 product_definition_shape}
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'fillet radius'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.14.40.2 pocket to angle_taper (as change_in_boundary)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path:


```

pocket <=
  feature_definition <=
    characterized_object
    characterized_definition = characterized_object
    characterized_definition <-
      property_definition.definition
    property_definition =>
      product_definition_shape <-
        shape_aspect.of_shape
        { shape_aspect
          shape_aspect.description = 'change in boundary occurrence' }
    shape_aspect <-
      shape_aspect_relationship.related_shape_aspect
      { [shape_aspect_relationship =>
        feature_component_relationship]
        [shape_aspect_relationship
          shape_aspect_relationship.description = 'taper usage']}
    shape_aspect_relationship
    shape_aspect_relationship.relate_shape_aspect ->
      { shape_aspect
        shape_aspect.description = 'angle taper' }
    shape_aspect =>
      taper
    
```

5.1.14.40.3 pocket to directed_taper (as change_in_boundary)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: pocket <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{ shape_aspect
shape_aspect.description = 'change in boundary occurrence'}
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
{ [shape_aspect_relationship =>
feature_component_relationship]
[shape_aspect_relationship
shape_aspect_relationship.description = 'taper usage']}
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
{ shape_aspect
shape_aspect.description = 'directed taper'}
shape_aspect =>
taper

5.1.14.40.4 pocket to linear_path (as pocket_depth)

AIM element: PATH

Rules: 5.2.4.9, 5.2.4.10

Reference Path:

```

pocket <=
  feature_definition <=
    characterized_object
    characterized_definition = characterized_object
    characterized_definition <-
      property_definition.definition
    property_definition =>
      product_definition_shape <-
        shape_aspect.of_shape
        { shape_aspect
          shape_aspect.description = 'pocket depth occurrence' }
        shape_aspect <-
          shape_aspect_relationship.related_shape_aspect
        { [shape_aspect_relationship =>
          shape_defining_relationship]
          [shape_aspect_relationship
            [shape_aspect_relationship.name = 'pocket depth']
            [shape_aspect_relationship.description = 'path feature component usage']] }
        shape_aspect_relationship
        shape_aspect_relationship.relate_shape_aspect ->
        { shape_aspect
          shape_aspect.description = 'linear' }
        shape_aspect =>
          path_feature_component

```

5.1.14.40.5 pocket to pocket_bottom_condition (as bottom_condition)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: pocket <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{shape_aspect
shape_aspect.description = 'bottom condition occurrence'}
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
{[shape_aspect_relationship =>
feature_component_relationship]
[shape_aspect_relationship
shape_aspect_relationship.description = 'pocket bottom usage']}
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
{shape_aspect
(shape_aspect.description = 'planar')
(shape_aspect.description = 'complex')}
shape_aspect =>
pocket_bottom

5.1.14.40.6 pocket to through_pocket_bottom_condition (as bottom_condition)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path:


```

pocket <=
  feature_definition <=
    characterized_object
    characterized_definition = characterized_object
    characterized_definition <-
      property_definition.definition
    property_definition =>
      product_definition_shape <-
        shape_aspect.of_shape
        { shape_aspect
          shape_aspect.description = 'bottom condition occurrence' }
      shape_aspect <-
        shape_aspect_relationship.related_shape_aspect
        { [shape_aspect_relationship =>
          feature_component_relationship]
          [shape_aspect_relationship
            shape_aspect_relationship.description = 'pocket bottom usage']]
        shape_aspect_relationship
        shape_aspect_relationship.relate_shape_aspect ->
        { shape_aspect
          (shape_aspect.description = 'through') }
        shape_aspect =>
          pocket_bottom
    
```

5.1.14.41 Profile_feature

AIM element: outside_profile
 Source: ISO 10303-522
 Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
 Reference Path:


```

(outside_profile <=
  { feature_definition =>
    instanced_feature }
  feature_definition <=
    characterized_object)
    
```

5.1.14.41.1 Profile_feature to linear_profile (as profile_swept_shape)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: outside_profile<=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{ shape_aspect
(shape_aspect.description = 'outside boundary'),
(shape_aspect.description = 'complex boundary occurrence'),
(shape_aspect.description = 'partial circular boundary occurrence'),
(shape_aspect.description = 'closed circular boundary occurrence'),
(shape_aspect.description = 'open rectangular boundary occurrence'),
(shape_aspect.description = 'closed rectangular boundary occurrence'))
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
{ [shape_aspect_relationship =>
shape_defining_relationship]
[shape_aspect_relationship
[shape_aspect_relationship.name = 'profile swept shape']
[shape_aspect_relationship.description = 'path feature component usage']]
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
shape_aspect
shape_aspect.description='linear'
shape_aspect =>
path_feature_component

5.1.14.42 Protrusion

AIM element: protrusion
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: protrusion <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object

5.1.14.42.1 protrusion to shape_element (as shape_volume)

AIM element: PATH
 Rules: 5.2.4.10
 Reference Path: protrusion <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'shape volume occurrence'
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 { [shape_aspect_relationship =>
 shape_defining_relationship]
 [shape_aspect_relationship
 shape_aspect_relationship.description = 'volume shape usage'] }
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 { shape_aspect
 shape_aspect.description = 'volume shape'
 shape_aspect

5.1.14.43 Recess

AIM element: pocket
 Source: ISO 10303-522
 Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
 Reference Path: pocket <=
 { feature_definition =>
 instanced_feature }
 feature_definition <=
 characterized_object
 { characterized_object
 characterized_object.description = 'recess' }

5.1.14.43.1 recess to pocket_bottom_condition (as bottom_condition)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: pocket <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'bottom condition occurrence'}
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 { [shape_aspect_relationship =>
 feature_component_relationship]
 [shape_aspect_relationship
 shape_aspect_relationship.description = 'pocket bottom usage']}
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 { shape_aspect
 (shape_aspect.description = 'planar')
 (shape_aspect.description = 'complex')}
 shape_aspect =>
 pocket_bottom

5.1.14.43.2 recess to closed_profile (as fillet boundary)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path:


```

pocket <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <-
property_definition.definition
property_definition =>
product_definition_shape <-
shape_aspect.of_shape
{ shape_aspect
shape_aspect.description = 'boundary occurrence' }
shape_aspect <-
shape_aspect_relationship.related_shape_aspect
{ [shape_aspect_relationship =>
shape_defining_relationship]
[shape_aspect_relationship
shape_aspect_relationship.description = 'profile usage']]
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
shape_aspect =>
( circular_closed_profile)
( closed_path_profile)
( ngon_closed_profile)
( rectangular_closed_profile)
( linear_profile)
( open_path_profile)
( partial_circular_profile)
( rounded_u_profile)
( square_u_profile)
( tee_profile)
( vee_profile)

```

5.1.14.43.3 recess to boss (as volume_not_removed)

AIM element: PATH
Reference Path: pocket <=
feature_definition <=
characterized_object
characterized_definition= characterized_object
characterized_definition <-
property_definition.definition
property_definition =>
product_definition_shape< -
shape_aspect.of_shape
{shape_aspect=>
composite_shape_aspect}
shape_aspect< -
shape_aspect_relationship.relate_shape_aspect
{shape_aspect_relationship.description= 'uncut area'}
{shape_aspect_relationship=>
feature_component_relationship}
shape_aspect_relationship
shape_aspect_relationship.related_shape_aspect->
shape_aspect=>
instanced_feature=>
feature_definition=>
boss

5.1.14.43.4 recess to protrusion(as volume_not_removed)

AIM element: PATH
 Reference Path: pocket <=
 feature_definition <=
 characterized_object
 characterized_definition= characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape< -
 shape_aspect.of_shape
 {shape_aspect=>
 composite_shape_aspect}
 shape_aspect< -
 shape_aspect_relationship.relate_shape_aspect
 {shape_aspect_relationship.description= 'uncut area'}
 {shape_aspect_relationship=>
 feature_component_relationship}
 shape_aspect_relationship
 shape_aspect_relationship.related_shape_aspect->
 shape_aspect=>
 instanced_feature=>
 feature_definition=>
 protrusion

5.1.14.44 Rectangular_boss

AIM element: boss
 Source: ISO 10303-522
 Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
 Reference Path: boss <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object
 {characterized_object
 characterized_object.description = 'rectangular'}

5.1.14.44.1 rectangular_boss to angle_taper (as change_in_boundary)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: boss <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{ shape_aspect
shape_aspect.description = 'change in boundary occurrence'}
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
{ [shape_aspect_relationship =>
feature_component_relationship]
[shape_aspect_relationship
shape_aspect_relationship.description = 'taper usage'] }
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
{ shape_aspect
shape_aspect.description = 'angle taper'}
shape_aspect =>
taper

5.1.14.44.2 rectangular_boss to directed_taper (as change_in_boundary)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path: boss <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'change in boundary occurrence'
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 { [shape_aspect_relationship =>
 feature_component_relationship]
 [shape_aspect_relationship
 shape_aspect_relationship.description = 'taper usage']
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 { shape_aspect
 shape_aspect.description = 'directed taper'
 shape_aspect =>
 taper

5.1.14.44.3 rectangular_boss to closed_profile (as enclosed_boundary)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: boss <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{ shape_aspect
shape_aspect.description = 'rectangular profile occurrence'}
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
{ [shape_aspect_relationship =>
shape_defining_relationship]
[shape_aspect_relationship
shape_aspect_relationship.description = 'profile usage'] }
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
shape_aspect =>
rectangular_closed_profile

5.1.14.45 Rectangular_closed_pocket

AIM element: pocket
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: pocket <=
{ feature_definition =>
instanced_feature }
feature_definition <=
characterized_object
{ characterized_object
characterized_object.description = 'closed rectangular' }

5.1.14.45.1 rectangular_closed_pocket to boss (as volume_not_removed)

AIM element: PATH

Reference Path:

```

pocket <=
feature_definition <=
characterized_object
characterized_definition= characterized_object
characterized_definition <-
property_definition.definition
property_definition =>
product_definition_shape< -
shape_aspect.of_shape
{shape_aspect=>
composite_shape_aspect}
shape_aspect< -
shape_aspect_relationship.relate_shape_aspect
{shape_aspect_relationship.description= 'uncut area'}
{shape_aspect_relationship=>
feature_component_relationship}
shape_aspect_relationship
shape_aspect_relationship.related_shape_aspect->
shape_aspect=>
instanced_feature=>
feature_definition=>
boss

```

5.1.14.45.2 rectangular_closed_pocket to protrusion(as volume_not_-removed)

AIM element: PATH
Reference Path: pocket <=
feature_definition <=
characterized_object
characterized_definition= characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape < -
shape_aspect.of_shape
{shape_aspect=>
composite_shape_aspect}
shape_aspect < -
shape_aspect_relationship.relate_shape_aspect
{shape_aspect_relationship.description= 'uncut area'}
{shape_aspect_relationship=>
feature_component_relationship}
shape_aspect_relationship
shape_aspect_relationship.related_shape_aspect->
shape_aspect=>
instanced_feature=>
feature_definition=>
protrusion

5.1.14.45.3 rectangular_closed_pocket to rectangular_closed_profile (as closed_boundary)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path: pocket <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'closed boundary occurrence'
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 { [shape_aspect_relationship =>
 shape_defining_relationship]
 [shape_aspect_relationship
 shape_aspect_relationship.description = 'profile usage']]
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 shape_aspect =>
 rectangular_closed_profile

5.1.14.46 Rectangular_closed_shape_profile

AIM element: outside_profile
 Source: ISO 10303-522
 Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
 Reference Path: outside_profile <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'closed rectangular boundary occurrence'}

5.1.14.46.1 rectangular_closed_shape_profile to rectangular_closed_profile (as closed_boundary)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: outside_profile <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{ shape_aspect
shape_aspect.description = 'closed rectangular boundary occurrence' }
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
{ shape_aspect_relationship =>
shape_defining_relationship
shape_aspect_relationship
shape_aspect_relationship.description = 'profile usage' }
shape_aspect_relationship.relate_shape_aspect ->
shape_aspect =>
rectangular_closed_profile

5.1.14.47 Rectangular_open_pocket

AIM element: pocket
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: pocket <=
{ feature_definition =>
instanced_feature }
feature_definition <=
characterized_object
{ characterized_object
characterized_object.description = 'open rectangular' }

5.1.14.47.1 rectangular_open_pocket to boss (as volume_not_removed)

AIM element: PATH

Reference Path:

```

pocket <=
feature_definition <=
characterized_object
characterized_definition= characterized_object
characterized_definition <-
property_definition.definition
property_definition =>
product_definition_shape< -
shape_aspect.of_shape
{shape_aspect=>
composite_shape_aspect}
shape_aspect< -
shape_aspect_relationship.relate_shape_aspect
{shape_aspect_relationship.description= 'uncut area'}
{shape_aspect_relationship=>
feature_component_relationship}
shape_aspect_relationship
shape_aspect_relationship.related_shape_aspect->
shape_aspect=>
instanced_feature=>
feature_definition=>
boss

```

5.1.14.47.2 rectangular_open_pocket to protrusion(as volume_not_removed)

AIM element: PATH
Reference Path: pocket <=
feature_definition <=
characterized_object
characterized_definition= characterized_object
characterized_definition <-
property_definition.definition
property_definition =>
product_definition_shape< -
shape_aspect.of_shape
{shape_aspect=>
composite_shape_aspect}
shape_aspect< -
shape_aspect_relationship.relate_shape_aspect
{shape_aspect_relationship.description= 'uncut area'}
{shape_aspect_relationship=>
feature_component_relationship}
shape_aspect_relationship
shape_aspect_relationship.related_shape_aspect->
shape_aspect=>
instanced_feature=>
feature_definition=>
protrusion

5.1.14.47.3 rectangular_open_pocket to square_u_profile (as open_boundary)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path:


```

pocket <=
  feature_definition <=
    characterized_object
    characterized_definition = characterized_object
    characterized_definition <-
      property_definition.definition
    property_definition =>
      product_definition_shape <-
        shape_aspect.of_shape
        { shape_aspect
          shape_aspect.description = 'open boundary occurrence' }
    shape_aspect <-
      shape_aspect_relationship.related_shape_aspect
      { [shape_aspect_relationship =>
        shape_defining_relationship]
        [shape_aspect_relationship
          shape_aspect_relationship.description = 'profile usage']]
    shape_aspect_relationship
    shape_aspect_relationship.relate_shape_aspect ->
    shape_aspect =>
      square_u_profile
    
```

5.1.14.48 Rectangular_open_shape_profile

AIM element: outside_profile
 Source: ISO 10303-522
 Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
 Reference Path:


```

outside_profile <=
  { feature_definition =>
    instanced_feature }
  feature_definition <=
    characterized_object
    characterized_definition = characterized_object
    characterized_definition <-
      property_definition.definition
    property_definition =>
      product_definition_shape <-
        shape_aspect.of_shape
        { shape_aspect
          shape_aspect.description = 'open rectangular boundary occurrence' }
    
```

5.1.14.48.1 rectangular_open_shape_profile to square_U_profile (as open-boundary)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: outside_profile <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{ shape_aspect
shape_aspect.description = 'open rectangular boundary occurrence'}
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
{ shape_aspect_relationship =>
shape_defining_relationship
shape_aspect_relationship
shape_aspect_relationship.description = 'profile usage'}
shape_aspect_relationship.relate_shape_aspect ->
shape_aspect =>
square_u_profile

5.1.14.49 Revolved_feature

AIM element: revolved_profile
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: revolved_profile <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object

5.1.14.49.1 revolved_feature to direction_element (as material_side)

AIM element: PATH
 Rules: 5.2.4.7
 Reference Path:


```

revolved_profile <=
  feature_definition <=
    characterized_object
    characterized_definition = characterized_object
    characterized_definition <-
      property_definition.definition
    property_definition <-
      {property_definition=>
        product_definition_shape}
    property_definition_representation.definition
    property_definition_representation
    property_definition_representation.used_representation ->
      {representation
        representation.name = 'removal direction'}
    representation =>
      shape_representation=>
        direction_shape_representation
    
```

5.1.14.49.2 revolved_feature to numeric_parameter (as radius)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: revolved_profile <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'radius'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.14.50 Revolved_flat

AIM element: revolved_profile
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: revolved_profile <=
{feature_definition =>
instanced_feature}
feature_definition <=
characterized_object
{characterized_object
characterized_object.description = 'flat'}

5.1.14.50.1 revolved_flat to linear_profile (as flat_edge_shape)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path:


```

revolved_profile <=
  feature_definition <=
    characterized_object
    characterized_definition = characterized_object
    characterized_definition <-
      property_definition.definition
    property_definition =>
      product_definition_shape <-
        shape_aspect.of_shape
        { shape_aspect
          shape_aspect.description = 'flat edge shape occurrence' }
    shape_aspect <-
      shape_aspect_relationship.related_shape_aspect
      { [shape_aspect_relationship =>
        shape_defining_relationship]
        [shape_aspect_relationship
          shape_aspect_relationship.description = 'profile usage'] }
    shape_aspect_relationship
    shape_aspect_relationship.relate_shape_aspect ->
      { shape_aspect
        shape_aspect.description = 'flat edge shape' }
    shape_aspect =>
      linear_profile
    
```

5.1.14.51 Revolved_round

AIM element: revolved_profile
 Source: ISO 10303-522
 Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
 Reference Path:


```

revolved_profile <=
  { feature_definition =>
    instanced_feature }
  feature_definition <=
    characterized_object
    { characterized_object
      characterized_object.description = 'round' }
    
```

5.1.14.51.1 revolved_round to partial_circular_profile (as rounded_edge_-shape)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: revolved_profile <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{shape_aspect
shape_aspect.description = 'rounded edge shape occurrence'}
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
{[shape_aspect_relationship =>
shape_defining_relationship]
[shape_aspect_relationship
shape_aspect_relationship.description = 'profile usage']}
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
{shape_aspect
shape_aspect.description = 'rounded edge shape'}
shape_aspect =>
partial_circular_profile

5.1.14.52 Rip_top

AIM element: rib_top
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: rib_top <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object

5.1.14.52.1 rib_top to direction_element (as removal_direction)

AIM element: PATH
 Rules: 5.2.4.7
 Reference Path: ribtop <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 {property_definition=>
 product_definition_shape}
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation
 representation.name= 'removal direction'}
 representation =>
 shape_representation =>
 direction_shape_representation

5.1.14.52.2 rib_top to rib_top_floor (as floor_condition)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: ribtop <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{shape_aspect
shape_aspect.description = 'rib top condition occurrence'}
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
{[shape_aspect_relationship =>
feature_component_relationship]
[shape_aspect_relationship
shape_aspect_relationship.description = 'ribtop usage']}
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
{shape_aspect
(shape_aspect.description = 'planar')
(shape_aspect.description = 'complex')}
shape_aspect =>
ribtop_floor

5.1.14.53 Round_hole

AIM element: round_hole
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: round_hole <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object

5.1.14.53.1 round_hole to angle_taper (as change_in_diameter)

AIM element: PATH

Rules: 5.2.4.9, 5.2.4.10

Reference Path: round_hole <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'change in diameter occurrence'}
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 {[shape_aspect_relationship =>
 feature_component_relationship]
 [shape_aspect_relationship
 shape_aspect_relationship.description = 'taper usage']}
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 { shape_aspect
 shape_aspect.description = 'angle taper'}
 shape_aspect =>
 taper

5.1.14.53.2 round_hole to blind_bottom_condition (as bottom_condition)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: round_hole <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{ shape_aspect
shape_aspect.description = 'bottom condition occurrence'}
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
{ [shape_aspect_relationship =>
feature_component_relationship]
[shape_aspect_relationship
shape_aspect_relationship.description = 'hole bottom usage']}
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
{ shape_aspect
(shape_aspect.description = 'conical')
(shape_aspect.description = 'flat')
(shape_aspect.description = 'flat with radius')
(shape_aspect.description = 'flat with taper')
(shape_aspect.description = 'spherical')}
shape_aspect =>
hole_bottom

5.1.14.53.3 round_hole to circular_closed_profile (as diameter)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path: round_hole <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'diameter occurrence'
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 { [shape_aspect_relationship =>
 shape_defining_relationship]
 [shape_aspect_relationship
 [shape_aspect_relationship.name = 'diameter']
 [shape_aspect_relationship.description = 'profile usage']] }
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 shape_aspect =>
 circular_closed_profile

5.1.14.53.4 round_hole to diameter_taper (as change_in_diameter)

AIM element: PATH

Rules: 5.2.4.9, 5.2.4.10

Reference Path: round_hole <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{ shape_aspect
shape_aspect.description = 'change in diameter occurrence'}
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
{ [shape_aspect_relationship =>
feature_component_relationship]
[shape_aspect_relationship
shape_aspect_relationship.description = 'taper usage'] }
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
{ shape_aspect
shape_aspect.description = 'diameter taper'}
shape_aspect =>
taper

5.1.14.53.5 round_hole to directed_taper (as change_in_diameter)

AIM element: PATH

Rules: 5.2.4.9, 5.2.4.10

Reference Path: round_hole <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'change in diameter occurrence' }
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 { [shape_aspect_relationship =>
 feature_component_relationship]
 [shape_aspect_relationship
 shape_aspect_relationship.description = 'taper usage'] }
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 { shape_aspect
 shape_aspect.description = 'directed taper' }
 shape_aspect =>
 taper

5.1.14.53.6 round_hole to linear_path (as hole_depth)

AIM element: PATH

Rules: 5.2.4.9, 5.2.4.10

Reference Path: round_hole <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{ shape_aspect
shape_aspect.description = 'hole depth occurrence'
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
{ [shape_aspect_relationship =>
shape_defining_relationship]
[shape_aspect_relationship
[shape_aspect_relationship.name = 'hole depth']
[shape_aspect_relationship.description = 'path feature component usage']] }
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
{ shape_aspect
shape_aspect.description = 'linear'
shape_aspect =>
path_feature_component

5.1.14.53.7 round_hole to through_bottom_condition (as bottom_condition)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path: round_hole <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'bottom condition occurrence'}
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 { [shape_aspect_relationship =>
 feature_component_relationship]
 [shape_aspect_relationship
 shape_aspect_relationship.description = 'hole bottom usage']}
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 { shape_aspect
 shape_aspect.description = 'through'}
 shape_aspect =>
 hole_bottom

5.1.14.54 Rounded_end

AIM element: rounded_end
 Source: ISO 10303-522
 Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
 Reference Path: rounded_end <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object

5.1.14.54.1 rounded_end to linear_path (as course_of_travel)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: rounded_end <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{ shape_aspect
shape_aspect.description = 'course of travel occurrence' }
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
{ [shape_aspect_relationship =>
shape_defining_relationship]
[shape_aspect_relationship
[shape_aspect_relationship.description = 'path feature component usage']] }
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
{ shape_aspect
shape_aspect.description = 'linear' }
shape_aspect =>
path_feature_component

5.1.14.54.2 rounded_end to partial_circular_profile (as partial_circular_boundary)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path: rounded_end <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'partial circular boundary occurrence'
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 { [shape_aspect_relationship =>
 shape_defining_relationship]
 [shape_aspect_relationship
 [shape_aspect_relationship.description = 'profile usage']]
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 shape_aspect =>
 partial_circular_profile

5.1.14.55 Shape_profile

AIM element: outside_profile
 Source: ISO 10303-522
 Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
 Reference Path: outside_profile <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object

5.1.14.55.1 shape_profile to profile_floor (as floor_condition)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: outside_profile <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{ shape_aspect
(shape_aspect.description = 'complex boundary occurrence')
(shape_aspect.description = 'partial circular boundary occurrence')
(shape_aspect.description = 'closed circular boundary occurrence')
(shape_aspect.description = 'open rectangular boundary occurrence')
(shape_aspect.description = 'closed rectangular boundary occurrence')}
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
{ shape_aspect_relationship =>
feature_component_relationship
shape_aspect_relationship
shape_aspect_relationship.description = 'profile floor usage'}
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
{ shape_aspect
(shape_aspect.description = 'planar')
(shape_aspect.description = 'complex')}
shape_aspect =>
profile_floor

5.1.14.55.2 shape_profile to through_profile_floor (as floor_condition)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path:


```

outside_profile <=
  feature_definition <=
    characterized_object
    characterized_definition = characterized_object
    characterized_definition <-
      property_definition.definition
    property_definition =>
      product_definition_shape <-
        shape_aspect.of_shape
        { shape_aspect
          (shape_aspect.description = 'complex boundary occurrence'),
          (shape_aspect.description = 'partial circular boundary occurrence'),
          (shape_aspect.description = 'closed circular boundary occurrence'),
          (shape_aspect.description = 'open rectangular boundary occurrence'),
          (shape_aspect.description = 'closed rectangular boundary occurrence')}
        shape_aspect <-
          shape_aspect_relationship.related_shape_aspect
        { shape_aspect_relationship =>
          feature_component_relationship
          shape_aspect_relationship
          shape_aspect_relationship.description = 'profile floor usage'
          shape_aspect_relationship
          shape_aspect_relationship.relate_shape_aspect ->
            { shape_aspect
              (shape_aspect.description = 'through')}
          shape_aspect =>
            profile_floor
    
```

5.1.14.55.3 shape_profile to direction_element (as removal_direction)

AIM element: PATH
Rules: 5.2.4.7
Reference Path: outside_profile <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
{property_definition=>
product_definition_shape}
{product_definition_shape <=
shape_aspect.of_shape
shape_aspect
(shape_aspect.description = 'complex boundary occurrence'),
(shape_aspect.description = 'partial circular boundary occurrence'),
(shape_aspect.description = 'closed circular boundary occurrence'),
(shape_aspect.description = 'open rectangular boundary occurrence'),
(shape_aspect.description = 'closed rectangular boundary occurrence')}
property_definition_representation.definition
property_definition_representation
property_definition_representation.used_representation ->
{representation
representation.name = 'removal direction'}
representation =>
shape_representation=>
direction_shape_representation

5.1.14.56 Slot

AIM element: slot
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: slot <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object

5.1.14.56.1 slot to open_profile (as sweep_shape)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path: slot <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'swept shape occurrence' }
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 { [shape_aspect_relationship =>
 shape_defining_relationship]
 [shape_aspect_relationship
 shape_aspect_relationship.description = 'profile usage'] }
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 shape_aspect =>
 (open_path_profile)
 (partial_circular_profile)
 (rounded_u_profile)
 (square_u_profile)
 (tee_profile)
 (vee_profile)

5.1.14.56.2 slot to path (as course_of_travel)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: slot <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
{ shape_aspect
shape_aspect.description = 'course of travel occurrence'}
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
{ [shape_aspect_relationship =>
shape_defining_relationship]
[shape_aspect_relationship
[shape_aspect_relationship.name = 'course of travel']
[shape_aspect_relationship.description = 'path feature component usage']] }
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
shape_aspect =>
path_feature_component

5.1.14.56.3 slot to slot_end_type (as end_conditions)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path: slot <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'end condition occurrence'
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 { [shape_aspect_relationship =>
 feature_component_relationship]
 [shape_aspect_relationship
 shape_aspect_relationship.description = 'slot end usage'] }
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 shape_aspect =>
 slot_end

5.1.14.57 Spherical_cap

AIM element: spherical_cap
 Source: ISO 10303-522
 Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
 Reference Path: spherical_cap <=
 { feature_definition =>
 instanced_feature }
 feature_definition <=
 characterized_object

5.1.14.57.1 spherical_cap to numeric_parameter (as internal_angle)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: spherical_cap <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'internal angle'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
plane_angle_measure_with_unit}

5.1.14.57.2 spherical_cap to numeric_parameter (as radius)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: spherical_cap <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'radius'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.14.58 Spur_gear

AIM element: gear
 Source: ISO 10303-522
 Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
 Reference Path: gear <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object
 {characterized_object
 characterized_object.description = 'spur gear'}

5.1.14.59 Step

AIM element: step
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
Reference Path: step <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object

5.1.14.59.1 step to linear_path (as course_of_travel)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: step <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 { shape_aspect
 shape_aspect.description = 'course of travel occurrence'}
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 { [shape_aspect_relationship =>
 shape_defining_relationship]
 [shape_aspect_relationship
 [shape_aspect_relationship.description = 'path feature component usage']]}
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 { shape_aspect
 shape_aspect.description = 'linear'}
 shape_aspect =>
 path_feature_component

5.1.14.59.2 step to vee_profile (as removal_boundary)

AIM element: PATH
 Rules: 5.2.4.9, 5.2.4.10
 Reference Path:


```

step <=
  feature_definition <=
  characterized_object
  characterized_definition = characterized_object
  characterized_definition <-
  property_definition.definition
  property_definition =>
  product_definition_shape <-
  shape_aspect.of_shape
  { shape_aspect
  shape_aspect.description = 'removal boundary occurrence'}
  shape_aspect <-
  shape_aspect_relationship.related_shape_aspect
  {[shape_aspect_relationship =>
  shape_defining_relationship]
  [shape_aspect_relationship
  shape_aspect_relationship.description = 'profile usage']}
  shape_aspect_relationship
  shape_aspect_relationship.relateing_shape_aspect ->
  shape_aspect =>
  vee_profile
    
```

5.1.14.59.3 step to boss (as volume_not_removed)

AIM element: PATH
Reference Path: step<=
feature_definition <=
characterized_object
characterized_definition= characterized_object
characterized_definition <-
property_definition.definition
property_definition =>
product_definition_shape< -
shape_aspect.of_shape
{shape_aspect=>
composite_shape_aspect}
shape_aspect< -
shape_aspect_relationship.relate_shape_aspect
{shape_aspect_relationship.description= 'uncut area'}
{shape_aspect_relationship=>
feature_component_relationship}
shape_aspect_relationship
shape_aspect_relationship.related_shape_aspect->
shape_aspect=>
instanced_feature=>
feature_definition=>
boss

5.1.14.59.4 step to protrusion(as volume_not_removed)

AIM element: PATH
 Reference Path: step<=
 feature_definition <=
 characterized_object
 characterized_definition= characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape< -
 shape_aspect.of_shape
 {shape_aspect=>
 composite_shape_aspect}
 shape_aspect< -
 shape_aspect_relationship.relate_shape_aspect
 {shape_aspect_relationship.description= 'uncut area'}
 {shape_aspect_relationship=>
 feature_component_relationship}
 shape_aspect_relationship
 shape_aspect_relationship.related_shape_aspect->
 shape_aspect=>
 instanced_feature=>
 feature_definition=>
 protrusion

5.1.14.60 Straight_knurl

AIM element: turned_knurl
 Source: ISO 10303-522
 Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
 Reference Path: turned_knurl <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object
 {characterized_object
 characterized_object.description = 'straight'}

5.1.14.61 Thread

AIM element: (thread)
(externally_defined_feature_definition)
Source: ISO 10303-522
Rules: 5.2.4.3, 5.2.4.9
Reference Path: (thread <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object)
(externally_defined_feature_definition <=
[externally_defined_item]
[{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object
{ characterized_object
characterized_object.description = 'thread' }])

5.1.14.61.1 thread to descriptive_parameter (as fit_class)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: (thread <=
(externally_defined_feature_definition <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{ property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{ representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{ representation_item
representation_item.name = 'fit class'
representation_item =>
descriptive_representation_item

5.1.14.61.2 thread to descriptive_parameter (as form)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: (thread <=)
 (externally_defined_feature_definition <=)
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'form'}
 representation_item =>
 descriptive_representation_item

5.1.14.61.3 thread to descriptive_parameter (as qualifier)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: (thread <=)
(externally_defined_feature_definition <=)
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'qualifier'}
representation_item =>
descriptive_representation_item

5.1.14.61.4 inner_or_outer_thread

AIM element: descriptive_representation_item.description
 Source: ISO 10303-45
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: (thread <=)
 (externally_defined_feature_definition <=)
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'thread side'}
 representation_item =>
 descriptive_representation_item
 descriptive_representation_item.description
 {(descriptive_representation_item.description = 'internal')
 (descriptive_representation_item.description = 'external')}

5.1.14.61.5 thread to numeric_parameter (as major_diameter)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: (thread <=)
(externally_defined_feature_definition <=)
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'major diameter'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.14.61.6 thread to numeric_parameter (as number_of_threads)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: (thread <=)
 (externally_defined_feature_definition <=)
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'number of threads'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 ratio_measure_with_unit}

5.1.14.61.7 thread to partial_area_definition (as partial_profile)

AIM element: PATH
Rules: 5.2.4.9, 5.2.4.10
Reference Path: (thread <=)
(externally_defined_feature_definition <=)
feature_definition <=
characterized_object<-
property_definition.definition
property_definition=>
product_definition_shape
shape_aspect.of_shape->
shape_aspect <-
shape_aspect_relationship.related_shape_aspect
{ [shape_aspect_relationship =>
shape_defining_relationship]
[shape_aspect_relationship
shape_aspect_relationship.description = 'applied area usage']}
shape_aspect_relationship
shape_aspect_relationship.relatng_shape_aspect ->
shape_aspect =>
applied_area

5.1.14.61.8 thread to shape (as applied_shape)

AIM element: PATH
Rules: 5.2.4.10
Reference Path: (thread <=)
(externally_defined_feature_definition <=)
feature_definition =>
characterized_object<-
property_definition.definition
property_definition=>
product_definition_shape

5.1.14.61.9 thread to descriptive_parameter (as thread_hand)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: (thread <=)
 (externally_defined_feature_definition <=)
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'hand'}
 {representation_item
 representation_item.description = 'left'
 representation_item.description = 'right'}
 representation_item =>
 descriptive_representation_item

5.1.14.62 Turned_knurl

AIM element: turned_knurl
 Source: ISO 10303-522
 Rules: 5.2.4.3, 5.2.4.9, 5.2.4.12
 Reference Path: turned_knurl <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object

5.1.14.62.1 turned_knurl to numeric_parameter (as diametral_pitch)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: turned_knurl <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'diametral pitch'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 plane_angle_measure_with_unit}

5.1.14.62.2 turned_knurl to numeric_parameter (as number_of_teeth)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path:


```

turned_knurl <=
  feature_definition <=
    characterized_object
    characterized_definition = characterized_object
    characterized_definition <-
      property_definition.definition
    property_definition <-
      property_definition_representation.definition
    {property_definition_representation =>
      shape_definition_representation}
    property_definition_representation
    property_definition_representation.used_representation ->
    {representation =>
      shape_representation =>
        shape_representation_with_parameters}
    representation
    representation.items[i] ->
    {representation_item
      representation_item.name = 'number of teeth'}
    representation_item =>
    measure_representation_item
    {measure_representation_item <=
      measure_with_unit
      measure_with_unit.value_component ->
      measure_value
      measure_value = count_measure
      count_measure}
    
```

5.1.14.62.3 turned_knurl to numeric_parameter (as major_diameter)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: turned_knurl <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'major diameter'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.14.62.4 turned_knurl to numeric_parameter (as nominal_diameter)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path:


```

turned_knurl <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <-
property_definition.definition
property_definition <-
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'nominal diameter'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

```

5.1.14.62.5 turned_knurl to numeric_parameter (as root_fillet)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: turned_knurl <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'root fillet'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.14.62.6 turned_knurl to numeric_parameter (as tooth_depth)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path:


```

turned_knurl <=
  feature_definition <=
    characterized_object
    characterized_definition = characterized_object
    characterized_definition <-
      property_definition.definition
    property_definition <-
      property_definition_representation.definition
    {property_definition_representation =>
      shape_definition_representation}
    property_definition_representation
    property_definition_representation.used_representation ->
    {representation =>
      shape_representation =>
        shape_representation_with_parameters}
    representation
    representation.items[i] ->
    {representation_item
      representation_item.name = 'tooth depth'}
    representation_item =>
    measure_representation_item
    {measure_representation_item <=
      measure_with_unit =>
        length_measure_with_unit}
    
```

5.1.15 Machining_feature_definition_items

5.1.15.1 Angle_taper

AIM element: taper
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: taper <=
 shape_aspect
 { shape_aspect
 shape_aspect.description = 'angle taper' }
 { shape_aspect
 shape_aspect.of_shape->
 product_definition_shape<=
 property_definition
 property_definition.definition->
 characterized_definition=characterized_object
 characterized_object=>
 feature_component_definition }

5.1.15.1.1 angle_taper to numeric_parameter (as angle)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: taper <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'taper angle'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 plane_angle_measure_with_unit}

5.1.15.2 Blind_bottom_condition

AIM element: hole_bottom
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: hole_bottom <=
 shape_aspect
 {shape_aspect
 (shape_aspect.description = 'conical')
 (shape_aspect.description = 'flat')
 (shape_aspect.description = 'flat with radius')
 (shape_aspect.description = 'flat with taper')
 (shape_aspect.description = 'spherical')}
 {shape_aspect.of_shape ->
 product_definition_shape <=
 property_definition
 property_definition.definition ->
 characterized_definition
 characterized_definition = characterized_object
 characterized_object =>
 feature_component_definition}

5.1.15.2.1 start_or_end

AIM element: shape_aspect_relationship.name
Source: ISO 10303-41
Reference Path: round_hole <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition =>
 product_definition_shape <=
 shape_aspect.of_shape
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 {shape_aspect_relationship =>
 feature_component_relationship}
 shape_aspect_relationship
 shape_aspect_relationship.name = 'hole depth start'
 shape_aspect_relationship.name = 'hole depth end'

5.1.15.3 Boss_top_condition

AIM element: boss_top
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: boss_top <=
 shape_aspect
 { shape_aspect.of_shape ->
 product_definition_shape <=
 property_definition
 property_definition.definition ->
 characterized_definition
 characterized_definition = characterized_object
 characterized_object =>
 feature_component_definition}

5.1.15.3.1 start_or_end

AIM element: shape_aspect_relationship.name
 Source: ISO 10303-41
 Reference Path: boss_top <=
 shape_aspect<-
 shape_aspect_relationship.relate_shape_aspect
 shape_aspect_relationship
 shape_aspect_relationship.name
 {(shape_aspect_relationship.name = 'boss height start')
 (shape_aspect_relationship.name = 'boss height end')}

5.1.15.3.2 boss_top to numeric_parameter (as top_radius)

AIM element: PATH
Source: ISO 10303-41
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: boss_top <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
{property_definition=>
product_definition_shape}
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'top radius'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.15.4 Conical_hole_bottom

AIM element: hole_bottom
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: hole_bottom <=
 shape_aspect
 { shape_aspect
 shape_aspect.description = 'conical' }

5.1.15.4.1 conical_hole_bottom to numeric_parameter (as tip_angle)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: hole_bottom <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 { property_definition_representation =>
 shape_definition_representation }
 property_definition_representation
 property_definition_representation.used_representation ->
 { representation =>
 shape_representation =>
 shape_representation_with_parameters }
 representation
 representation.items[i] ->
 { representation_item
 representation_item.name = 'tip angle' }
 representation_item =>
 measure_representation_item
 { measure_representation_item <=
 measure_with_unit =>
 plane_angle_measure_with_unit }

5.1.15.4.2 conical_hole_bottom to numeric_parameter (as tip_radius)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: hole_bottom <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'tip radius'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.15.5 Diameter_taper

AIM element: taper
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: taper <=
 shape_aspect
 { shape_aspect
 shape_aspect.description = 'diameter taper' }
 { shape_aspect
 shape_aspect.of_shape->
 product_definition_shape<=
 property_definition
 property_definition.definition->
 characterized_definition=characterized_object
 characterized_object=>
 feature_component_definition }

5.1.15.5.1 diameter_taper to numeric_parameter (as final_diameter)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: taper <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 { property_definition_representation =>
 shape_definition_representation }
 property_definition_representation
 property_definition_representation.used_representation ->
 { representation =>
 shape_representation =>
 shape_representation_with_parameters }
 representation
 representation.items[i] ->
 { representation_item
 representation_item.name = 'final diameter' }
 representation_item =>
 measure_representation_item
 { measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit }

5.1.15.6 Directed_taper

AIM element: taper
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: taper <=
shape_aspect
{ shape_aspect
shape_aspect.description = 'directed taper' } { shape_aspect
shape_aspect.of_shape->
product_definition_shape<=
property_definition
property_definition.definition->
characterized_definition=characterized_object
characterized_object=>
feature_component_definition }

5.1.15.6.1 directed_taper to direction_element (as direction)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: taper <=
shape_aspect
shape_definition = shape_aspect
shape_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation
property_definition_representation.used_representation ->
{ representation
representation.name = 'direction' }
representation =>
shape_representation=>
direction_shape_representation

5.1.15.6.2 directed_taper to numeric_parameter (as angle)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: taper <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'angle'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 plane_angle_measure_with_unit}

5.1.15.7 Flat_hole_bottom

AIM element: hole_bottom
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: hole_bottom <=
 shape_aspect
 {shape_aspect
 shape_aspect.description = 'flat'}

5.1.15.8 Flat_slot_end_type

AIM element: slot_end
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: slot_end <=
shape_aspect
{shape_aspect
shape_aspect.description = 'flat'}

5.1.15.8.1 flat_slot_end_type to numeric_parameter (as first_radius)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: slot_end <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'first radius'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.15.8.2 flat_slot_end_type to numeric_parameter (as second_radius)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: slot_end <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'second radius'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.15.9 Flat_with_radius_hole_bottom

AIM element: hole_bottom
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: hole_bottom <=
 shape_aspect
 {shape_aspect
 shape_aspect.description = 'flat with radius'}

5.1.15.9.1 flat_with_radius_hole_bottom to numeric_parameter (as corner-radius)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: hole_bottom <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'corner radius'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.15.10 Flat_with_taper_hole_bottom

AIM element: hole_bottom
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: hole_bottom <=
shape_aspect
{shape_aspect
shape_aspect.description = 'flat with taper'}

5.1.15.10.1 flat_with_taper_hole_bottom to numeric_parameter (as final_diameter)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: hole_bottom <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'final diameter'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.15.10.2 flat_with_taper_hole_bottom to numeric_parameter (as taper angle)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: hole_bottom <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'taper angle'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
plane_angle_measure_with_unit}

5.1.15.11 General_profile_floor

AIM element: profile_floor
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: profile_floor <=
shape_aspect
{shape_aspect
shape_aspect.description = 'complex'}

5.1.15.11.1 general_profile_floor to face_shape_element (as floor)

AIM element: PATH
 Rules: 5.2.4.7
 Reference Path: profile_floor <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation
 representation.name = 'floor'}
 representation =>
 shape_representation=>
 face_shape_representation

5.1.15.12 General_pocket_bottom_condition

AIM element: pocket_bottom
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: pocket_bottom <=
 shape_aspect
 {shape_aspect
 shape_aspect.description = 'complex'}

5.1.15.12.1 general_pocket_bottom_condition to face_shape_element (as floor)

AIM element: PATH
Rules: 5.2.4.7
Reference Path: pocket_bottom <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation
 representation.name = 'floor face'}
 representation =>
 shape_representation=>
 face_shape_representation

5.1.15.12.2 general_pocket_bottom_condition to numeric_parameter (as floor_radius)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path:


```

pocket_bottom <=
  shape_aspect
  shape_definition = shape_aspect
  shape_definition
  characterized_definition = shape_definition
  characterized_definition <-
  property_definition.definition
  property_definition <-
  property_definition_representation.definition
  {property_definition_representation =>
  shape_definition_representation}
  property_definition_representation
  property_definition_representation.used_representation ->
  {representation =>
  shape_representation =>
  shape_representation_with_parameters}
  representation
  representation.items[i] ->
  {representation_item
  representation_item.name = 'radius'}
  representation_item =>
  measure_representation_item
  {measure_representation_item <=
  measure_with_unit =>
  length_measure_with_unit}
    
```

5.1.15.13 General_rib_top_floor

AIM element: rib_top_floor
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path:


```

rib_top_floor <=
  shape_aspect
  {shape_aspect
  shape_aspect.description = 'complex'}
    
```

5.1.15.13.1 general_rib_top_floor to ordered_face_element (as rib_top_face)

AIM element: PATH
Rules: 5.2.4.7
Reference Path: rib_top_floor<=
shape_aspect
shape_definition=shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation
representation.name = 'rib top face'}
representation =>
shape_representation =>
face_shape_representation

5.1.15.14 General_top_condition

AIM element: boss_top
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: boss_top <=
shape_aspect
{shape_aspect
shape_aspect.description = 'complex'}

5.1.15.14.1 general_top_condition to face_shape_element (as top_face)

AIM element: PATH
 Rules: 5.2.4.7
 Reference Path: boss_top <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation
 property_definition_representation.used_representation ->
 representation =>
 shape_representation=>
 face_shape_representation

5.1.15.15 Open_slot_end_type

AIM element: slot_end
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: slot_end <=
 shape_aspect
 { shape_aspect
 shape_aspect.description = 'open' }

5.1.15.16 Partial_area_definition

AIM element: applied_area
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: applied_area <=
 shape_aspect
 { shape_aspect
 shape_aspect.of_shape->
 product_definition_shape }

5.1.15.16.1 partial_area_definition to numeric_parameter (as effective-_length)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: applied_area <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'effective length'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.15.16.2 partial_area_definition to numeric_parameter (as maximum-_length)

AIM element: PATH
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: applied_area <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'maximum length'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.15.16.3 partial_area_definition to orientation (as placement)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: applied_area <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'orientation'}
representation_item =>
geometric_representation_item =>
placement

5.1.15.17 Planar_pocket_bottom_condition

AIM element: pocket_bottom
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: pocket_bottom <=
shape_aspect
{shape_aspect
shape_aspect.description = 'planar'}

5.1.15.17.1 planar_pocket_bottom_condition to direction_element (as floor-normal)

AIM element: PATH
 Rules: 5.2.4.7
 Reference Path: pocket_bottom <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation
 representation.name = 'floor normal'}
 representation =>
 shape_representation=>
 direction_shape_representation

5.1.15.17.2 planar_pocket_bottom_condition to location_element (as floor-location)

AIM element: PATH
 Rules: 5.2.4.7
 Reference Path: pocket_bottom <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation
 representation.name = 'floor location'}
 representation =>
 shape_representation=>
 location_shape_representation

5.1.15.17.3 planar_pocket_bottom_condition to numeric_parameter (as floor-radius)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: pocket_bottom <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'radius'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.15.18 Planar_profile_floor

AIM element: profile_floor
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: profile_floor <=
shape_aspect
{shape_aspect
shape_aspect.description = 'planar'}

5.1.15.18.1 planar_profile_floor to planar_element (as floor)

AIM element: PATH
 Rules: 5.2.4.7
 Reference Path: profile_floor <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation
 representation.name = 'floor'}
 representation =>
 planar_shape_representation

5.1.15.19 Planar_rip_top_floor

AIM element: rib_top_floor
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: rib_top_floor <=
 shape_aspect
 {shape_aspect
 shape_aspect.description = 'planar'}

5.1.15.19.1 planar_rib_top_floor to closed_profile (as boundary)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: rib_top_floor <=
 {shape_aspect
 shape_aspect.description = 'boundary occurrence'}
 shape_aspect<-
 shape_aspect_relationship.related_shape_aspect
 {[shape_aspect_relationship =>
 feature_component_relationship]
 [shape_aspect_relationship
 shape_aspect_relationship.description = 'profile usage']}
 shape_aspect_relationship
 shape_aspect_relationship.relate_shape_aspect ->
 {shape_aspect
 shape_aspect.description= 'rib top floor boundary'}
 shape_aspect =>
 (circular_closed_profile)
 (closed_path_profile)
 (ngon_closed_profile)
 (rectangular_closed_profile)

5.1.15.19.2 planar_rib_top_floor to planar_element (as planar_face)

AIM element: PATH
Rules: 5.2.4.7
Reference Path: rib_top_floor<=
 shape_aspect
 shape_definition=shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <-
 property_definition.definition
 property_definition <-
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation
 representation.name = 'rib top face'}
 representation =>
 shape_representation =>
 planar_shape_representation

5.1.15.20 Planar_top_condition

AIM element: boss_top
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: boss_top <=
 shape_aspect
 { shape_aspect
 shape_aspect.description = 'planar' }

5.1.15.20.1 planar_top_condition to direction_element (as top_normal)

AIM element: PATH
 Rules: 5.2.4.7
 Reference Path: boss_top <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation
 property_definition_representation.used_representation ->
 representation =>
 shape_representation=>
 direction_shape_representation

5.1.15.20.2 planar_top_condition to location_element (as top_location)

AIM element: PATH
 Rules: 5.2.4.7
 Reference Path: boss_top <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation
 property_definition_representation.used_representation ->
 representation =>
 shape_representation=>
 location_shape_representation

5.1.15.21 Pocket_bottom_condition

AIM element: pocket_bottom
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: pocket_bottom <=
shape_aspect
{shape_aspect.of_shape ->
product_definition_shape <=
property_definition
property_definition.definition ->
characterized_definition
characterized_definition = characterized_object
characterized_object =>
feature_component_definition}

5.1.15.21.1 start_or_end

AIM element: shape_aspect_relationship.name
Source: ISO 10303-41
Reference Path: pocket_bottom <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition =>
product_definition_shape <=
shape_aspect.of_shape
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
{shape_aspect_relationship =>
feature_component_relationship}
shape_aspect_relationship
shape_aspect_relationship.name = 'pocket depth start'
shape_aspect_relationship.name = 'pocket depth end'

5.1.15.22 Profile_floor

AIM element: profile_floor
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: profile_floor <=
 shape_aspect
 {shape_aspect.of_shape ->
 product_definition_shape <=
 property_definition
 property_definition.definition ->
 characterized_definition
 characterized_definition = characterized_object
 characterized_object =>
 feature_component_definition}

5.1.15.22.1 start_or_end

AIM element: descriptive_representation_item.description
 Source: ISO 10303-45
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: profile_floor <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'shape profile floor orientation'}
 representation_item =>
 descriptive_representation_item
 descriptive_representation_item.description
 {(descriptive_representation_item.description = 'shape profile start')
 (descriptive_representation_item.description = 'shape profile end')}

5.1.15.22.2 profile_floor to numeric_parameter (as floor radius)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: profile_floor <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'radius'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.15.23 Radiused_slot_end_type

AIM element: slot_end
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: slot_end <=
shape_aspect
{shape_aspect
shape_aspect.description = 'radiused'}

5.1.15.24 Rip_top_floor

AIM element: rib_top_floor
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: rib_top_floor <=
 shape_aspect
 {shape_aspect.of_shape ->
 product_definition_shape <=
 property_definition
 property_definition.definition ->
 characterized_definition
 characterized_definition = characterized_object
 characterized_object =>
 feature_component_definition}

5.1.15.25 Slot_end_type

AIM element: slot_end
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: slot_end <=
 shape_aspect
 {shape_aspect.of_shape ->
 product_definition_shape <=
 property_definition
 property_definition.definition ->
 characterized_definition
 characterized_definition = characterized_object
 characterized_object =>
 feature_component_definition}

5.1.15.25.1 first_or_second

AIM element: shape_aspect_relationship.name
 Source: ISO 10303-41
 Reference Path: slot_end <=
 shape_aspect <=
 shape_aspect_relationship.relate_shape_aspect
 shape_aspect_relationship
 shape_aspect_relationship.name
 {(shape_aspect_relationship.name = 'course of travel start')
 (shape_aspect_relationship.name = 'course of travel end')}

5.1.15.26 Spherical_hole_bottom

AIM element: hole_bottom
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: hole_bottom <=
shape_aspect
{shape_aspect
shape_aspect.description = 'spherical'}

5.1.15.26.1 spherical_hole_bottom to numeric_parameter (as radius)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: hole_bottom <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'radius'}
representation_item =>
measure_representation_item
{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.15.27 Through_bottom_condition

AIM element: hole_bottom
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: hole_bottom <=
 shape_aspect
 { shape_aspect
 shape_aspect.description = 'through'
 { shape_aspect.of_shape ->
 product_definition_shape <=
 property_definition
 property_definition.definition ->
 characterized_definition
 characterized_definition = characterized_object
 characterized_object =>
 feature_component_definition}

5.1.15.28 Through_pocket_bottom_condition

AIM element: pocket_bottom
 Source: ISO 10303-522
 Rules: 5.2.4.9
 Reference Path: pocket_bottom <=
 shape_aspect
 { shape_aspect
 shape_aspect.description = 'through'
 { shape_aspect.of_shape ->
 product_definition_shape <=
 property_definition
 property_definition.definition ->
 characterized_definition
 characterized_definition = characterized_object
 characterized_object =>
 feature_component_definition}

5.1.15.29 Through_profile_floor

AIM element: profile_floor
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: profile_floor <=
shape_aspect
{shape_aspect
shape_aspect.description = 'through'}
{shape_aspect.of_shape ->
product_definition_shape <=
property_definition
property_definition.definition ->
characterized_definition
characterized_definition = characterized_object
characterized_object =>
feature_component_definition}

5.1.15.30 Woodruff_slot_end_type

AIM element: slot_end
Source: ISO 10303-522
Rules: 5.2.4.9
Reference Path: slot_end <=
shape_aspect
{shape_aspect
shape_aspect.description = 'woodruff'}

5.1.15.30.1 woodruff_slot_end_type to numeric_parameter (as radius)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: slot_end <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'radius'}
representation_item =>
measure_representation_item
.{measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.16 Cartesian_point_and_vector UoF**5.1.16.1 Cartesian_point**

AIM element: cartesian_point
Source: ISO 10303-42

5.1.16.1.1 x

AIM element: cartesian_point.coordinates[1]
Source: ISO 10303-42

5.1.16.1.2 y

AIM element: cartesian_point.coordinates[2]
Source: ISO 10303-42

5.1.16.1.3 z

AIM element: cartesian_point.coordinates[3]
Source: ISO 10303-42

5.1.16.2 Cartesian_vector

AIM element: direction
Source: ISO 10303-42

5.1.16.2.1 i

AIM element: direction.direction_ratios[1]
Source: ISO 10303-42

5.1.16.2.2 j

AIM element: direction.direction_ratios[2]
Source: ISO 10303-42

5.1.16.2.3 k

AIM element: direction.direction_ratios[3]
Source: ISO 10303-42

5.1.17 Geometric_tolerance UoF

5.1.17.1 Angularity_tolerance

AIM element: angularity_tolerance
Source: ISO 10303-519
Rules: 5.2.4.2

5.1.17.1.1 segment_size

AIM element: [measure_with_unit.value_component]
 [measure_with_unit.unit_component]
 Source: ISO 10303-41
 Reference Path: angularity_tolerance <=
 geometric_tolerance_with_datum_reference <=
 geometric_tolerance =>
 geometric_tolerance_with_defined_unit
 geometric_tolerance_with_defined_unit.unit_size ->
 measure_with_unit
 [measure_with_unit.value_component]
 [measure_with_unit.unit_component]

5.1.17.1.2 angularity_tolerance to datum (as geometric_reference)

AIM element: PATH
 Reference Path: angularity_tolerance <=
 geometric_tolerance_with_datum_reference
 geometric_tolerance_with_datum_reference.datum_system[i] ->
 datum_reference

5.1.17.2 Circular_runout_tolerance

AIM element: circular_runout_tolerance
 Source: ISO 10303-519
 Rules: 5.2.4.2

5.1.17.2.1 runout_angle

AIM element: [measure_with_unit.value_component]
[measure_with_unit.unit_component]
Source: ISO 10303-41
Rules: 5.2.4.9
Reference Path: circular_runout_tolerance <=
geometric_tolerance_with_datum_reference <=
geometric_tolerance <=
tolerance_zone.defining_tolerance[i]
tolerance_zone <=
tolerance_zone_definition.zone
tolerance_zone_definition =>
runout_zone_definition
runout_zone_definition.orientation ->
runout_zone_orientation
runout_zone_orientation.angle ->
measure_with_unit
[measure_with_unit.value_component]
[measure_with_unit.unit_component]

5.1.17.2.2 circular_runout_tolerance to datum (as geometric_reference)

AIM element: PATH
Reference Path: circular_runout_tolerance <=
geometric_tolerance_with_datum_reference
geometric_tolerance_with_datum_reference.datum_system[i] ->
datum_reference

5.1.17.3 Circularity_tolerance

AIM element: roundness_tolerance
Source: ISO 10303-519
Rules: 5.2.4.2

5.1.17.4 Compound_datum

AIM element: datum
(see NOTE)
Source: ISO 10303-47
Rules: 5.2.4.9

Note - The datum that represents a compound_datum uses at least four shape_aspect_relationships. At least two shape_aspect_relationship reference the datum associated to the compound_datum. Each datum referenced by the compound_datum has a shape_aspect_relationship to a datum_feature. The compound_datum has a shape_aspect_relationship that references the same datum_features.

5.1.17.4.1 compound_datum to datum_feature (as element)

AIM element: PATH
 Reference Path: datum <=
 shape_aspect <=
 shape_aspect_relationship.related_shape_aspect
 shape_aspect_relationship
 shape_aspect_relationship.relatingshape_aspect ->
 shape_aspect =>
 datum_feature

5.1.17.5 Concentricity_tolerance

AIM element: concentricity_tolerance
 Source: ISO 10303-519
 Rules: 5.2.4.2

5.1.17.5.1 value_qualifier

AIM element: tolerance_zone_form.name
 Source: ISO 10303-47
 Reference Path: concentricity_tolerance <=
 geometric_tolerance_with_datum_reference <=
 geometric_tolerance <=
 tolerance_zone.defining_tolerance[i]
 tolerance_zone
 tolerance_zone.form ->
 tolerance_zone_form
 tolerance_zone_form.name

5.1.17.5.2 concentricity_tolerance to datum (as geometric_reference)

AIM element: PATH
 Reference Path: concentricity_tolerance <=
 geometric_tolerance_with_datum_reference
 geometric_tolerance_with_datum_reference.datum_system[i] ->
 datum_reference

5.1.17.6 Cylindricity_tolerance

AIM element: cylindricity_tolerance
 Source: ISO 10303-519

ISO/CD 10303-219:2003(E)

5.1.17.7 Datum

AIM element: datum_reference
Source: ISO 10303-47

5.1.17.7.1 name

AIM element: shape_aspect.name
Source: ISO 10303-41
Rules: 5.2.4.9
Reference Path: datum_reference
datum_reference.referenced_datum ->
datum <=
shape_aspect
shape_aspect.name

5.1.17.7.2 precedence

AIM element: datum_reference.precedence
Source: ISO 10303-47

5.1.17.8 Datum_feature

AIM element: (datum)
([datum]
[datum_feature])
Source: ISO 10303-47
Rules: 5.2.4.9
Reference Path: {(datum)
(datum <=
shape_aspect <=
shape_aspect_relationship.related_shape_aspect
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
shape_aspect =>
datum_feature)}

5.1.17.8.1 datum_feature to datum_target_set (as datum_representation)

AIM element: PATH
Reference Path: datum
datum.established_by_relationships

5.1.17.8.2 datum_feature to material_condition_modifier (as modifier)

AIM element: PATH
 Reference Path: datum <-
 datum_reference.referenced_datum
 datum_reference =>
 referenced_modified_datum
 referenced_modified_datum.modifier ->
 limit_condition

5.1.17.8.3 datum_feature to shape_element (as datum_representation)

AIM element: IDENTICAL MAPPING

5.1.17.9 Datum_target

AIM element: datum_target
 Source: ISO 10303-47
 Rules: 5.2.4.9

5.1.17.9.1 identifier

AIM element: datum_target.target_id
 Source: ISO 10303-47

5.1.17.10 Datum_target_set

AIM element: datum.established_by_relationships
 Source: ISO 10303-47
 Rules: 5.2.4.9
 Reference Path: { datum.established_by_relationships[i] ->
 shape_aspect_relationship
 shape_aspect_relationship.relating_shape_aspect ->
 shape_aspect =>
 datum_target }

5.1.17.10.1 rule_description

AIM element: shape_aspect_relationship.description
 Source: ISO 10303-41
 Reference Path: datum.established_by_relationships[i] ->
 shape_aspect_relationship
 shape_aspect_relationship.description

ISO/CD 10303-219:2003(E)

5.1.17.10.2 datum_target_set to datum_target (as target_shape)

AIM element: PATH
Reference Path: datum.established_by_relationships
datum <=
shape_aspect<-
shape_aspect_relationship.related_shape_aspect
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
shape_aspect =>
datum_target

5.1.17.11 Flatness_tolerance

#1: if segment size is specified

AIM element: (geometric_tolerance_with_defined_unit)
Source: ISO 10303-519
Reference Path: flatness_tolerance<=
{(geometric_tolerance_with_defined_unit <=
geometric_tolerance)}

#2: if segment_size is not specified

AIM element: (geometric_tolerance)
Source: ISO 10303-519
Reference Path: flatness_tolerance<=
{ (geometric_tolerance)}

5.1.17.11.1 segment_size

AIM element: [measure_with_unit.value_component]
[measure_with_unit.unit_component]
Source: ISO 10303-41
Reference Path: #1: geometric_tolerance_with_defined_unit
geometric_tolerance_with_defined_unit.unit_size ->
measure_with_unit
[measure_with_unit.value_component]
[measure_with_unit.unit_component]

5.1.17.12 Geometric_tolerance

AIM element: geometric_tolerance
Source: ISO 10303-47
Rules: 5.2.4.2

5.1.17.12.1 geometric_tolerance_value

AIM element: measure_with_unit.value_component
 Source: ISO 10303-41
 Reference Path: geometric_tolerance
 geometric_tolerance.magnitude ->
 measure_with_unit
 measure_with_unit.value_component

5.1.17.12.2 significant_digits

AIM element: precision_qualifier.precision_value
 Source: ISO 10303-45
 Reference Path: geometric_tolerance
 geometric_tolerance.magnitude ->
 measure_with_unit <-
 measure_qualification.qualifiers[1] ->
 value_qualifier
 value_qualifier = precision_qualifier
 precision_qualifier
 precision_qualifier.precision_value

5.1.17.12.3 unit_of_measure

AIM element: unit
 Source: ISO 10303-41
 Reference Path: geometric_tolerance
 geometric_tolerance.magnitude ->
 measure_with_unit
 measure_with_unit.unit_component ->
 unit

5.1.17.12.4 geometric_tolerance to material_condition_modifier (as modifier_control)

AIM element: PATH
 Reference Path: geometric_tolerance =>
 modified_geometric_tolerance
 modified_geometric_tolerance.modifier ->
 limit_condition

5.1.17.12.5 geometric_tolerance to shape_aspect (as applied_shape)

AIM element: PATH
Reference Path: geometric_tolerance
geometric_tolerance.toleranced_shape_aspect ->
shape_aspect

5.1.17.12.6 geometric_tolerance to tolerance_zone (as zone_definition)

AIM element: PATH
Reference Path: geometric_tolerance <-
tolerance_zone.defining_tolerance[i]
tolerance_zone

5.1.17.13 Geometric_tolerance_precedence_relationship

AIM element: geometric_tolerance_relationship
Source: ISO 10303-47
Reference Path: {geometric_tolerance_relationship
geometric_tolerance_relationship.name = 'precedence'}

5.1.17.13.1 geometric_tolerance_precedence_relationship to geometric-
_tolerance(as base_shape_tolerance)

AIM element: PATH
Reference Path: geometric_tolerance_precedence_relationship <=
shape_aspect_relationship
shape_aspect_relationship.related_shape_aspect ->
shape_aspect <-
geometric_tolerance.toleranced_shape_aspect
geometric_tolerance

5.1.17.13.2 geometric_tolerance_precedence_relationship to geometric-
_tolerance (as pattern_shape_tolerance)

AIM element: PATH
Reference Path: geometric_tolerance_precedence_relationship <=
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
shape_aspect <-
geometric_tolerance.toleranced_shape_aspect
geometric_tolerance

5.1.17.14 Linear_profile_tolerance

AIM element: line_profile_tolerance
 Source: ISO 10303-519
 Rules: 5.2.4.2

5.1.17.14.1 linear_profile_tolerance to datum (as geometric_reference)

AIM element: PATH
 Reference Path: line_profile_tolerance <=
 geometric_tolerance =>
 geometric_tolerance_with_datum_reference
 geometric_tolerance_with_datum_reference.datum_system[i] ->
 datum_reference

5.1.17.14.2 linear_profile_tolerance to orientation (as affected_plane)

AIM element: PATH
 Reference Path: line_profile_tolerance <=
 geometric_tolerance <=
 tolerance_zone.defining_tolerance[i]
 tolerance_zone <=
 shape_aspect <=
 shape_aspect_relationship.relate_shape_aspect
 shape_aspect_relationship
 shape_aspect_relationship.related_shape_aspect->
 shape_aspect
 { shape_aspect
 shape_aspect.description = 'affected plane'
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation
 property_definition_representation.used_representation ->
 representation
 representation.items[i] ->
 { representation_item
 representation_item.name = 'affected plane'
 representation_item =>
 geometric_representation_item =>
 placement

5.1.17.15 Material_condition_modifier

AIM element: limit_condition
Source: ISO 10303-47

5.1.17.15.1 material_type

AIM element: IDENTICAL_MAPPING

5.1.17.16 Parallelism_tolerance

AIM element: parallelism_tolerance
Source: ISO 10303-519
Rules: 5.2.4.2

5.1.17.16.1 segment_size

AIM element: [measure_with_unit.value_component]
[measure_with_unit.unit_component]
Source: ISO 10303-41
Reference Path: parallelism_tolerance <=
geometric_tolerance_with_datum_reference <=
geometric_tolerance =>
geometric_tolerance_with_defined_unit
geometric_tolerance_with_defined_unit.unit_size ->
measure_with_unit
[measure_with_unit.value_component]
[measure_with_unit.unit_component]

5.1.17.16.2 parallelism_tolerance to datum (as geometric_reference)

AIM element: PATH
Reference Path: parallelism_tolerance <=
geometric_tolerance_with_datum_reference
geometric_tolerance_with_datum_reference.datum_system[i] ->
datum_reference

5.1.17.16.3 parallelism_tolerance to orientation (as affected_plane)

AIM element: PATH

Reference Path:

```

parallelism_tolerance <=
geometric_tolerance_with_datum_reference <=
geometric_tolerance <-
tolerance_zone.defining_tolerance[i]
tolerance_zone <=
shape_aspect <-
shape_aspect_relationship.relate_shape_aspect
shape_aspect_relationship
shape_aspect_relationship.related_shape_aspect->
shape_aspect
{ shape_aspect
shape_aspect.description = 'affected plane' }
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <-
property_definition.definition
property_definition <-
property_definition_representation.definition
property_definition_representation
property_definition_representation.used_representation ->
representation
representation.items[i] ->
{ representation_item
representation_item.name = 'affected plane' }
representation_item =>
geometric_representation_item =>
placement

```

5.1.17.17 Perpendicularity_tolerance

AIM element: perpendicularity_tolerance

Source: ISO 10303-519

Rules: 5.2.4.2

5.1.17.17.1 segment_size

AIM element: [measure_with_unit.value_component]
[measure_with_unit.unit_component]
Source: ISO 10303-41
Reference Path: perpendicularity_tolerance <=
geometric_tolerance_with_datum_reference <=
geometric_tolerance =>
geometric_tolerance_with_defined_unit
geometric_tolerance_with_defined_unit.unit_size ->
measure_with_unit
[measure_with_unit.value_component]
[measure_with_unit.unit_component]

5.1.17.17.2 perpendicularity_tolerance to datum (as geometric_reference)

AIM element: PATH
Reference Path: perpendicularity_tolerance <=
geometric_tolerance_with_datum_reference
geometric_tolerance_with_datum_reference.datum_system[i] ->
datum_reference

5.1.17.17.3 perpendicularity_tolerance to orientation (as affected_plane)

AIM element: PATH

Reference Path:

```

perpendicularity_tolerance <=
geometric_tolerance_with_datum_reference <=
geometric_tolerance <-
tolerance_zone.defining_tolerance[i]
tolerance_zone <=
shape_aspect <-
shape_aspect_relationship.relate_shape_aspect
shape_aspect_relationship
shape_aspect_relationship.related_shape_aspect->
shape_aspect
{ shape_aspect
shape_aspect.description = 'affected plane' }
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <-
property_definition.definition
property_definition <-
property_definition_representation.definition
property_definition_representation
property_definition_representation.used_representation ->
representation
representation.items[i] ->
{ representation_item
representation_item.name = 'affected plane' }
representation_item =>
geometric_representation_item =>
placement

```

5.1.17.18 Placed_target

AIM element: placed_datum_target_feature

Source: ISO 10303-224

Rules:

Reference Path: placed_datum_target_feature <=

```

datum_target
{ datum_target <=
shape_aspect
(shape_aspect.description = 'point')
(shape_aspect.description = 'line')
(shape_aspect.description = 'rectangle')
(shape_aspect.description = 'circle')}

```

5.1.17.18.1 placed_target to orientation (as placement)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: placed_datum_target_feature <=
datum_target <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{representation_item
representation_item.name = 'orientation'}
representation_item =>
geometric_representation_item =>
placement

5.1.17.19 Position_tolerance

AIM element: position_tolerance
Source: ISO 10303-519
Rules: 5.2.4.2

5.1.17.19.1 value_qualifier

AIM element: tolerance_zone_form.name
Source: ISO 10303-47
Rules: 5.2.4.2
Reference Path: position_tolerance <=
geometric_tolerance_with_datum_reference <=
geometric_tolerance <=
tolerance_zone.defined_tolerance[i]
tolerance_zone
tolerance_zone.form ->
tolerance_zone_form
tolerance_zone_form.name

5.1.17.19.2 position_tolerance to datum (as geometric_reference)

AIM element: PATH
Reference Path: position_tolerance <=
geometric_tolerance_with_datum_reference
geometric_tolerance_with_datum_reference.datum_system[i] ->
datum_reference

5.1.17.19.3 position_tolerance to orientation (as affected_plane)

AIM element: PATH
Reference Path: position_tolerance <=
geometric_tolerance_with_datum_reference <=
geometric_tolerance <=
tolerance_zone.defining_tolerance[i]
tolerance_zone <=
shape_aspect <=
shape_aspect_relationship.relate_shape_aspect
shape_aspect_relationship
shape_aspect_relationship.related_shape_aspect->
shape_aspect
{ shape_aspect
shape_aspect.description = 'affected plane'}
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation
property_definition_representation.used_representation ->
representation
representation.items[i] ->
{ representation_item
representation_item.name = 'affected plane'}
representation_item =>
geometric_representation_item =>
placement

5.1.17.20 Projection

AIM element: projected_zone_definition
Source: ISO 10303-47

5.1.17.20.1 projection_length

AIM element: [measure_with_unit.value_component]
 [measure_with_unit.unit_component]
 Source: ISO 10303-41
 Reference Path: projected_zone_definition
 projected_zone_definition.projected_length ->
 measure_with_unit
 [measure_with_unit.value_component]
 [measure_with_unit.unit_component]

5.1.17.20.2 projection to shape_element (as projection_end)

AIM element: PATH
 Reference Path: projected_zone_definition
 projected_zone_definition.projection_end ->
 shape_aspect

5.1.17.21 Straightness_tolerance

#1: if segment size is specified

AIM element: (geometric_tolerance_with_defined_unit)
 Source: ISO 10303-519
 Reference Path: straightness_tolerance<=
 (geometric_tolerance_with_defined_unit <=
 geometric_tolerance)

#2: if segment size is not specified

AIM element: (geometric_tolerance)
 Source: ISO 10303-519
 Reference Path: straightness_tolerance<=
 (geometric_tolerance)}

5.1.17.21.1 segment_size

#1: if segment size is specified

AIM element: [measure_with_unit.value_component]
 [measure_with_unit.unit_component]
 Source: ISO 10303-41
 Reference Path: geometric_tolerance_with_defined_unit
 geometric_tolerance_with_defined_unit.unit_size ->
 measure_with_unit
 [measure_with_unit.value_component]
 [measure_with_unit.unit_component]

5.1.17.21.2 straightness_tolerance to orientation (as affected_plane)

#1: if segment size is specified

```
AIM element:      PATH
Reference Path:   (geometric_tolerance_with_defined_unit <=
                  geometric_tolerance <-)
                  tolerance_zone.defined_tolerance[i]
                  tolerance_zone <=
                  shape_aspect <-
                  shape_aspect_relationship.relate_shape_aspect
                  shape_aspect_relationship
                  shape_aspect_relationship.related_shape_aspect->
                  shape_aspect
                  {shape_aspect
                  shape_aspect.description = 'affected plane'}
                  shape_definition = shape_aspect
                  shape_definition
                  characterized_definition = shape_definition
                  characterized_definition <-
                  property_definition.definition
                  property_definition <-
                  property_definition_representation.definition
                  property_definition_representation
                  property_definition_representation.used_representation ->
                  representation
                  representation.items[i] ->
                  {representation_item
                  representation_item.name = 'affected plane'}
                  representation_item =>
                  geometric_representation_item =>
                  placement
```

#2: if segment size is not specified

AIM element: PATH
 Reference Path: (geometric_tolerance <-)
 tolerance_zone.defined_tolerance[i]
 tolerance_zone <=
 shape_aspect <-
 shape_aspect_relationship.relate_shape_aspect
 shape_aspect_relationship
 shape_aspect_relationship.related_shape_aspect->
 shape_aspect
 {shape_aspect
 shape_aspect.description = 'affected plane'}
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <-
 property_definition.definition
 property_definition <-
 property_definition_representation.definition
 property_definition_representation
 property_definition_representation.used_representation ->
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'affected plane'}
 representation_item =>
 geometric_representation_item =>
 placement

5.1.17.22 Surface_profile_tolerance

AIM element: surface_profile_tolerance
 Source: ISO 10303-519
 Rules: 5.2.4.2

5.1.17.22.1 surface_profile_tolerance to datum (as geometric_reference)

AIM element: PATH
 Reference Path: surface_profile_tolerance <=
 geometric_tolerance =>
 geometric_tolerance_with_datum_reference
 geometric_tolerance_with_datum_reference.datum_system[i] ->
 datum_reference

5.1.17.23 Symmetry_tolerance

AIM element: symmetry_tolerance
Source: ISO 10303-519
Rules: 5.2.4.2

5.1.17.23.1 symmetry_tolerance to datum (as geometric_reference)

AIM element: PATH
Reference Path: symmetry_tolerance <=
geometric_tolerance_with_datum_reference
geometric_tolerance_with_datum_reference.datum_system[i] ->
datum_reference

5.1.17.23.2 symmetry_tolerance to orientation (as affected_plane)

AIM element: PATH
Reference Path: symmetry_tolerance <=
geometric_tolerance_with_datum_reference <=
geometric_tolerance <=
tolerance_zone.defining_tolerance[i]
tolerance_zone <=
shape_aspect <=
shape_aspect_relationship.relate_shape_aspect
shape_aspect_relationship
shape_aspect_relationship.related_shape_aspect ->
shape_aspect
{ shape_aspect
shape_aspect.description = 'affected plane' }
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation
property_definition_representation.used_representation ->
representation
representation.items[i] ->
{ representation_item
representation_item.name = 'affected plane' }
representation_item =>
geometric_representation_item =>
placement

(1) Target_area

AIM element: datum_target
 Source: ISO 10303-47
 Rules: 5.2.4.9

5.1.17.23.3 target_area to shape_element (as area_shape)

AIM element: IDENTICAL MAPPING

5.1.17.24 Target_circle

AIM element: placed_datum_target_feature
 Source: ISO 10303-224
 Rules: 5.2.4.9
 Reference Path: placed_datum_target_feature <=
 datum_target
 { datum_target <=
 shape_aspect
 shape_aspect.description = 'circle' }

5.1.17.24.1 target_diameter

AIM element: measure_representation_item
Source: ISO 10303-45
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: placed_datum_target_feature <=
 datum_target <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'target diameter'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.17.25 Target_line

AIM element: placed_datum_target_feature
Source: ISO 10303-224
Rules: 5.2.4.9
Reference Path: placed_datum_target_feature <=
 datum_target
 {datum_target <=
 shape_aspect
 shape_aspect.description = 'line'}

5.1.17.25.1 target_length

AIM element: measure_representation_item
 Source: ISO 10303-45
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: placed_datum_target_feature <=
 datum_target <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'target length'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.17.26 Target_point

AIM element: placed_datum_target_feature
 Source: ISO 10303-224
 Rules: 5.2.4.9
 Reference Path: placed_datum_target_feature <=
 datum_target
 {datum_target <=
 shape_aspect
 shape_aspect.description = 'point'}

5.1.17.27 Target_rectangle

AIM element: placed_datum_target_feature
Source: ISO 10303-224
Rules: 5.2.4.9
Reference Path: placed_datum_target_feature <=
datum_target
{ datum_target <=
shape_aspect
shape_aspect.description = 'rectangle'}

5.1.17.28 target_length

AIM element: measure_representation_item
Source: ISO 10303-45
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: placed_datum_target_feature <=
datum_target <=
shape_aspect
shape_definition = shape_aspect
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
{ property_definition_representation =>
shape_definition_representation}
property_definition_representation
property_definition_representation.used_representation ->
{ representation =>
shape_representation =>
shape_representation_with_parameters}
representation
representation.items[i] ->
{ representation_item
representation_item.name = 'target length'}
representation_item =>
measure_representation_item
{ measure_representation_item <=
measure_with_unit =>
length_measure_with_unit}

5.1.17.28.1 target_width

AIM element: measure_representation_item
 Source: ISO 10303-45
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: placed_datum_target_feature <=
 datum_target <=
 shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'target width'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit =>
 length_measure_with_unit}

5.1.17.29 Tolerance_zone

AIM element: tolerance_zone
 Source: ISO 10303-47

5.1.17.29.1 common_zone

AIM element: tolerance_zone.defining_tolerance
 Source: ISO 10303-47

5.1.17.29.2 form_type

AIM element: tolerance_zone_form.name
Source: ISO 10303-47
Reference Path: tolerance_zone
tolerance_zone.form ->
tolerance_zone_form
tolerance_zone_form.name

5.1.17.29.3 tolerance_zone to projection (as extended_shape)

AIM element: PATH
Reference Path: tolerance_zone <-
tolerance_zone_definition.zone
tolerance_zone_definition =>
projected_zone_definition

5.1.17.29.4 tolerance_zone to tolerance_zone_definition (as zone_definition)

AIM element: PATH
Reference Path: tolerance_zone <-
tolerance_zone_definition.zone
tolerance_zone_definition

5.1.17.30 Tolerance_zone_definition

AIM element: tolerance_zone_definition
Source: ISO 10303-47

5.1.17.30.1 tolerance_zone_definition to shape_element (as first_element)

AIM element: PATH
Reference Path: tolerance_zone_definition
tolerance_zone_definition.boundaries[i] ->
shape_aspect

5.1.17.30.2 tolerance_zone_definition to shape_element (as second_element)

AIM element: PATH
Reference Path: tolerance_zone_definition
tolerance_zone_definition.boundaries[i] ->
shape_aspect

5.1.17.31 Total_runout_tolerance

AIM element: total_runout_tolerance
 Source: ISO 10303-519
 Rules: 5.2.4.2

5.1.17.31.1 runout

AIM element: [measure_with_unit.value_component]
 [measure_with_unit.unit_component]
 Source: ISO 10303-41
 Rules: 5.2.4.9
 Reference Path: total_runout_tolerance <=
 geometric_tolerance_with_datum_reference <=
 geometric_tolerance <=
 tolerance_zone.defining_tolerance[i]
 tolerance_zone <=
 tolerance_zone_definition.zone
 tolerance_zone_definition =>
 runout_zone_definition
 runout_zone_definition.orientation ->
 runout_zone_orientation
 runout_zone_orientation.angle ->
 measure_with_unit
 [measure_with_unit.value_component]
 [measure_with_unit.unit_component]

5.1.17.31.2 total_runout_tolerance to datum (as geometric_reference)

AIM element: PATH
 Reference Path: total_runout_tolerance <=
 geometric_tolerance_with_datum_reference
 geometric_tolerance_with_datum_reference.datum_system[i] ->
 datum_reference

5.1.18 Derived_shape_element UoF**5.1.18.1 Derived_shape_element**

AIM element: derived_shape_aspect
 Source: ISO 10303-47

5.1.18.1.1 rule

AIM element: shape_aspect.description
Source: ISO 10303-47
Reference Path: derived_shape_aspect<=
shape_aspect
shape_aspect.description

5.1.18.1.2 Derived_shape_element to shape_element (as is_derived_from)

AIM element: PATH
Reference Path: derived_shape_aspect<-
shape_aspect_deriving_relationship.relate_shape_aspect
shape_aspect_deriving_relationship
shape_aspect_deriving_relationship.related_shape_aspect
shape_aspect

5.1.18.2 Offset_shape_element

AIM element: derived_shape_aspect
Source: ISO 10303-47
Reference Path: derived_shape_aspect<=
shape_aspect
shape_aspect.name='offset shape element'

5.1.18.2.1 Offset_shape_element to Value_with_unit (as offset)

AIM element: PATH
 Reference Path: shape_aspect
 shape_definition = shape_aspect
 shape_definition
 characterized_definition = shape_definition
 characterized_definition <-
 property_definition.definition
 property_definition
 representation_definition=property_definition<-
 property_definition_representation.definition
 {property_definition_representation =>
 shape_definition_representation}
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'offset'}
 representation_item =>
 measure_representation_item
 {measure_representation_item <=
 measure_with_unit

5.1.19 Dimension_tolerance UoF**5.1.19.1 Angular_dimension_tolerance**

AIM element: angular_location
 Source: ISO 10303-47
 Rules: 5.2.4.10

5.1.19.1.1 major_angle

AIM element: angular_location.angle_selection
 Source: ISO 10303-47

5.1.19.1.2 mirror_origin

#1: The origin element is not mirrored.

AIM element: (shape_aspect)
Source: ISO 10303-41
Reference Path: angular_location <=
dimensional_location <=
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
(shape_aspect)

#2: The origin element is mirrored.

AIM element: (shape_aspect_relationship)
Source: ISO 10303-41
Reference Path: angular_location <=
dimensional_location <=
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
(shape_aspect <-
shape_aspect_relationship.relate_shape_aspect
shape_aspect_relationship
{ shape_aspect_relationship
shape_aspect_relationship.name = 'mirroring relationship' })

5.1.19.1.3 mirror_termination

#1: The termination element is not mirrored.

AIM element: #1: (shape_aspect)
 Source: ISO 10303-41
 Reference Path: angular_location <=
 dimensional_location <=
 shape_aspect_relationship
 shape_aspect_relationship.related_shape_aspect ->
 (shape_aspect)

#2: The termination element is mirrored.

AIM element: (shape_aspect_relationship)
 Source: ISO 10303-41
 Reference Path: angular_location <=
 dimensional_location <=
 shape_aspect_relationship
 shape_aspect_relationship.related_shape_aspect ->
 (shape_aspect <-
 shape_aspect_relationship.relate_shape_aspect
 shape_aspect_relationship
 { shape_aspect_relationship
 shape_aspect_relationship.name = 'mirroring relationship'})

5.1.19.2 Angular_size_dimension_tolerance

AIM element: angular_size
 Source: ISO 10303-47

5.1.19.2.1 full_or_half

AIM element: representation_item.name
Source: ISO 10303-43
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: angular_size <=
dimensional_size
dimensional_characteristic = dimensional_size
dimensional_characteristic <=
dimensional_characteristic_representation.dimension
dimensional_characteristic_representation
dimensional_characteristic_representation.representation ->
shape_dimension_representation <=
shape_representation <=
representation
representation.items[i] ->
representation_item
representation_item.name
{(representation_item.name = 'full angle')
(representation_item.name = 'half angle')}

5.1.19.2.2 major_angle

AIM element: angular_size.angle_selection
Source: ISO 10303-47

5.1.19.3 Curved_dimension_tolerance

AIM element: dimensional_size
Source: ISO 10303-47
Reference Path: {dimensional_size
dimensional_size.name = 'curve length'}

5.1.19.4 Diameter_dimension_tolerance

AIM element: dimensional_size
Source: ISO 10303-47
Reference Path: {dimensional_size
dimensional_size.name = 'diameter'}

5.1.19.5 Dimensional_tolerance

AIM element: shape_dimension_representation
Source: ISO 10303-47

5.1.19.5.1 dimension_value

AIM element: measure_representation_item
 Source: ISO 10303-45
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: shape_dimension_representation <=
 shape_representation <=
 representation
 representation.items[i] ->
 representation_item =>
 measure_representation_item<=
 measure_with_unit

5.1.19.5.2 dimension_description

AIM element: (dimensional_size.name)
 (shape_aspect_relationship.description)
 Source: ISO 10303-47
 ISO 10303-41
 Rules: 5.2.4.10
 Reference Path: shape_dimension_representation <-
 dimensional_characteristic_representation.representation
 dimensional_characteristic_representation
 dimensional_characteristic_representation.dimension ->
 dimensional_characteristic
 (dimensional_characteristic = dimensional_size
 dimensional_size
 dimensional_size.name)
 (dimensional_characteristic = dimensional_location
 dimensional_location <=
 shape_aspect_relationship
 shape_aspect_relationship.description)

5.1.19.5.3 significant_digits

AIM element: precision_qualifier.precision_value
Source: ISO 10303-45
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: shape_dimension_representation <=
shape_representation <=
representation
representation.items[i] ->
{representation_item =>
measure_representation_item}
representation_item =>
qualified_representation_item
qualified_representation_item.qualifiers[1] ->
value_qualifier
value_qualifier = precision_qualifier
precision_qualifier
precision_qualifier.precision_value

5.1.19.5.4 unit_of_measure

AIM element: unit
Source: ISO 10303-41
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: shape_dimension_representation <=
shape_representation <=
representation
representation.items[i] ->
representation_item =>
measure_representation_item <=
measure_with_unit
measure_with_unit.unit_component ->
unit

5.1.19.6 Distance_along_curve_tolerance

AIM element: dimensional_location_with_path
Source: ISO 10303-47
Rules: 5.2.4.10

5.1.19.6.1 with_curve_direction

AIM element: dimensional_location_with_path.path
Source: ISO 10303-47

5.1.19.6.2 distance_along_curve_ - tolerance to shape_aspect (as path)

AIM element: PATH
 Reference Path: dimensional_location_with_path
 dimensional_location_with_path.path ->
 shape_aspect

5.1.19.7 Limits_and_fits

AIM element: limits_and_fits
 Source: ISO 10303-47

5.1.19.7.1 deviation

AIM element: limits_and_fits.form_variance
 Source: ISO 10303-47

5.1.19.7.2 fitting_type

AIM element: limits_and_fits.zone_variance
 Source: ISO 10303-47

5.1.19.7.3 grade

AIM element: limits_and_fits.grade
 Source: ISO 10303-47

5.1.19.8 Location_dimension_tolerance

#1: if directed = true

AIM element: (directed_dimensional_location)
 Source: ISO 10303-224
 Rules:
 Reference Path: #1: directed_dimensional_location <=
 dimensional_location

#2: if directed = false

AIM element: (dimensional_location)
 Source: ISO 10303-47
 Rules: 5.2.4.9

5.1.19.8.1 directed

AIM element: IDENTICAL MAPPING

5.1.19.8.2 location_dimension_tolerance to orientation (as plane_and-direction)

#1: if directed = true

AIM element: PATH

Rules:

Reference Path: (directed_dimensional_location <=
dimensional_location <=)

#2: if directed = false

AIM element: PATH

Rules:

Reference Path: (dimensional_location <=)
shape_aspect_relationship
shape_definition = shape_aspect_relationship
shape_definition
characterized_definition = shape_definition
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation
property_definition_representation.used_representation ->
representation
representation.items[i] ->
{representation_item
representation_item.name = 'orientation'}
representation_item =>
geometric_representation_item =>
placement

5.1.19.9 Location_tolerance

AIM element: dimensional_location

Source: ISO 10303-47

Rules: 5.2.4.10

5.1.19.9.1 location_tolerance to shape_element (as origin_shape)

AIM element: PATH

Reference Path: dimensional_location <=
shape_aspect_relationship
shape_aspect_relationship.relate_shape_aspect ->
shape_aspect

5.1.19.9.2 location_tolerance to shape_element (as termination_shape)

AIM element: PATH

Reference Path: dimensional_location <=
 shape_aspect_relationship
 shape_aspect_relationship.related_shape_aspect ->
 shape_aspect

5.1.19.10 Plus_minus_value

#1: if the plus_minus_value is selected for tolerance_value

AIM element: #1: (tolerance_value)

Source: ISO 10303-47

#2: if the plus_minus_value is selected for numeric_parameter

AIM element: (qualified_representation_item)

Source: ISO 10303-45

5.1.19.10.1 lower_limit

#1: if the plus_minus_value is selected for tolerance_value

AIM element: #1: (tolerance_value.lower_bound)

Source: ISO 10303-47

#2: if the plus_minus_value is selected for numeric_parameter

AIM element: (standard_uncertainty.uncertainty_value)

Source: ISO 10303-47

Reference Path: {qualified_representation_item <=
 representation_item}
 qualified_representation_item
 qualified_representation_item.qualifiers[i] ->
 value_qualifier
 value_qualifier = uncertainty_qualifier
 uncertainty_qualifier.measure_name='lower limit'
 uncertainty_qualifier =>
 standard_uncertainty
 standard_uncertainty.uncertainty_value

5.1.19.10.2 significant_digits

#1: if the plus_minus_value is selected for tolerance_value

AIM element: precision_qualifier.precision_value
Source: ISO 10303-45
Reference Path: #1: (tolerance_value
[tolerance_value.upper_bound ->]
[tolerance_value.lower_bound ->]
measure_with_unit <-
measure_qualification.qualifiers[1] ->)
value_qualifier
value_qualifier = precision_qualifier
precision_qualifier
precision_qualifier.precision_value

#2: if the plus_minus_value is selected for numeric_parameter

AIM element: precision_qualifier.precision_value
Source: ISO 10303-45
Reference Path: (qualified_representation_item
qualified_representation_item.qualifiers[i] ->)
value_qualifier
value_qualifier = precision_qualifier
precision_qualifier
precision_qualifier.precision_value

5.1.19.10.3 upper_limit

#1: if the plus_minus_value is selected for tolerance_value

AIM element: (tolerance_value.upper_bound)
Source: ISO 10303-47

#2: if the plus_minus_value is selected for numeric_parameter

AIM element: (standard_uncertainty.uncertainty_value)
Source: ISO 10303-47
Reference Path: {qualified_representation_item <=
representation_item}
qualified_representation_item
qualified_representation_item.qualifiers[i] ->
value_qualifier
value_qualifier = uncertainty_qualifier
uncertainty_qualifier.measure_name='upper limit'
uncertainty_qualifier =>
standard_uncertainty
standard_uncertainty.uncertainty_value

5.1.19.11 Radial_dimension_tolerance

AIM element: dimensional_size
Source: ISO 10303-47
Reference Path: {dimensional_size
dimensional_size.name = 'radius'}

5.1.19.12 Size_tolerance

AIM element: dimensional_size
Source: ISO 10303-47

5.1.19.12.1 size_tolerance to shape_element (as applied_shape)

AIM element: PATH
Reference Path: dimensional_size
dimensional_size.applies_to ->
shape_aspect

5.1.19.13 Tolerance_limit

AIM element: type_qualifier
Source: ISO 10303-45

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5.1.19.13.1 limit_qualifier

AIM element: type_qualifier.name
Source: ISO 10303-45

5.1.19.13.2 Tolerance_range

AIM element: shape_dimension_representation
Source: ISO 10303-47

5.1.19.13.3 lower_range

AIM element: measure_representation_item
Source: ISO 10303-45
Reference Path: shape_dimension_representation <=
shape_representation<=
representation
representation.items[i] ->
{representation_item
representation_item.name = 'lower range'}
representation_item =>
measure_representation_item

5.1.19.13.4 significant_digits

AIM element: precision_qualifier.precision_value
Source: ISO 10303-45
Reference Path: shape_dimension_representation <=
representation
representation.items[i] ->
representation_item =>
measure_representation_item <=
measure_with_unit <=
measure_qualification.qualified_measure
measure_qualification.qualifiers[1] ->
value_qualifier = precision_qualifier
precision_qualifier
precision_qualifier.precision_value

5.1.19.13.5 upper_range

AIM element: measure_representation_item
 Source: ISO 10303-45
 Reference Path: shape_dimension_representation <=
 representation
 representation.items[i] ->
 {representation_item
 representation_item.name = 'upper range'}
 representation_item =>
 measure_representation_item

5.1.19.14 Tolerance_value

AIM element: dimensional_characteristic_representation
 Source: ISO 10303-45

5.1.19.14.1 envelope

AIM element: representation.name
 Source: ISO 10303-43
 Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
 Reference Path: dimensional_characteristic_representation
 dimensional_characteristic_representation.representation ->
 shape_dimension_representation <=
 shape_representation <=
 representation
 representation.name
 {representation.name = 'envelope tolerance'}

5.1.19.14.2 tolerance_value to limits_and_fits (as defined_value)

AIM element: PATH
 Source: ISO 10303-522
 Reference Path: dimensional_characteristic_representation
 dimensional_characteristic_representation.dimension ->
 dimensional_characteristic <-
 plus_minus_tolerance.toleranced_dimension
 plus_minus_tolerance
 plus_minus_tolerance.range ->
 tolerance_method_definition
 tolerance_method_definition = limits_and_fits
 limits_and_fits

5.1.19.14.3 tolerance_value to plus_minus_value (as defined_value)

AIM element: PATH
Reference Path: dimensional_characteristic_representation
dimensional_characteristic_representation.dimension ->
dimensional_characteristic <-
plus_minus_tolerance.toleranced_dimension
plus_minus_tolerance
plus_minus_tolerance.range ->
tolerance_method_definition
tolerance_method_definition = tolerance_value
tolerance_value

5.1.19.14.4 tolerance_value to tolerance_limit (as defined_value)

AIM element: PATH
Rules: 5.2.4.1, 5.2.4.7, 5.2.4.11
Reference Path: dimensional_characteristic_representation
dimensional_characteristic_representation.representation ->
shape_dimension_representation <=
shape_representation <=
representation
representation.items[i] ->
{representation_item =>
measure_representation_item}
representation_item =>
qualified_representation_item
qualified_representation_item.qualifiers[i] ->
value_qualifier
value_qualifier = type_qualifier
type_qualifier

5.1.19.14.5 tolerance_value to tolerance_range (as defined_value)

AIM element: PATH
Reference Path: dimensional_characteristic_representation
dimensional_characteristic_representation.representation ->
shape_dimension_representation

5.1.19.15 Value_limitation

AIM element: [measure_representation_item]
[qualified_representation_item]
Source: ISO 10303-45

5.1.19.15.1 envelope

AIM element: representation.name
 Source: ISO 10303-43
 Rules: 5.2.4.7
 Reference Path: measure_representation_item <=
 representation_item<-
 representation_item.items[i]
 representation
 representation.name
 {representation.name = 'envelope tolerance'}

5.1.19.15.2 Value_limitation to numerical_value (as limited_value)

AIM element: measure_with_unit
 Source: ISO 10303-41
 Reference Path: measure_representation_item<=
 measure_with_unit

5.1.19.15.3 Value_limitation to Plus_minus_value (as is_defined_by)

AIM element: IDENTICAL MAPPING

5.1.19.15.4 Value_limitation to Tolerance_limit (as is_defined_by)

AIM element: PATH
 Reference Path: qualified_representation_item
 qualified_representation_item.qualifiers[i] ->
 value_qualifier
 value_qualifier = type_qualifier
 type_qualifier

5.1.20 Date_time UoF**5.1.20.1Calendar_date**

AIM element: calendar_date
 Source: ISO 10303-41

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5.1.20.1.1 day

AIM element: day_in_month_number
Source: ISO 10303-41
Reference Path: calendar_date
calendar_date.day_component ->
day_in_month_number

5.1.20.1.2 month

AIM element: month_in_year_number
Source: ISO 10303-41
Reference Path: calendar_date
calendar_date.month_component ->
day_in_month_number

5.1.20.1.3 year

AIM element: year_number
Source: ISO 10303-41
Reference Path: calendar_date<=
date
date.year_component ->
year_number

5.1.20.2Date_time

AIM element: date_and_time
Source: ISO 10303-41

5.1.20.2.1 date

AIM element: year_number
Source: ISO 10303-41
Reference Path: date_and_time
date_and_time.date_component->
date
date.year_component ->
year_number

5.1.20.2.2 hour

AIM element: hour_in_day
Source: ISO 10303-41
Reference Path: date_and_time
date_and_time.time_component->
local_time
local_time.hour_component ->
hour_in_day

5.1.20.2.3 minute

AIM element: minute_in_hour
Source: ISO 10303-41
Reference Path: date_and_time
date_and_time.time_component->
local_time
local_time.minute_component ->
minute_in_hour

5.1.20.2.4 second

AIM element: second_in_minute
Source: ISO 10303-41
Reference Path: date_and_time
date_and_time.time_component->
local_time
local_time.second_component ->
second_in_minute

5.1.20.2.5 offset

AIM element: coordinated_universal_time_offset
Source: ISO 10303-41
Reference Path: date_and_time
date_and_time.time_component->
local_time
local_time.zone ->
coordinated_universal_time_offset

5.1.20.3Time_offset

AIM element: coordinated_universal_time_offset
Source: ISO 10303-41

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5.1.20.3.1 hour

AIM element: coordinated_universal_time_offset. hour_offset
Source: ISO 10303-41

5.1.20.3.2 minute

AIM element: coordinated_universal_time_offset. minute_offset
Source: ISO 10303-41

5.1.21 Person_organization UoF

5.1.21.1 Address

AIM element: address
Source: ISO 10303-41

5.1.21.1.1 internal_location

AIM element: address.internal_location
Source: ISO 10303-41

5.1.21.1.2 street_number

AIM element: address.street_number
Source: ISO 10303-41

5.1.21.1.3 street

AIM element: address.street
Source: ISO 10303-41

5.1.21.1.4 postal_box

AIM element: address.postal_box
Source: ISO 10303-41

5.1.21.1.5 town

AIM element: address.town
Source: ISO 10303-41

5.1.21.1.6 region

AIM element: address.region
Source: ISO 10303-41

5.1.21.1.7 postal_code

AIM element: address.postal_code
Source: ISO 10303-41

5.1.21.1.8 country

AIM element: address.country
Source: ISO 10303-41

5.1.21.1.9 facsimile_number

AIM element: address.facsimile_number
Source: ISO 10303-41

5.1.21.1.10 telephone_number

AIM element: address.telephone_number
Source: ISO 10303-41

5.1.21.1.11 electronic_mail_address

AIM element: address.electronic_mail_address
Source: ISO 10303-41

5.1.21.1.12 telex_number

AIM element: address.electronic_mail_address
Source: ISO 10303-41

5.1.21.2 Organization

AIM element: organization
Source: ISO 10303-41

5.1.21.2.1 id

AIM element: organization.id
Source: ISO 10303-41

5.1.21.2.2 short_name

AIM element: organization.name
Source: ISO 10303-41

5.1.21.2.3 long_name

AIM element: organization.description
Source: ISO 10303-41

5.1.21.2.4 Organization to Address (as address)

AIM element: address
Source: ISO 10303-41
Reference Path: organization<-
organizational_address.organizations[i]
organizational_address<=
address

5.1.21.3 Person_in_organization

AIM element: person
Source: ISO 10303-41

5.1.21.3.1 id

AIM element: person.id
Source: ISO 10303-41

5.1.21.3.2 last_name

AIM element: person.last_name
Source: ISO 10303-41

5.1.21.3.3 first_name

AIM element: person.first_name
Source: ISO 10303-41

5.1.21.3.4 middle_names

AIM element: person.middle_name

Source: ISO 10303-41

5.1.21.3.5 prefix_titles

AIM element: person.prefix_titles
Source: ISO 10303-41

5.1.21.3.6 suffix_titles

AIM element: person.suffix_titles
Source: ISO 10303-41

5.1.21.3.7 Person_in_organization to Address (as address)

AIM element: address
Source: ISO 10303-41
Reference Path: person<-
personal_address.people[i]
personal_address<=
address

5.1.22 Dimensional_measurement_analysis UoF

5.1.22.1Dm_parameter_analysis_dml

AIM element: representation
Source: ISO 10303-43

5.1.22.1.1 calculated_value

AIM element: IDENTICAL MAPPING

5.1.22.1.2 feature_analysis

AIM element: representation.item
Source: ISO 10303-43
Reference Path: representation
representation.items[i] ->
representation_item

5.1.22.1.3 tolerance_analysis

AIM element: representation.item
Source: ISO 10303-43
Reference Path: representation
representation.items[i] ->
representation_item

5.1.22.2Dm_analysis_dofs_dml

AIM element: representation_item
Source: ISO 10303-43

5.1.22.2.1 rotx

AIM element: representation_item
Source: ISO 10303-45
Reference Path: representation
representation.items[i] ->
representation_item=>
(representation_item.name = 'analysis rotx upper limit')
(representation_item.name = 'analysis rotx lower limit')
(representation_item.name = 'analysis rotx settings')

5.1.22.2.2 roty

AIM element: representation_item
Source: ISO 10303-45
Reference Path: representation
representation.items[i] ->
representation_item=>
(representation_item.name = 'analysis roty upper limit')
(representation_item.name = 'analysis roty lower limit')
(representation_item.name = 'analysis roty settings')

5.1.22.2.3 rotz

AIM element: representation_item
Source: ISO 10303-45
Reference Path: representation
representation.items[i] ->
representation_item=>
(representation_item.name = 'analysis rotz upper limit')
(representation_item.name = 'analysis rotz lower limit')
(representation_item.name = 'analysis rotz settings')

5.1.22.2.4 transx

AIM element: representation_item
Source: ISO 10303-45
Reference Path: representation
representation.items[i] ->
representation_item=>
(representation_item.name = 'analysis transx upper limit')
(representation_item.name = 'analysis transx lower limit')
(representation_item.name = 'analysis transx settings')

5.1.22.2.5 transy

AIM element: representation_item
Source: ISO 10303-45
Reference Path: representation
representation.items[i] ->
representation_item=>
(representation_item.name = 'analysis transy upper limit')
(representation_item.name = 'analysis transy lower limit')
(representation_item.name = 'analysis transy settings')

5.1.22.2.6 transz

AIM element: representation_item
Source: ISO 10303-45
Reference Path: representation
representation.items[i] ->
representation_item=>
(representation_item.name = 'analysis transz upper limit')
(representation_item.name = 'analysis transz lower limit')
(representation_item.name = 'analysis transz settings')

5.1.22.3Dof_attribute_dml

AIM element: representation_item
Source: ISO 10303-43

5.1.22.3.1 lower_limit

AIM element: length_measure
Source: ISO 10303-41
Reference Path: representation_item=>
(representation_item.name = 'analysis rotx lower limit')
(representation_item.name = 'analysis roty lower limit ')
(representation_item.name = 'analysis rotz lower limit ')
(representation_item.name = 'analysis transx lower limit ')
(representation_item.name = 'analysis transy lower limit ')
(representation_item.name = 'analysis transz lower limit ')
measure_representation_item<=
measure_with_unit
measure_with_unit.value_component ->
measure_value=length_measure
length_measure

5.1.22.3.2 settings

AIM element: descriptive_representation_item.description
Source: ISO 10303-45
Reference Path: representation
representation.items[i] ->
representation_item=>
(representation_item.name = 'analysis rotx settings')
(representation_item.name = 'analysis roty settings')
(representation_item.name = 'analysis rotz settings')
(representation_item.name = 'analysis transx settings')
(representation_item.name = 'analysis transy settings')
(representation_item.name = 'analysis transz settings')
descriptive_representation_item
descriptive_representation_item.description
(descriptive_representation_item.description=' limits')
(descriptive_representation_item.description=' off')
(descriptive_representation_item.description=' on')

5.1.22.3.3 upper_limit

AIM element: length_measure
 Source: ISO 10303-41
 Reference Path: representation_item=>
 (representation_item.name = 'analysis rotx upper limit')
 (representation_item.name = 'analysis roty upper limit ')
 (representation_item.name = 'analysis rotz upper limit ')
 (representation_item.name = 'analysis transx upper limit ')
 (representation_item.name = 'analysis transy upper limit ')
 (representation_item.name = 'analysis transz upper limit ')
 measure_representation_item<=
 measure_with_unit
 measure_with_unit.value_component ->
 measure_value=length_measure
 length_measure

5.1.22.4Dm_feature_analysis_mode_dml

AIM element: representation_item
 Source: ISO 10303-43

5.1.22.4.1 axis

AIM element: descriptive_representation_item.description
 Source: ISO 10303-45
 Reference Path: representation
 representation.items[i] ->
 representation_item=>
 (representation_item.name = 'feature analysis mode axis')
 descriptive_representation_item
 descriptive_representation_item.description
 (descriptive_representation_item.description=' least square')
 (descriptive_representation_item.description=' min rad')
 (descriptive_representation_item.description=' xsect_centers')

5.1.22.4.2 axis_extrapolate

AIM element: descriptive_representation_item.description
Source: ISO 10303-45
Reference Path: representation
representation.items[i] ->
representation_item=>
(representation_item.name = ' feature analysis mode axis extrapolate')
descriptive_representation_item
descriptive_representation_item.description
(descriptive_representation_item.description='true')
(descriptive_representation_item.description='false')
(descriptive_representation_item.description='unknown')

5.1.22.4.3 aelpr

AIM element: descriptive_representation_item.description
Source: ISO 10303-45
Reference Path: representation
representation.items[i] ->
representation_item=>
(representation_item.name = ' feature analysis mode aelpr')
descriptive_representation_item
descriptive_representation_item.description
(descriptive_representation_item.description='lstsq')
(descriptive_representation_item.description='minmax')

5.1.22.4.4 cccpst

AIM element: descriptive_representation_item.description
Source: ISO 10303-45
Reference Path: representation
representation.items[i] ->
representation_item=>
(representation_item.name = ' feature analysis mode cccpst')
descriptive_representation_item
descriptive_representation_item.description
(descriptive_representation_item.description='lstsq')
(descriptive_representation_item.description='maxins')
(descriptive_representation_item.description='mincir')
(descriptive_representation_item.description='minmax')

5.1.22.4.5 curve

AIM element: descriptive_representation_item.description
 Source: ISO 10303-45
 Reference Path: representation
 representation.items[i] ->
 representation_item=>
 (representation_item.name = ' feature analysis mode curve')
 descriptive_representation_item
 descriptive_representation_item.description
 (descriptive_representation_item.description='somevalue')

5.1.22.4.6 limits

AIM element: descriptive_representation_item.description
 Source: ISO 10303-45
 Reference Path: representation
 representation.items[i] ->
 representation_item=>
 (representation_item.name = ' feature analysis mode limits')
 descriptive_representation_item
 descriptive_representation_item.description
 (descriptive_representation_item.description='functional')
 (descriptive_representation_item.description='mrs average')
 (descriptive_representation_item.description='two point')

5.1.22.4.7 surface

AIM element: descriptive_representation_item.description
 Source: ISO 10303-45
 Reference Path: representation
 representation.items[i] ->
 representation_item=>
 (representation_item.name = ' feature analysis mode surface')
 descriptive_representation_item
 descriptive_representation_item.description
 (descriptive_representation_item.description='somevalue')

5.1.22.5Dm_feature_tolerance_mode_dml

AIM element: representation_item
 Source: ISO 10303-43

5.1.22.5.1 method

AIM element: descriptive_representation_item.description
Source: ISO 10303-45
Reference Path: representation
representation.items[i] ->
representation_item=>
(representation_item.name = 'feature tolerance mode method')
descriptive_representation_item
descriptive_representation_item.description
(descriptive_representation_item.description='lsq3d')
(descriptive_representation_item.description='lsq nrm')
(descriptive_representation_item.description='mindev 3d')
(descriptive_representation_item.description='standard')

5.1.22.5.2 option

AIM element: descriptive_representation_item.description
Source: ISO 10303-45
Reference Path: representation
representation.items[i] ->
representation_item=>
(representation_item.name = 'feature tolerance mode option')
descriptive_representation_item
descriptive_representation_item.description
(descriptive_representation_item.description='somevalue')

5.1.22.5.3 setting

AIM element: descriptive_representation_item.description
Source: ISO 10303-45
Reference Path: representation
representation.items[i] ->
representation_item=>
(representation_item.name = 'feature tolerance mode setting')
descriptive_representation_item
descriptive_representation_item.description
(descriptive_representation_item.description='inner')
(descriptive_representation_item.description='outer')
(descriptive_representation_item.description='standard')

5.1.23 Dimensional_measurement_program_run UoF

5.1.23.1 Dm_program_run

AIM element: dm_program_run
 Source: ISO 10303-219
 Reference Path: dm_program_run <=
 action_method

5.1.23.1.1 Part_inspection_status

AIM element: action_resource.description
 Source: ISO 10303-41
 Reference Path: dm_program_run <=
 action_method
 supported_item=action_method<-
 action_resource
 { action_resource.name='part inspection status'
 action_resource.description

5.1.23.1.2 url

AIM element: action_resource.description
 Source: ISO 10303-41
 Reference Path: dm_program_run <=
 action_method
 supported_item=action_method<-
 action_resource
 { action_resource.name='url'
 action_resource.description

5.1.23.1.3 Dm_program_run to Measurement_location (as run_location)

AIM element: PATH
 Reference Path: dm_program_run <=
 action_method
 characterized_action_definition=action_method
 characterized_action_definition<-
 action_resource_requirement.operations[i]
 action_resource_requirement
 characterized_resource_definition= action_resource_requirement
 characterized_resource_definition<-
 resource_property.resource
 resource_property

5.1.23.1.4 Dm_program_run to Numerical_value (as measurement-_humidity)

AIM element: PATH
Reference Path: dm_program_run <=
action_method
characterized_action_definition=action_method<-
action_property.definition
action_property<-
action_property_representation.property
action_property_representation
action_property_representation.representation->
representation
representation.items[I]->
representation_item=>
(representation_item.name='measurement humidity')
measure_representation_item<=
measure_with_unit

5.1.23.1.5 Dm_program_run to Numerical_value (as measurement_-temperature)

AIM element: PATH
Reference Path: dm_program_run <=
action_method
characterized_action_definition=action_method<-
action_property.definition
action_property<-
action_property_representation.property
action_property_representation
action_property_representation.representation->
representation
representation.items[I]->
representation_item=>
(representation_item.name='measurement temerature')
measure_representation_item<=
measure_with_unit

5.1.23.1.6 Dm_program_run to Dm_program_identification (as program_id)

AIM element: PATH
 Reference Path: dm_program_run <=
 action_method<-
 action_method
 characterized_action_definition=action_method
 characterized_action_definition<-
 action_resource_requirement.operations[i]
 action_resource_requirement

5.1.23.1.7 Dm_program_run to Run_administrator (as run_administrator)

#1 administrator is organization

AIM element: PATH
 Reference Path: dm_program_run <=
 action_method
 person_item=action_method<-
 applied_organization_assignment.items[i]
 applied_organization_assignment

#2 administrator is person_in_organization

AIM element: PATH
 Reference Path: dm_program_run <=
 action_method
 person_item=action_method<-
 applied_person_and_organization_assignment.items[i]
 applied_person_and_organization_assignment

5.1.23.1.8 Dm_program_run to Date_time (as run_start)

AIM element: PATH
 Reference Path: dm_program_run <=
 action_method
 date_item=action_method<-
 applied_date_assignment<=
 date_assignment
 date_assignment.assigned_date->
 date<-
 date_and_time.date_component
 date_and_time

5.1.23.1.9 Dm_program_run to Date_time (as run_end)

AIM element: PATH
Reference Path: dm_program_run <=
action_method
date_item=action_method<-
applied_date_assignment<=
date_assignment
date_assignment.assigned_date->
date<-
date_and_time.date_component
date_and_time

5.1.23.1.10 Dm_program_run to Date_time (as run_date)

AIM element: PATH
Reference Path: dm_program_run <=
action_method
date_item=action_method<-
applied_date_assignment<=
date_assignment
date_assignment.assigned_date->
date<-
date_and_time.date_component
date_and_time

5.1.23.1.11 Dm_program_run to Calendar_date (as run_date)

AIM element: PATH
Reference Path: dm_program_run <=
action_method
date_item=action_method<-
applied_date_assignment<=
date_assignment
date_assignment.assigned_date->
date=>
calendar_date

5.1.23.1.12 Dm_program_run to Calendar_date (as run_end)

AIM element: PATH
 Reference Path: dm_program_run <=
 action_method
 date_item=action_method<-
 applied_date_assignment<=
 date_assignment
 date_assignment.assigned_date->
 date=>
 calendar_date

5.1.23.1.13 Dm_program_run to Calendar_date (as run_start)

AIM element: PATH
 Reference Path: dm_program_run <=
 action_method
 date_item=action_method<-
 applied_date_assignment<=
 date_assignment
 date_assignment.assigned_date->
 date=>
 calendar_date

**5.1.23.1.14 Dm_program_run to Numerical_value (as workpiece-
_temperature)**

AIM element: PATH
 Reference Path: dm_program_run <=
 action_method
 characterized_action_definition=action_method<-
 action_property.definition
 action_property<-
 action_property_representation.property
 action_property_representation
 action_property_representation.representation->
 representation
 representation.items[I]->
 representation_item=>
 (representation_item.name='workpiece temerature')
 measure_representation_item<=
 measure_with_unit

5.1.23.2 Measurement_location

AIM element: resource_property
Source: ISO 10303-49

5.1.23.2.1 name

AIM element: resource_property.name
Source: ISO 10303-49

5.1.23.2.2 machine

AIM element: resource_property.description
Source: ISO 10303-49

5.1.23.3 Run_administrator

#1 administrator is organization

AIM element: applied_organization_assignment
Source: ISO 10303-219
Reference Path: applied_organization_assignment<=
organization_assignment

#2 administrator is person_in_organization

AIM element: applied_person_organization_assignment
Source: ISO 10303-219
Reference Path: applied_person_and_organization_assignment <=
person_and_organization_assignment

5.1.23.3.1 shift

#1 administrator is organization

AIM element: organization_role.description
 Source: ISO 10303-219
 Reference Path: applied_organization_assignment<=
 organization_assignment
 organization_assignment.role->
 organization_role
 organization_role.name='shift'
 organization_role.description

#2 administrator is person_in_organization

AIM element: person_and_organization_role.description
 Source: ISO 10303-219
 Reference Path: applied_person_and_organization_assignment <=
 person_and_organization_assignment
 person_and_organization_assignment.role->
 person_and_organization_role
 person_and_organization.name='shift'
 person_and_organization.description

5.1.23.3.2 Run_administrator to Organization (as administrator)

#1 administrator is organization

AIM element: organization
 Source: ISO 10303-219
 Reference Path: applied_organization_assignment<=
 organization_assignment
 organization_assignment.assigned_organization
 organization

5.1.23.3.3 Run_administrator to Person_in_organization (as administrator)

#2 administrator is person_in_organization

AIM element: person_and_organization
 Source: ISO 10303-219
 Reference Path: applied_person_and_organization_assignment <=
 person_and_organization_assignment
 person_and_organization_assignment.assigned.person_and_organization
 person_and_organization

5.1.24 Dimensional_measurement_execution_result UoF

5.1.24.1Dm_execution_result

AIM element: dm_execution_result
Source: ISO 10303-219
Reference Path: dm_execution_result <=
executed_action<=
action

5.1.24.1.1 dm_measurements

AIM element: dm_execution_result
Source: ISO 10303-219
Reference Path: dm_execution_result <=
executed_action<=
action
characterized_action_definition=action<-
action_property.definition
action_property

5.1.24.1.2 program_run

AIM element: dm_program_run
Source: ISO 10303-219
Reference Path: dm_execution_result <=
executed_action<=
action
action.chosen_method
action_method=>
dm_program_run

5.1.24.2Dm_execution_result_measurement

AIM element: dm_execution_result_measurement
Source: ISO 10303-219
Reference Path: dm_execution_result_measurement <=
action_property

5.1.24.2.1 compensation

AIM element: action_property.description
 Source: ISO 10303-41
 Reference Path: dm_execution_result_measurement <=
 action_property
 action_property.description

5.1.24.2.2 Dm_execution_result_measurement to Dm_result_parameter (as parameter)

AIM element: PATH
 Reference Path: dm_execution_result_measurement <=
 action_property<-
 action_property_representation.property
 action_property_representation
 (action_property_representation.name='reported parameter value')
 (action_property_representation.name='calculated_value')
 action_property_representation
 action_property_representation.representation->
 representation

5.1.24.2.3 Dm_execution_result_measurement to Dm_data_acquisition_software (as software)

AIM element: PATH
 Reference Path: dm_execution_result_measurement <=
 action_property<-
 action_property_representation.property
 action_property_representation
 action_property_representation.representation->
 representation

5.1.24.2.4 Dm_execution_result_measurement to Dm_point (as measurement_points)

AIM element: PATH
 Reference Path: dm_execution_result_measurement <=
 action_property<-
 action_property_representation.property
 action_property_representation
 action_property_representation.representation->
 representation

5.1.24.3 Dm_result_parameter

ISO/CD 10303-219:2003(E)

AIM element: representation
Source: ISO 10303-43

5.1.24.3.1 Dm_result_parameter to Calculated_value (as calculated_value)

AIM element: IDENTICAL MAPPING

5.1.24.3.2 Dm_result_parameter to Parameter_calculated_value (as reported_parameter_value)

AIM element: IDENTICAL MAPPING

5.1.24.4 Dm_data_acquisition_software

AIM element: representation
Source: ISO 10303-43

5.1.24.4.1 application_version

AIM element: descriptive_representation_item.description
Source: ISO 10303-45
Reference Path: representation
representation.items[i] ->
representation_item=>
(representation_item.name = 'application version')
descriptive_representation_item
descriptive_representation_item.description

5.1.24.4.2 application_name

AIM element: descriptive_representation_item.description
Source: ISO 10303-45
Reference Path: representation
representation.items[i] ->
representation_item=>
(representation_item.name = 'application name')
descriptive_representation_item
descriptive_representation_item.description

5.1.24.4.3 vendor_name

AIM element: descriptive_representation_item.description
 Source: ISO 10303-45
 Reference Path: representation
 representation.items[i] ->
 representation_item=>
 (representation_item.name = 'vendor name')
 descriptive_representation_item
 descriptive_representation_item.description

5.1.24.5Dm_point

AIM element: dm_point
 Source: ISO 10303-219
 Reference Path: dm_point<=
 representation

5.1.24.5.1 Dm_point to Cartesian_point (as measured_point)

AIM element: PATH
 Reference Path: dm_point <=
 representation
 representation.items[i] ->
 representation_item=>
 (representation_item.name='measured point')
 geometric_representation_item=>
 point=>
 cartesian_point

5.1.24.5.2 Dm_point to Cartesian_point (as expected_point)

AIM element: PATH
 Reference Path: dm_point <=
 representation
 representation.items[i] ->
 representation_item=>
 (representation_item.name='expected point')
 geometric_representation_item=>
 point=>
 cartesian_point

5.1.25 Dimensional_measurement_parameter UoF**5.1.25.1Dm_parameter**

ISO/CD 10303-219:2003(E)

AIM element: dm_parameter
Source: ISO 10303-219
Reference Path: dm_parameter<=
representation_item

5.1.25.1.1 Dm_parameter to DM_parameter_value_limits (as limits)

AIM element: IDENTICAL MAPPING

5.1.25.2DM_parameter_value_limits

AIM element: representation_item
Source: ISO 10303-43

5.1.25.2.1 limits_method

AIM element: measure_qualification.description
Source: ISO 10303-45
Reference Path: representation_item=>
measure_representation_item<=
measure_with_unit<-
measure_qualification.qualified_measure
measure_qualification
{ measure_qualification.name='limit method' }
measure_qualification.description
{ measure_qualification.qualifiers[I]->
value_qualifier
value_qualifier = type_qualifier
type_qualifier
type_qualifier.name='calculated limit' }

5.1.25.2.2 DM_parameter_value_limits to value_limit (as calculated_limits)

AIM element: PATH
 Reference Path: representation_item=>
 measure_representation_item<=
 measure_with_unit
 { measure_with_unit=>
 measure_representation_item
 representation_item =>
 qualified_representation_item
 qualified_representation_item.qualifiers[1] ->
 value_qualifier
 value_qualifier = type_qualifier
 type_qualifier
 type_qualifier.name='calculated limit' }

5.1.25.3Dm_dimension_parameter

AIM element: dm_dimension_parameter
 Source: ISO 10303-219
 Reference Path: dm_dimension_parameter<=
 dm_parameter<=
 representation_item

5.1.25.3.1 Dm_dimension_parameter to Calculated_value

AIM element: IDENTICAL MAPPING

5.1.25.4Calculated_value

AIM element: representation_item
 Source: ISO 10303-41

5.1.25.4.1 calculation_method

AIM element: descriptive_representation_item
 Source: ISO 10303-45
 Reference Path: representation_item=>
 (representation_item.name = 'calculation method')
 descriptive_representation_item

5.1.25.4.2 Calculated_value to numerical_value (as value_amount)

AIM element: PATH
Source: ISO 10303-41
Reference Path: representation_item
measure_representation_item<=
measure_with_unit
{ measure_with_unit=>
measure_representation_item
representation_item =>
qualified_representation_item
qualified_representation_item.qualifiers[1] ->
value_qualifier
value_qualifier = type_qualifier
type_qualifier
type_qualifier.name='calculated value' }

5.1.25.5Parameter_calculated_value

AIM element: representation_item
Source: ISO 10303-41

5.1.25.5.1 Parameter_calculated_value to Shape_aspect (as specification)

AIM element: PATH
Reference Path: representation<-
property_definition_representation.used_representation
property_definition_representation
property_definition_representation.definition->
representation_definition=property_definition
property_definition
property_definition.definition->
characterized_definition
characterized_definition = shape_definition
shape_definition
shape_definition = shape_aspect
shape_aspect

5.1.25.5.2 Parameter_calculated_value to Calculated_value (as calculated_value)

AIM element: IDENTICAL MAPPING

5.1.25.6Dm_point_parameter

AIM element: dm_parameter
 Source: ISO 10303-219
 Reference Path: dm_parameter<=
 representation_item

5.1.25.6.1 Dm_point_parameter to Cartesian_point (as calculated_point)

AIM element: PATH
 Reference Path: dm_parameter<=
 representation_item=>
 geometric_representation_item=>
 point=>
 cartesian_point

5.1.25.7Dm_vector_parameter

AIM element: dm_parameter
 Source: ISO 10303-219
 Reference Path: dm_parameter<=
 representation

5.1.25.7.1 Dm_vector_parameter to Cartesian_vector (as calculated-_vector)

AIM element: PATH
 Reference Path: dm_parameter<=
 representation
 representation.items[i] ->
 representation_item=>
 geometric_representation_item=>
 vector

5.1.25.8Cartesian_point

AIM element: cartesian_point
 Source: ISO 10303-42

5.1.25.8.1 x

AIM element: cartesian_point.coordinates[1]
 Source: ISO 10303-42

5.1.25.8.2 y

AIM element: cartesian_point.coordinates[2]
 Source: ISO 10303-42

5.1.25.8.3 z

AIM element: cartesian_point.coordinates[3]
Source: ISO 10303-42

5.1.25.9 Cartesian_vector

AIM element: vector
Source: ISO 10303-42

5.1.25.9.1 i

AIM element: direction.direction_ratios[1]
Source: ISO 10303-42
Reference Path: vector
vector.orientation->
direction
direction.direction_ratios[1]

5.1.25.9.2 j

AIM element: direction.direction_ratios[2]
Source: ISO 10303-42
Reference Path: vector
vector.orientation->
direction
direction.direction_ratios[2]

5.1.25.9.3 k

AIM element: direction.direction_ratios[3]
Source: ISO 10303-42
Reference Path: vector
vector.orientation->
direction
direction.direction_ratios[3]

5.1.26 Dimensional_measurement_feature UoF

5.1.26.1Dm_feature

AIM element: instanced_feature
 Source: ISO 10303-520
 Reference Path: instanced_feature <=
 [shape_aspect]
 [feature_definition <=
 characterized_object]

5.1.26.2Dmf_arc

AIM element: dmf_arc
 Source: ISO 10303-219
 Reference Path: dmf_arc <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object

5.1.26.2.1 inner_outer

AIM element: PATH
 Reference Path: dmf_arc <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 {representation =>
 shape_representation =>
 shape_representation_with_parameters}
 representation
 representation.items[i] ->
 representation_item=>
 (representation_item.name = 'inner outer')
 descriptive_representation_item
 (descriptive_representation_item.description='inner')
 (descriptive_representation_item.description='outer')

5.1.26.2.2 Dmf_arc to Dm_vector_parameter (as axis_direction_vector)

AIM element: PATH
Reference Path: dmf_arc <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
{representation =>
shape_representation =>
shape_representation_with_parameters}
representation =>
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='axis direction vector' }

5.1.26.2.3 Dmf_arc to Dm_vector_parameter (as start_vector)

AIM element: PATH
Reference Path: dmf_arc <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
representation =>
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='start vector' }

5.1.26.2.4 Dmf_arc to Dm_vector_parameter (as end_vector)

AIM element: PATH
 Reference Path: dmf_arc <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 representation =>
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='end vector'}

5.1.26.2.5 Dmf_arc to Dm_dimension_parameter (as radius)

AIM element: PATH
 Reference Path: dmf_arc <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='radius'}

5.1.26.2.6 Dmf_arc to Dm_point_parameter (as center_point)

AIM element: PATH
Reference Path: dmf_arc <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='center point'}

5.1.26.3 Dmf_circle

AIM element: dmf_circle
Source: ISO 10303-219
Rules: ???
Reference Path: dmf_circle <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object

5.1.26.3.1 inner_outer

AIM element: PATH
 Reference Path: dmf_arc <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 representation
 representation.items[i] ->
 representation_item=>
 (representation_item.name = 'inner outer')
 descriptive_representation_item
 (descriptive_representation_item.description='inner')
 (descriptive_representation_item.description='outer')

5.1.26.3.2 Dmf_circle to Dm_point_parameter (as center_point)

AIM element: PATH
 Reference Path: dmf_circle <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='center point'}

5.1.26.3.3 Dmf_circle to Dm_dimension_parameter (as diameter)

AIM element: PATH
Reference Path: dmf_circle <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='diameter'}

5.1.26.3.4 Dmf_circle to Dm_vector_parameter (as axis_direction_vector)

AIM element: PATH
Reference Path: dmf_circle <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='axis direction vector'}

5.1.26.4Dmf_cone

AIM element: dmf_cone
Source: ISO 10303-219
Reference Path: dmf_cone <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object

5.1.26.4.1 inner_outer

AIM element: PATH
 Reference Path: dmf_arc <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 representation
 representation.items[i] ->
 representation_item=>
 (representation_item.name = 'inner outer')
 descriptive_representation_item
 (descriptive_representation_item.description='inner')
 (descriptive_representation_item.description='outer')

5.1.26.4.2 Dmf_cone to Dm_vector_parameter (as axis_direction_vector)

AIM element: PATH
 Reference Path: dmf_cone <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='axis direction vector'}

5.1.26.4.3 Dmf_cone to Dm_vector_parameter (as start_vector)

AIM element: PATH
Reference Path: dmf_cone <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='start vector'}

5.1.26.4.4 Dmf_cone to Dm_vector_parameter (as end_vector)

AIM element: PATH
Reference Path: dmf_cone <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='end vector'}

5.1.26.4.5 Dmf_cone to Dm_point_parameter (as apex_point)

AIM element: PATH
 Reference Path: dmf_cone <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='apex point'}

5.1.26.4.6 Dmf_cone to Dm_point_parameter (as start_point)

AIM element: PATH
 Reference Path: dmf_cone <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='start point'}

5.1.26.4.7 Dmf_cone to Dm_point_parameter (as end_point)

AIM element: PATH
Reference Path: dmf_cone <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='end point'}

5.1.26.4.8 Dmf_cone to Dm_dimension_parameter (as included_angle)

AIM element: PATH
Reference Path: dmf_cone <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='included angle'}

5.1.26.4.9 Dmf_cone to Dm_dimension_parameter (as diameter)

AIM element: PATH
 Reference Path: dmf_cone <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='diameter'}

5.1.26.4.10 Dmf_cone to Dm_dimension_parameter (as end_length_dml)

AIM element: PATH
 Reference Path: dmf_cone <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='end length dml'}

5.1.26.4.11 Dmf_cone to Dm_dimension_parameter (as start_length_dml)

AIM element: PATH
Reference Path: dmf_cone <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='start length dml'}

5.1.26.5Dmf_cylinder

AIM element: dmf_cylinder
Source: ISO 10303-219
Reference Path: dmf_cylinder <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object

5.1.26.5.1 inner_outer

AIM element: PATH
 Reference Path: dmf_cylinder <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 representation
 representation.items[i] ->
 representation_item=>
 (representation_item.name = 'inner outer')
 descriptive_representation_item
 (descriptive_representation_item.description='inner')
 (descriptive_representation_item.description='outer')

5.1.26.5.2 Dmf_cylinder to Dm_vector_parameter (as axis_direction_vector)

AIM element: PATH
 Reference Path: dmf_cylinder <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='axis direction vector'}

5.1.26.5.3 Dmf_cylinder to Dm_point_parameter (as center_point)

AIM element: PATH
Reference Path: dmf_cylinder <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='center point'}

5.1.26.5.4 Dmf_cylinder to Dm_point_parameter (as end_point)

AIM element: PATH
Reference Path: dmf_cylinder <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='end point'}

5.1.26.5.5 Dmf_cylinder to Dm_point_parameter (as start_point)

AIM element: PATH
 Reference Path: dmf_cylinder <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='start point'}

5.1.26.5.6 Dmf_cylinder to Dm_point_parameter (as boundary)

AIM element: PATH
 Reference Path: dmf_cylinder <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='boundary'}

5.1.26.5.7 Dmf_cylinder to Dm_dimension_parameter (as diameter)

AIM element: PATH
Reference Path: dmf_cylinder <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='diameter'}

5.1.26.5.8 Dmf_cylinder to Dm_dimension_parameter (as length_dml)

AIM element: PATH
Reference Path: dmf_cylinder <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='length dml'}

5.1.26.6Dmf_ellipse

AIM element: dmf_ellipse
 Source: ISO 10303-219
 Reference Path: dmf_ellipse <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object

5.1.26.6.1 inner_outer

AIM element: PATH
 Reference Path: dmf_ellipse <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 representation
 representation.items[i] ->
 representation_item=>
 (representation_item.name = 'inner outer')
 descriptive_representation_item
 (descriptive_representation_item.description='inner')
 (descriptive_representation_item.description='outer')

5.1.26.6.2 Dmf_ellipse to Dm_vector_parameter (as normal_direction)

AIM element: PATH
Reference Path: dmf_ellipse <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='normal direction'}

5.1.26.6.3 Dmf_ellipse to Dm_vector_parameter (as major_axis_vector)

AIM element: PATH
Reference Path: dmf_ellipse <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='major axis vector'}

5.1.26.6.4 Dmf_ellipse to Dm_point_parameter (as center_point)

AIM element: PATH
 Reference Path: dmf_ellipse <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='center point'}

5.1.26.6.5 Dmf_ellipse to Dm_point_parameter (as focus_point_one_dml)

AIM element: PATH
 Reference Path: dmf_ellipse <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='focus point one dml'}

5.1.26.6.6 Dmf_ellipse to Dm_point_parameter (as focus_point_two_dml)

AIM element: PATH
Reference Path:

```
dmf_ellipse <=  
feature_definition <=  
characterized_object  
characterized_definition = characterized_object  
characterized_definition <=  
property_definition.definition  
property_definition <=  
property_definition_representation.definition  
property_definition_representation =>  
property_definition_representation  
property_definition_representation.used_representation ->  
dm_parameter  
{representation.items[i]->  
representation_items  
representation_items.name='focus point two dml'}
```

5.1.26.6.7 Dmf_ellipse to Dm_dimension_parameter (as minor_diameter)

AIM element: PATH
Reference Path:

```
dmf_ellipse <=  
feature_definition <=  
characterized_object  
characterized_definition = characterized_object  
characterized_definition <=  
property_definition.definition  
property_definition <=  
property_definition_representation.definition  
property_definition_representation =>  
property_definition_representation  
property_definition_representation.used_representation ->  
dm_parameter  
{representation.items[i]->  
representation_items  
representation_items.name='minor diameter'}
```

5.1.26.6.8 Dmf_ellipse to Dm_dimension_parameter (as major_diameter)

AIM element: PATH
 Reference Path: dmf_ellipse <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='major diameter'}

5.1.26.7Dmf_geometric_curve

AIM element: dmf_geometric_curve
 Source: ISO 10303-219
 Reference Path: dmf_geometric_curve <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object

5.1.26.7.1 Dmf_geometric_curve to Dm_point_parameter (as point_on-_plane_of_curve)

AIM element: PATH
Reference Path: dmf_geometric_curve <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='point on plane of curve'}

5.1.26.7.2 Dmf_geometric_curve to Dm_vector_parameter (as curve_plane-_direction)

AIM element: PATH
Reference Path: dmf_geometric_curve <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='curve plane direction'}

5.1.26.7.3 Dmf_geometric_curve to Cartesian_point (as data_points)

AIM element: PATH

Reference Path: dmf_geometric_curve <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 representation
 representation.items[i] ->
 representation_item=>
 (representation_item.name = 'data points')
 geometric_representation_item=>
 point=>
 cartesian_point

5.1.26.8Dmf_geometric_surface

AIM element: dmf_geometric_surface

Source: ISO 10303-219

Reference Path: dmf_geometric_surface <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object

5.1.26.8.1 Dmf_geometric_surface to Dm_point_parameter (as point_on-_plane_of_curve)

AIM element: PATH
Reference Path: dmf_geometric_surface <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='point on plane of curve'}

5.1.26.8.2 Dmf_geometric_surface to Dm_vector_parameter (as curve-_plane_direction)

AIM element: PATH
Reference Path: dmf_geometric_surface <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='curve plane direction'}

5.1.26.8.3 Dmf_geometric_surface to Cartesian_point (as data_points)

AIM element: PATH
 Reference Path: dmf_geometric_surface <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 representation
 representation.items[i] ->
 representation_item=>
 (representation_item.name = 'data points')
 geometric_representation_item=>
 point=>
 cartesian_point

5.1.26.9Dmf_generic_feature

AIM element: dmf_generic_feature
 Source: ISO 10303-219
 Reference Path: dmf_generic_feature <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object

5.1.26.9.1 description

AIM element: characterized_object.description
 Source: ISO 10303-41
 Reference Path: dmf_generic_feature <=
 feature_definition =>
 characterized_object
 characterized_object.description

5.1.26.9.2 Dmf_generic_feature to Dm_point_parameter (as center_point

AIM element: PATH
Reference Path: dmf_generic_feature <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='center point'}

5.1.26.9.3 Dmf_generic_feature to Dm_vector_parameter (as vector_from-_center_of_object)

AIM element: PATH
Reference Path: dmf_generic_feature <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='vector from center of object'}

5.1.26.9.4 Dmf_generic_feature to Dm_vector_parameter (as secondary- _vector

AIM element: PATH
 Reference Path: dmf_generic_feature <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='secondary vector'}

5.1.26.9.5 Dmf_generic_feature to Dm_dimension_parameter (parameters

AIM element: PATH
 Reference Path: dmf_generic_feature <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='parameters'}

5.1.26.10 Dmf_line_bounded

AIM element: dmf_line_bounded
Source: ISO 10303-219
Reference Path: dmf_line_bounded <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object

5.1.26.10.1 Dmf_line_bounded to Dm_point_parameter (as first_end_point)

AIM element: PATH
Reference Path: dmf_line_bounded <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='first end point'}

5.1.26.10.2 Dmf_line_bounded to Dm_point_parameter (as second_end_point)

AIM element: PATH
 Reference Path: dmf_line_bounded <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='second end point'}

5.1.26.10.3 Dmf_line_bounded to Dm_vector_parameter (as vector_dml)

AIM element: PATH
 Reference Path: dmf_line_bounded <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='vector dml'}

5.1.26.10.4 Dmf_line_bounded to Dm_vector_parameter (as surface- _approach_vector)

AIM element: PATH
Reference Path: dmf_line_bounded <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='surface approach vector'}

5.1.26.10.5 Dmf_line_bounded to Dm_dimension_parameter (length_dml)

AIM element: PATH
Reference Path: dmf_line_bounded <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='length dml'}

5.1.26.11 Dmf_line_closed_parallel

AIM element: dmf_line_closed_parallel
 Source: ISO 10303-219
 Reference Path: dmf_line_closed_parallel <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object

5.1.26.11.1 inner_outer

AIM element: PATH
 Reference Path: dmf_line_closed_parallel <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 representation
 representation.items[i] ->
 representation_item=>
 (representation_item.name = 'inner outer')
 descriptive_representation_item
 (descriptive_representation_item.description='inner')
 (descriptive_representation_item.description='outer')

5.1.26.11.2 end_kind

AIM element: PATH
Reference Path: dmf_line_closed_parallel <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
representation
representation.items[i] ->
representation_item=>
(representation_item.name = 'end kind')
descriptive_representation_item
(descriptive_representation_item.description='round')
(descriptive_representation_item.description='square')

5.1.26.11.3 Dmf_line_closed_parallel to Dm_point_parameter (as center-point)

AIM element: PATH
Reference Path: dmf_line_closed_parallel <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='center point'}

5.1.26.11.4 Dmf_line_closed_parallel to Dm_vector_parameter (as longitude_vector)

AIM element: PATH
 Reference Path: dmf_line_closed_parallel <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='longitude vector'}

5.1.26.11.5 Dmf_line_closed_parallel to Dm_vector_parameter (as axis-direction_vector)

AIM element: PATH
 Reference Path: dmf_line_closed_parallel <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='axis direction vector'}

5.1.26.11.6 Dmf_line_closed_parallel to Dm_dimension_parameter (feature-length)

AIM element: PATH
Reference Path: dmf_line_closed_parallel <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='feature length'}

5.1.26.11.7 Dmf_line_closed_parallel to Dm_dimension_parameter (width)

AIM element: PATH
Reference Path: dmf_line_closed_parallel <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name=' width '}

5.1.26.12 Dmf_line_unbounded

AIM element: dmf_line_unbounded
 Source: ISO 10303-219
 Reference Path: dmf_line_unbounded <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object

5.1.26.12.1 Dmf_line_unbounded to Dm_point_parameter (point_on_line)

AIM element: PATH
 Reference Path: dmf_line_unbounded <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <-
 property_definition.definition
 property_definition <-
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name=' point on line'}

5.1.26.12.2 Dmf_line_unbounded to Dm_vector_parameter (direction- _vector)

AIM element: PATH

Reference Path: dmf_line_unbounded <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='direction vector'}

5.1.26.12.3 Dmf_line_unbounded to Dm_vector_parameter (surface- _approach_vector)

AIM element: PATH

Reference Path: dmf_line_unbounded <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='surface approach vector'}

5.1.26.13 Dmf_pattern

AIM element: dmf_pattern
 Source: ISO 10303-219
 Reference Path: dmf_pattern <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object

5.1.26.13.1 Dmf_pattern to Dm_point_parameter (point)

AIM element: PATH
 Reference Path: dmf_pattern <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name=' point'}

5.1.26.13.2 Dmf_pattern to Dm_vector_parameter (direction_vector)

AIM element: PATH
 Reference Path: dmf_pattern <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='direction vector'}

5.1.26.14 Dmf_plane

AIM element: dmf_plane
Source: ISO 10303-219
Reference Path: dmf_plane <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object

5.1.26.14.1 Dmf_plane to Dm_vector_parameter (direction_vector)

AIM element: PATH
Reference Path: dmf_plane <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='direction vector'}

5.1.26.14.2 Dmf_plane to Dm_point_parameter (point_on_plane)

AIM element: PATH
 Reference Path: dmf_plane <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name=' point on plane'}

5.1.26.14.3 Dmf_plane to Dm_point_parameter (point_dml)

AIM element: PATH
 Reference Path: dmf_plane <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name=' point dml'}

5.1.26.14.4 Dmf_plane to Cartesian_point (as boundary)

AIM element: PATH
Reference Path: dmf_plane <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
representation
representation.items[i] ->
representation_item=>
(representation_item.name = 'boundary')
geometric_representation_item=>
point=>
cartesian_point

5.1.26.15 Dmf_plane_closed_parallel

AIM element: dmf_plane_closed_parallel
Source: ISO 10303-219
Reference Path: dmf_plane_closed_parallel <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object

5.1.26.15.1 end_kind

AIM element: PATH

Reference Path: dmf_plane_closed_parallel <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
representation
representation.items[i] ->
representation_item=>
(representation_item.name = 'end kind')
descriptive_representation_item
(descriptive_representation_item.description='round')
(descriptive_representation_item.description='square')

5.1.26.15.2 inner_outer

AIM element: PATH
Reference Path: dmf_plane_closed_parallel <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
{property_definition_representation
name_attribute_select= property_definition_representation <=
name_attribute.named_item
name_attribute
name_attribute.attribute_value='inner outer'}
property_definition_representation.used_representation ->
representation
representation.items[i] ->
representation_item=>
(representation_item.name = 'inner outer')
descriptive_representation_item
(descriptive_representation_item.description='inner')
(descriptive_representation_item.description='outer')

5.1.26.15.3 Dmf_plane_closed_parallel to Dm_point_parameter (center-point)

AIM element: PATH
Reference Path: dmf_plane_closed_parallel <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='center point'}

5.1.26.15.4 Dmf_plane_closed_parallel to Dm_vector_parameter (axis-direction_vector)

AIM element: PATH
 Reference Path: dmf_plane_closed_parallel <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='axis direction vector'}

5.1.26.15.5 Dmf_plane_closed_parallel to Dm_vector_parameter (normal-dml)

AIM element: PATH
 Reference Path: dmf_plane_closed_parallel <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='normal dml'}

5.1.26.15.6 Dmf_plane_closed_parallel to Dm_vector_parameter (longitude- _vector)

AIM element: PATH
Reference Path: dmf_plane_closed_parallel <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='longitude vector'}

5.1.26.15.7 Dmf_plane_closed_parallel to Dm_dimension_parameter (width)

AIM element: PATH
Reference Path: dmf_plane_closed_parallel <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name=' width '}

5.1.26.15.8 Dmf_plane_closed_parallel to Dm_dimension_parameter (height)

AIM element: PATH
 Reference Path: dmf_plane_closed_parallel <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='height'}

5.1.26.15.9 Dmf_plane_closed_parallel to Dm_dimension_parameter (feature_length)

AIM element: PATH
 Reference Path: dmf_plane_closed_parallel <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='feature length'}

5.1.26.16 Dmf_plane_symmetric

AIM element: dmf_plane_symmetric
Source: ISO 10303-219
Reference Path: dmf_plane_symmetric <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object

5.1.26.16.1 inner_outer

AIM element: PATH
Reference Path: dmf_plane_symmetric <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
representation
representation.items[i] ->
representation_item=>
(representation_item.name = 'inner outer')
descriptive_representation_item
(descriptive_representation_item.description='inner')
(descriptive_representation_item.description='outer')

5.1.26.16.2 Dmf_plane_symmetric to Dm_point_parameter (point_on-one_side)

AIM element: PATH
 Reference Path: dmf_plane_symmetric <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='point on one side'}

5.1.26.16.3 Dmf_plane_symmetric to Dm_point_parameter (point_on-other_side)

AIM element: PATH
 Reference Path: dmf_plane_symmetric <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='point on other side'}

5.1.26.16.4 Dmf_plane_symmetric to Dm_point_parameter (point_on-_mid_plane)

AIM element: PATH
Reference Path: dmf_plane_symmetric <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='point on mid plane'}

5.1.26.16.5 Dmf_plane_symmetric to Dm_vector_parameter (direction-_vector_side_one)

AIM element: PATH
Reference Path: dmf_plane_symmetric <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='direction vector side one'}

5.1.26.16.6 Dmf_plane_symmetric to Dm_vector_parameter (direction- _vector_side_two)

AIM element: PATH
 Reference Path: dmf_plane_symmetric <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='direction vector side two'}

5.1.26.16.7 Dmf_plane_symmetric to Dm_dimension_parameter (width- _at_mid_point)

AIM element: PATH
 Reference Path: dmf_plane_symmetric <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name=' width at mid point'}

5.1.26.17 Dmf_point

AIM element: dmf_point
Source: ISO 10303-219
Reference Path: dmf_point <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object

5.1.26.17.1 point_type_dml

AIM element: PATH
Reference Path: dmf_point <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
representation
representation.items[i] ->
representation_item=>
(representation_item.name = 'point type dml')
descriptive_representation_item
(descriptive_representation_item.description='h edge')
(descriptive_representation_item.description='t edge')

5.1.26.17.2 Dmf_point to Dm_point_parameter (point)

AIM element: PATH
 Reference Path: dmf_point <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='point'}

5.1.26.17.3 Dmf_point to Dm_vector_parameter (direction_vector)

AIM element: PATH
 Reference Path: dmf_point <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='direction vector'}

5.1.26.18 Dmf_edge_point

AIM element: dmf_edge_point
 Source: ISO 10303-219
 Reference Path: dmf_point_edge <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object

5.1.26.18.1 Dmf_edge_point to Dm_vector_parameter (surface_normal_vector)

AIM element: PATH
Reference Path: dmf_edge_point <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='surface normal vector'}

5.1.26.18.2 Dmf_edge_point to Dm_vector_parameter (edge_normal_vector)

AIM element: PATH
Reference Path: dmf_edge_point <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='edge normal vector'}

5.1.26.18.3 Dmf_edge_point to Dm_point_parameter (location_point)

AIM element: PATH
 Reference Path: dmf_edge_point <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='location point' }

5.1.26.18.4 Dmf_edge_point to Dm_vector_parameter (edge_normal_vector)

AIM element: PATH
 Reference Path: dmf_edge_point <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='edge normal vector' }

5.1.26.18.5 Dmf_edge_point to Dm_vector_parameter (edge_normal_vector)

AIM element: PATH
Reference Path: dmf_edge_point <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='edge normal vector'}

5.1.26.19 Dmf_sphere

AIM element: dmf_sphere
Source: ISO 10303-219
Reference Path: dmf_sphere <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object

5.1.26.19.1 Dmf_sphere to Cartesian_point (as boundary)

AIM element: PATH
 Reference Path: dmf_sphere <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 representation
 representation.items[i] ->
 representation_item=>
 (representation_item.name = 'boundary')
 geometric_representation_item=>
 point=>
 cartesian_point

5.1.26.19.2 Dmf_sphere to Dm_point_parameter (center_point)

AIM element: PATH
 Reference Path: dmf_sphere <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='center point'}

5.1.26.19.3 Dmf_sphere to Dm_vector_parameter (prime_meridian_vector)

AIM element: PATH
Reference Path: dmf_sphere <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='prime meridian vector'}

5.1.26.19.4 Dmf_sphere to Dm_vector_parameter (north_pole_vector)

AIM element: PATH
Reference Path: dmf_sphere <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='north pole vector'}

5.1.26.19.5 Dmf_sphere to Dm_dimension_parameter (latitude_start_angle)

AIM element: PATH
 Reference Path: dmf_sphere <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='latitude start angle'}

5.1.26.19.6 Dmf_sphere to Dm_dimension_parameter (latitude_stop_angle)

AIM element: PATH
 Reference Path: dmf_sphere <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name=' latitude stop angle'}

5.1.26.19.7 Dmf_sphere to Dm_dimension_parameter (longitude_start_angle)

AIM element: PATH
Reference Path: dmf_sphere <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='longitude start angle'}

5.1.26.19.8 Dmf_sphere to Dm_dimension_parameter (longitude_stop_angle)

AIM element: PATH
Reference Path: dmf_sphere <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='longitude stop angle'}

5.1.26.19.9 Dmf_sphere to Dm_dimension_parameter (diameter)

AIM element: PATH

Reference Path: dmf_sphere <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='diameter'}

5.1.26.20 Dmf_torus

AIM element: dmf_torus

Source: ISO 10303-219

Reference Path: dmf_torus <=
 { feature_definition =>
 instanced_feature}
 feature_definition <=
 characterized_object

5.1.26.20.1 inner_outer

AIM element: PATH
Reference Path: dmf_torus <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
representation
representation.items[i] ->
representation_item=>
(representation_item.name = 'inner outer')
descriptive_representation_item
(descriptive_representation_item.description='inner')
(descriptive_representation_item.description='outer')
representation.items[i] ->
representation_item=>
(representation_item.name = 'inner outer')
descriptive_representation_item
(descriptive_representation_item.description='inner')
(descriptive_representation_item.description='outer')

5.1.26.20.2 Dmf_torus to Dm_point_parameter (center_point)

AIM element: PATH
Reference Path: dmf_torus <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='center point'}

5.1.26.20.3 Dmf_torus to Dm_vector_parameter (vector_or_plane)

AIM element: PATH
 Reference Path: dmf_torus <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='vector or plane'}

5.1.26.20.4 Dmf_torus to Dm_dimension_parameter (major_diameter)

AIM element: PATH
 Reference Path: dmf_torus <=
 feature_definition <=
 characterized_object
 characterized_definition = characterized_object
 characterized_definition <=
 property_definition.definition
 property_definition <=
 property_definition_representation.definition
 property_definition_representation =>
 property_definition_representation
 property_definition_representation.used_representation ->
 dm_parameter
 {representation.items[i]->
 representation_items
 representation_items.name='major diameter'}

5.1.26.20.5 Dmf_torus to Dm_dimension_parameter (minor_diameter)

AIM element: PATH
Reference Path: dmf_torus <=
feature_definition <=
characterized_object
characterized_definition = characterized_object
characterized_definition <=
property_definition.definition
property_definition <=
property_definition_representation.definition
property_definition_representation =>
property_definition_representation
property_definition_representation.used_representation ->
dm_parameter
{representation.items[i]->
representation_items
representation_items.name='minor diameter'}

5.1.26.21 Dmf_surface_of_revolution_dml

AIM element: dmf_surface_of_revolution_dml
Source: ISO 10303-219
Reference Path: dmf_surface_of_revolution_dml <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object

5.1.26.22 Dmf_unknown_feature_type_dml

AIM element: dmf_unknown_feature_type_dml
Source: ISO 10303-219
Reference Path: dmf_unknown_feature_type_dml <=
{ feature_definition =>
instanced_feature}
feature_definition <=
characterized_object

5.1.27 Dimensional_measurement_program_identification UoF

5.1.27.1Dm_program_identification

AIM element: action_resource_requirement
Source: ISO 10303-49

5.1.27.1.1 angular_units_dml

AIM element: resource_property.description
 Source: ISO 10303-49
 Reference Path: action_resource_requirement<-
 characterized_resource_definition= action_resource_requirement
 characterized_resource_definition<-
 resource_property.resource
 resource_property
 resource_property.name='angular units dml'
 resource_property.description

5.1.27.1.2 linear_units_dml

AIM element: resource_property.description
 Source: ISO 10303-49
 Reference Path: action_resource_requirement<-
 characterized_resource_definition= action_resource_requirement
 characterized_resource_definition<-
 resource_property.resource
 resource_property
 resource_property.name='linear units dml'
 resource_property.description

5.1.27.1.3 tolerance_standard_dml

AIM element: resource_property.description
 Source: ISO 10303-49
 Reference Path: action_resource_requirement<-
 characterized_resource_definition= action_resource_requirement
 characterized_resource_definition<-
 resource_property.resource
 resource_property
 resource_property.name='tolerance standard dml'
 resource_property.description

5.1.27.1.4 identifier

AIM element: action_resource_requirement.name
 Source: ISO 10303-49

5.1.27.1.5 version

AIM element: action_resource_requirement.description
 Source: ISO 10303-49

5.1.27.1.6 Dm_program_identification to Person_in_organization (as program_custodian)

AIM element: PATH
Reference Path: version_action_request
person_item= version_action_request <-
applied_person_assignment.items
applied_person_assignment<=
person_assignment
person_assignment.assigned_person->
person

5.1.27.1.7 Dm_program_identification to Organization (as program_custodian)

AIM element: PATH
Reference Path: version_action_request
person_item= version_action_request <-
applied_organization_assignment.items
applied_organization_assignment<=
organization_assignment
organization_assignment.assigned_organization->
organization

5.2 AIM EXPRESS short listing

5.2.1 Fundamental concepts and assumptions

5.2.2 Dimensional inspection schema types

5.2.3 Dimensional inspection schema entities

5.2.3.1 Dimensional inspection schema imported entity modifications

5.2.4 Dimensional inspection schema planning rules

5.2.4.1 dependent_instantiable_shape_representation

5.2.4.2geometric_tolerance_subtype_exclusiveness

5.2.4.3machining_feature_life_cycle

5.2.4.4product_requires_version

5.2.4.5product_definition_formation_requires_security_classification

5.2.4.6dependent_instantiable_security_classification_level

5.2.4.7representation_subtype_exclusiveness

5.2.4.8restrict_security_classification_level

5.2.4.9shape_aspect_subtype_exclusiveness

5.2.4.10 shape_aspect_relationship_subtype_exclusiveness

5.2.4.11shape_representation_subtype_exclusiveness

5.2.4.12subtype_mandatory_characterized_object

5.2.4.13 transition_feature_life_cycle

5.2.4.14 transition_feature_on_part_boundary

6 Conformance requirements

Annex A

(normative)

AIM EXPRESS expanded listing

Annex B

(normative)

AIM short names

Table B.1 provides the short names of entities specified in the AIM of this part of ISO 10303. Requirements on the use of the short names are found in the implementation methods included in ISO 10303.

Table B.1 - AIM short names of entities

Annex C

(normative)

Implementation method specific requirements

The implementation method defines what type of exchange behavior is required with respect to this part of ISO 10303. Conformance to this part of ISO 10303 shall be realized in an exchange structure. The file format shall be encoded according to the syntax and EXPRESS language mapping defined in ISO 10303-21 and annotated listing defined in Annex A of this part of ISO 10303. The header of the exchange structure shall identify use of this part of ISO 10303 by the schema name 'dimensional_inspection_schema'.

Annex D**(normative)****Protocol Implementation Conformance Statement (proforma)**

This clause list the optional elements of this part of ISO 10303. An implementation may chose to support any combination of these optional elements. However, certain combinations of options are likely to be implemented together. These combinations are called conformance classes and are described in the subclauses of this annex.

This annex is in the form of a questionnaire. This questionnaire is intended to be filled out by the filled out by the implementor and may be used in preparation for conformance testing by a testing laboratory. The completed PICS proforma is referred to as a PICS. The information contained in the PICS is used to configure as appropriate executable test suite for use by the client.

A single conformance class is identified in this part of ISO 10303. A conforming implementation shall support this one conformance class. This class is detailed in clause 6 of ISO 10303-219.

Question:

1. Please provide an identifier for the product or system for which conformance is claimed:

Product name and current version number:_____

2. Please indicate the implementation method chosen:

- ISO 10303-21 Exchange Structure – preprocessor

Preprocessor name and current version number:_____

- ISO 10303-21 Exchange Structure – postprocessor

Postprocessor name and current version number:_____

Annex E

(normative)

Information object registration

E.1 Document identification

To provide for unambiguous identification of an information object in an open system, the object identifier

{iso standard 10303 part(219) version (0) }

is assigned to this part of ISO 10303. The meaning of this value is defined in ISO/IEC 8824-1, and described in ISO 10303-1.

E.2 Schema identification

To provide for unambiguous identification of the schema specification given in this application protocol feature-based-process-planning-schema in the open information system, the object identifier are assigned as follows:

{ iso standard 10303 part(219) version (0) object (1) dimensional_inspection_schema(1)}

is assigned to the dimensional_inspection_schema (see annex A).

{ iso standard 10303 part(219) version (0) object (1) dimensional_inspection_schema(2) }

is assigned to the dimensional_inspection_schema short form schema (see 5.2).

The meaning of this value is defined in ISO 8824-1, and is described in ISO 10303-1.

Annex F**(informative)****Application activity model**

The application activity model (AAM) is provided to aid in the understanding the scope and information requirements defined in this application protocol. The model is presented as a set of activity figures that contain the activity diagrams and a set of definitions of the activities and their data.

The AAM covers activities which go beyond the subject of this application protocol. The diagrams use a modified IDEF0 notation [2]. Figure F.1 gives the basic notation. Each activity may be decomposed to provide more detail. If an activity has been decomposed, a separate figure is included.

As with any IDEF0 model, the application activity model is dependent on a particular viewpoint and purpose. The viewpoint of the application activity model is from a manufacturing engineer. The purpose of the application activity model is to clarify the context and scope of this application protocol.

This is an activity model of an enterprise for manufacturing a part. There are several activity diagrams that have all activities out of scope but they are important in illustrating how the manufacture of a part process was developed and how the in-scope requirements were derived.

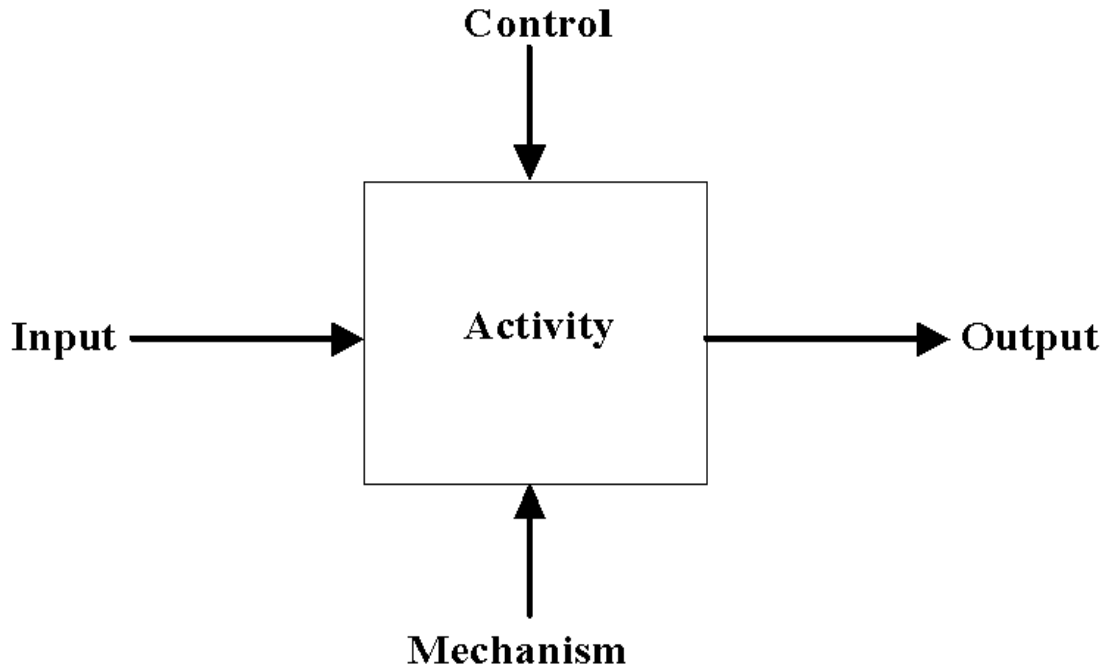


Figure F.1 IDEF0 Basic notation

F.1 Application activity model definitions

F.1.1 actual inspection hours: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The real time that is required to perform the inspection activity.

F.1.2 administrative data: Data relating to the organizational and business aspects of a dimensional inspection operation rather than the engineering or metrology aspects.

F.1.3 algorithm software: Computer codes for calculating the dimensions of a feature from the measured data points that collectively represent the feature.

F.1.4 aligned part: See *part* in this dictionary and *aligned* in the *Concise Oxford Dictionary (COD)*.

F.1.5 analysis results (feedback): Information resulting from performing the dimensional inspection process, which can be used as a control for the planning and the execution functions of that process.

F.1.6 approve/disapprove the draft plan: See individual terms in *COD*.

F.1.7 approved manufacturing plan package: (see AP 213) (Term may be deleted because it is no longer, or was never, contained in the activity model.) The collection of all approved documents including manufacturing plan, associated drawings and illustrations ready to be released for production.

F.1.8 approved manufacturing plans: (see AP 213) (Term may be deleted because it is no longer, or was never, contained in the activity model.) The collection of all documentation along with a signature, that can be electronic, of a responsible individual that releases the documentation and sets the authority for the authenticity of the data.

F.1.9 approved inspection tooling package: The collection of all inspection tooling information, including probes and fixtures, and associated documentation along with authorized signature ready to be released for production.

F.1.10 archival results of analysis: Data, calculated quantities, and other information flowing from the *perform analysis of inspection* function and headed for the *archiving* function. This term includes raw data points, analysis results feedback, and statistical results.

F.1.11 archived information: All the dimensional inspection information considered worth being stored. It is important to note that the archive is not really a data stream, but a data base. Data is constantly added to the archival data base but data is occasionally fetched. The Inputs and Outputs represent the schema. - ??

F.1.12 archiving: The act of storing all data and information that are worth being kept for future use, for example, for more calculations or for statistical purposes.

F.1.13 associate: The activity by which the individual measured data points are grouped to form digital representations of part features and fitted to substitute part features.

F.1.14 calculate: The activity used to combine two or more substitute features in a relationship to generate a composite feature, when that is required for subsequent tolerance evaluation. In addition, the activity may generate a third feature from two or more features, when that is required for subsequent tolerance evaluation or for the generation of a coordinate system.

F.1.15 calculate statistics: *COD*.

F.1.16 CAX: (Useful term, but could be deleted because it is no longer contained in the activity model.) Various computer-aided equipment or systems that add automation functions to the dimensional inspection process.

F.1.17 change request: A request made by an inspection plan validator to change a draft inspection plan.

Data Structure: text string.

Alternative Definition: A formal means, which can be electronic or hard copy, of informing the inspection planners of a need to rework one or more of the documents contained within the inspection plan in order to conform to a specific requirement

F.1.18 clamping specifications: (Term may be deleted because it is no longer, or was never, contained in the activity model.) See *work holding specifications*.

F.1.19 constructed feature relationship: Need definition.

F.1.20 constructed substitute feature: A feature which is composed of more than one substitute feature.

F.1.21 contract number: (Term may be deleted because it is no longer, or was never, contained in the activity model.) A unique identification of the contract.

F.1.22 contractual requirements: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The criteria provided by the customer that explicitly states the form, fit, and function of the part to be manufactured.

F.1.23 coordinate system(s): Mathematical system(s) for describing the position and orientation of something in the 3D space. The coordinate systems include the machine's coordinate system and where needed, the coordinate systems for each fixture, part, sensor, carriage, rotary table, and sensor calibration artifact.

NOTE: Locate the appropriate ISO definition.

F.1.24 create inspection process plan: (Term may be deleted because it is no longer, or was never, contained in the activity model.) See *develop inspection process plan*.

Obsolete definition: The development of the instructions required for transforming the raw or purchased material into products. The process planner goes through the steps of categorizing the parts and processes and generates the process plan. Categorizing the parts and processes allows identification of data from previously developed process plans and facilitates the generation of new process plans.

F.1.25 data analysis functions: Mathematical functions and procedures used to analyze measured data points to evaluate actual dimensions and tolerances of the parts (for example, regression analysis).

F.1.26 data structures: The files, along with their specific formats, that store the data resulting from the development of a dimensional inspection plan and the execution of a dimensional inspection activity.

F.1.27 database system: *COD*.

F.1.28 Decompose selected tolerances and features(A22): See individual terms in this dictionary.

F.1.29 decomposed tolerance: Measurable surfaces which are decomposed from a tolerance.

F.1.30 decomposed tolerances with points to measure: See *decomposed tolerance* in this dictionary and other terms in *COD*.

F.1.31 derived coordinate system: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The coordinate system considered appropriate for a particular inspection. Choosing a good coordinate system reduces uncertainty in measurements and results. As the first coordinate system used is generally not the best one, a derived coordinate system is generated that suits the inspection task better.

F.1.32 derived tolerance: (Term may be deleted because it is no longer, or was never, contained in the activity model.)

F.1.33 design data: (Useful term, but could be deleted because it is no longer contained in the activity model.) The product model data representing the part design which includes the following models: geometry, topology, tolerance, form feature, product functionality, and surface conditions. This also includes all CAD/CAM data.

F.1.34 design tolerances: (Useful term, but could be deleted because it is no longer contained in the activity model.) The tolerances coming from the design part of the process.

F.1.35 determine clamping devices: (Term may be deleted because it is no longer, or was never, contained in the activity model.)

F.1.36 determine in-process shapes/features/attributes: (Term may be deleted because it is no longer, or was never, contained in the activity model.) This activity determines the initial, intermediate and final shapes, features and surface conditions necessary to perform the required manufacturing processes. This would include such things as tabs and manufacturing tolerances.

F.1.37 determine fixture: See *fixture*.

F.1.38 determine inspection sequence: See *inspection sequence*.

F.1.39 determine measurement positions: See *measurement positions*.

F.1.40 determine part orientation: See *part orientation*.

F.1.41 determine process parameters: See *process parameters*.

F.1.42 determine setup: See *setup*.

F.1.43 Develop inspection process plan (A24): The summation of activities that evaluate the design data, such as engineering product design data (PDD), for a machined part and determine the inspection requirements and associated data required to produce the part. This activity begins upon the release of the engineering PDD to the manufacturing planning department and ends with the delivery of the inspection package to production control. Both engineering PDD and process plan change requests may be generated as a result of the inspection strategy evaluation (Note: this activity is not defined. Is this a subtask?). This task (Note: refer to what?) includes the verification of the inspection information and the administration of the package and associated data. This activity (Note: refer to what?) includes determining the inspection requirements, processes and equipment to be utilized. The gaging and measurement resources are selected for the characteristics identified for inspection. This information is organized into the inspection package (Note: process plan?), verified and released for part manufacture.

F.1.44 develop inspection strategy: (Useful term, but could be deleted because it is not contained in the activity model.) Develop an approach for inspection such that inspections are done at critical points in the process and when required to verify the manufacturing process. This becomes steps in the process plan. This determines the characteristics to be inspected, the inspection methods to be used and equipment needs.

F.1.45 develop machining package(s): (Term may be deleted because it is no longer, or was never, contained in the activity model.) The summation of activities which evaluates the engineering product design data for a machined part and determines the manufacturing steps and data required to produce the part. This activity begins upon the release of the engineering PDD to the manufacturing planning department and ends with the delivery of the NC data package to production control. This task does include the verification of the NC program and the administration of the program and associated data. This activity does not include shop floor scheduling.

F.1.46 develop manufacturing process plan(s): (Term may be deleted because it is no longer, or was never, contained in the activity model.) The activities required to define the method of manufacture for a given product and the generation of the manufacturing data required to describe the manufacturing processes. This activity combines all activities into a sequence of operations that include the steps developed in sub-activities such as NC, tooling, and inspection.

F.1.47 develop NC strategy: (Term may be deleted because it is no longer, or was never, contained in the activity model.) Develop a framework or basic structure of the NC data package. This activity includes consideration of the machining approach, tool path sequences, designed machine setups, processing procedures, and cutting tool type selection. This becomes the steps to each operation specified in the planning package.

F.1.48 develop tooling package(s): (Term may be deleted because it is no longer, or was never, contained in the activity model.) The summation of activities which evaluate the design data, such as engineering PDD, for a machined part and determines the tooling requirements and associated data required to produce the part. This activity begins upon the release of the engineering PDD to the manufacturing planning department and ends with the delivery of the tooling package to production control. Both engineering PDD and process plan change requests may be generated as a result of the tooling strategy evaluation. This task includes the verification of the tooling information and the administration of the package and associated data.

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F.1.49 develop tooling strategy: (Term may be deleted because it is no longer, or was never, contained in the activity model.) Develop an approach for the tool design such that the tools are available when required to perform the manufacturing process. This becomes the steps required for each operation specified in the operation plan.

F.1.50 dimensional inspection accuracy requirement: (Term may be deleted because it is no longer, or was never, contained in the activity model.) Specification of the interval of uncertainty associated with each measurement, level of confidence on the substitute feature, and magnitudes of pass error and fail error on the inspected tolerance.

F.1.51 dimensional inspection plan: A document of detailed instructions to inspect parts using design model data as input. Contents of the document may include inspection scope, accuracy requirements, specification of appropriate dimensional measurement equipment, part set-up, step-by-step inspection instructions, and plan validation.

F.1.52 dimensional inspection planning: (Term may be deleted because it is no longer, or was never, contained in the activity model.) Activity to generate dimensional inspection plan.

F.1.53 dimensional inspection results: (Term may be deleted because it is no longer, or was never, contained in the activity model.) Measurement data, such as raw data points, compensated data points, measured lengths, or other measured dimensional results, and related data, such as labels for the measurement coordinate system and toleranced features or dimensions. Often, analysis of the measurement data takes place in the DME during the execute phase of dimensional inspection.

F.1.54 dimensional inspection standards: Standards that deal with dimensional inspection methods such as ANSI B89.3.2 Dimensional Measuring Method, and ANSI/ASQC E-2 Guide to Inspection Planning.

F.1.55 dimensional inspection systems: (Term may be deleted because it is no longer, or was never, contained in the activity model.) Dimensional measurement equipment.

F.1.56 dimensional measurement equipment (DME): A measuring system which is used to determine the conformance of a part to designed tolerances or used to provide measurement for feedback and process development. Dimensional measurement equipment can consist of measuring machines, sensors (sensor types, for example, may be defined in DMIS), and software tools with mathematical functions for calculating actual features and actual tolerances.

F.1.57 dimensions: This term is defined in ISO 219 as *a numerical value expressed in appropriate units of measurement and indicated graphically on technical drawings with lines, symbols, and notes*. Dimensions are classified according to the following types: functional dimension; nonfunctional dimension; auxiliary dimension (just for information) -??.

F.1.58 dimensions and tolerances: See *dimensions*, see *tolerance*.

F.1.59 distribute information: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The disbursement of all of the process plan package and sub-packages to the individuals responsible for their implementation and use under configuration control.

F.1.60 DME data: Data that define the functionality of the dimensional measurement equipment.

F.1.61 DME program: The part of the dimensional inspection containing the software code describing the detailed sequence of operations to be performed by automated DME.

F.1.62 DME program library: A set of commonly used software routines that may be called as part of a DME program.

F.1.63 DME, tools, and fixtures: See individual terms in this dictionary.

F.1.64 DMIS: Dimensional Measuring Interface Standard, ANSI/CAM-I 101, one type of equipment programming language standard.

F.1.65 draft inspection plan: An inspection plan developed by an inspection planner subject to change by an inspection validator.

F.1.66 engineering part design data: (Term may be deleted because it is no longer, or was never, contained in the activity model.) All data from design considered useful, such as dimensions, material used, surface finish.

F.1.67 engineering product definition data: The subset of released engineering product definition data (PDD) relevant to NC processing and a superset of change descriptions. It is assumed that the access to this information is managed by a vault function - ???. It includes engineering bill of material (EBOM), shape, interface requirements, change description, geometry model, tolerances, surface finish, material requirements, and specified stock material. The data element is cast as a control to the A0 activities because the process planner does not directly change the engineering PDD.

F.1.68 engineering PDD change request(s): (Term may be deleted because it is no longer, or was never, contained in the activity model.) A formal form used to document and control requested changes to the product definition data part of engineering PDD. A description of a change to the engineering PDD are alterations to the engineering PDD, which result in a change in the NC strategy and/or manufacturing detail plan. The description is a subset of the engineering PDD. Typically called an engineering change notice (ECN) or engineering change order (ECO). An ECN or ECO generally refers to change in form, fit, or function reflected in an engineering drawing.

F.1.69 environmental conditions: The ambient temperature, pressure, and humidity under which an inspection process is carried out.

F.1.70 equipment programming language standard: A computer language, such as DMIS, in which instructions for a computerized dimensional inspection operation may be written.

F.1.71 error source: (Useful term, but could be deleted because it is no longer, or was never, contained in the activity model.) All the parameters that may affect the results of the inspection (such as pressure, temperature, known deviation of the probe,...) so that these influences on the results could be taken into account in the execution process.

F.1.72 estimated standard hours: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The basic standard time needed to perform some manufacturing function taken as an average over the course of years with a specific piece of equipment and materials under controlled conditions.

F.1.73 evaluate: The activity whereby dimensions and other parameters of a constructed feature or profile are compared with the tolerance zones for that feature.

F.1.74 execute dimensional inspection: (Term may be deleted because it is no longer, or was never, contained in the activity model.)

F.1.75 Execute inspection(A3): The activity whereby a dimensional inspection plan is carried out by the operator and the equipment to produce dimensional inspection results, including at least raw data points and possibly some preliminary results of analysis.

F.1.76 facility ID: (Term may be deleted because it is no longer, or was never, contained in the activity model.) A unique identification of a single facility.

F.1.77 facility requirements: The information regarding the specific materials and supplies for a facility necessary for requisition.

F.1.78 Feature: The general term applied to a physical portion of a part, such as a surface, pin, tab, hole, or slot.

F.1.79 feature label: Identification of the feature being inspected.

F.1.80 fixture: A mechanical device for holding securely a part to be inspected.

F.1.81 fixture specifications or specifications of fixtures: (Term may be deleted because it is no longer, or was never, contained in the activity model.) Data that specifies fixtures to be used during inspection.

F.1.82 fixture synthesis system: A system that designs fixtures for an inspection process.

F.1.83 GD&T standards: Geometric dimensioning and tolerancing standards, such as ISO 1101, 286-1, 286-2, 8015, etc. and ANSI Y14.5.

F.1.84 generate data structures: See *data structures*.

F.1.85 generate inspection data: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The process of defining in either machine or human readable form the data needed for inspection. For machine inspection, this would be set up data and fixturing with coordinate measuring machine data. For human inspection, this would be sketches and drawings describing the features to be inspected and tools to be used with the empirical data to be used to evaluate the inspection. The control limits of inspection characteristics, inspection frequency requirements, data recording requirements are defined and control data for the inspection equipment is generated.

F.1.86 generate machine and sensor motion simulation: See individual terms in this dictionary or in *COD*.

F.1.87 generate NC machine tool data: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The creation of machine control data (MCD), additional diagrams, cutter

offset list, and any special machining instructions to the machine operator required to NC machine the part. Tool path and machining optimization is included in this activity.

F.1.88 generate output data: See individual terms in *COD*.

F.1.89 Generate support data (A25): See *support data*.

F.1.90 generate tooling data: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The activity of developing the required design data necessary for the fabrication of a tool as required by a specific manufacturing process step.

F.1.91 global inspection: Need definition.

F.1.92 global manufacturing capability: (Term may be deleted because it is no longer, or was never, contained in the activity model.) All known and available manufacturing technologies that might be used to produce a specified part.

F.1.93 human resources: The operator(s) of a dimensional inspection activity or process.

F.1.94 Identify inspection scope and accuracy requirements (A21): See *inspection scope* and *inspection accuracy requirements*.

F.1.95 input measurement parameters: See *measurement parameters*.

F.1.96 inspected part: A discrete, solid object or assembly, which has dimensional requirements in its specification, has been inspected, and has either passed or failed inspection.

F.1.97 inspection accuracy requirements: Need definition.

F.1.98 inspection data analysis systems: (Term may be deleted because it is no longer, or was never, contained in the activity model.) System which, from a collection of raw points and mathematical procedures (generally software), is to answer the question which led to the inspection process.

F.1.99 inspection data analysis package: A collection of all the necessary documents and software required to examine and verify the product for adherence to the form, fit, and function of a specific engineering design.

F.1.100 inspection knowledge: (Term may be deleted because it is no longer, or was never, contained in the activity model.) Knowledge for determining how parts should be inspected.

F.1.101 inspection method: (Term may be deleted because it is no longer, or was never, contained in the activity model.) Detailed specification about how to measure parts (e.g., determination of points to measure, specifications of process parameters, selection of data analysis algorithms).

F.1.102 inspection order: The authorization to begin the process of inspection once the scheduling requirements are met. This is a component of the manufacturing process plan. It enables the planning authorization.

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F.1.103 inspection package: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The accumulation of all the necessary information related to inspection, i.e., before, during, and after.

F.1.104 inspection package change request(s): (Term may be deleted because it is no longer, or was never, contained in the activity model.) See *change request*..

F.1.105 inspection plan: Identical to *dimensional inspection plan*.

F.1.106 inspection plan approval: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The collection of signatures necessary to authorize the inspection process.

F.1.107 inspection plan change request: (Term may be deleted because it is no longer, or was never, contained in the activity model.) A formal means, which can be electronic or hard copy, of informing the inspection planners of a need to rework the inspection plan in order to conform to a specific requirement.

F.1.108 inspection plan validator: A person or a software function that checks the validity of a draft inspection plan and makes the decision to approve, disapprove, or request changes to the draft inspection plan.

F.1.109 inspection planner: A person or a software function that uses an inspection planning system to generate inspection plans.

F.1.110 inspection planning system: A computer system used to assist an inspection planner to generate inspection plans.

F.1.111 inspection process parameter: A factor that determines how an inspection process should be performed. The process parameter can either be a machine parameter or a sensor parameter. Some examples are machine speed, measuring speed, machine operation mode, sensor orientation, sensor size, etc.

F.1.112 inspection request: The authorization to begin the process of inspection, once the scheduling requirements are met.

F.1.113 inspection results: (Term may be deleted because it is no longer, or was never, contained in the activity model.) Feature labels and their associated raw data points, associated data (e.g., labeled coordinate system), report on environmental conditions.

F.1.114 inspection scope: (Term may be deleted because it is no longer, or was never, contained in the activity model.) Specification of what tolerated features should be verified.

F.1.115 inspection sequence: The order in which surfaces and individual data points are measured during an inspection operation.

F.1.116 inspection simulation system: A system that generates simulated machine and probe motion relative to the part for verification.

F.1.117 inspection strategy: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The approach, tools, sequences, and procedures to be used in inspecting a discrete part.

F.1.118 inspection strategy change request: (Term may be deleted because it is no longer, or was never, contained in the activity model.) A formal means, that can be electronic or hard copy, of notifying the inspection department of the need for a change to one or more inspection document.

F.1.119 inspection tooling: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The collection of all interchangeable parts used on an inspection machine, e.g., fixtures, probes, and probe styli.

F.1.120 inspection type: Two types of inspection are possible: in-process inspection and final part inspection. In-process inspection includes on-machine inspection and between-workstation inspection. In-process inspection is for monitoring, correcting, and controlling manufacturing processes. Final inspection determines conformance of parts to design specification. A *global* inspection of a part can also be performed to check the completeness of all the machined features before the in-process or the final inspection.

F.1.121 inspection uncertainty requirements: The uncertainties required in the result for each measured dimensional feature taking into account the required tolerance for each feature. The uncertainty requirement is usually significantly smaller than the tolerance.

F.1.122 in-work process plan: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The process plan at any state within its development process.

F.1.123 knowledge based system

F.1.124 labeled coordinate system: Need definition.

F.1.125 list of features: See *list* in *COD* and *feature* in this dictionary.

F.1.126 list of tolerances: See *list* in *COD* and *tolerance* in this dictionary.

F.1.127 load program: *COD*.

F.1.128 machine-and-sensor motion simulation: A time sequence of the calculated positions of a probe with respect to the part, the fixtures, and other components of the dimensional measuring equipment for a draft inspection plan. The purpose of the simulation is to reveal errors in the draft inspection plan.

F.1.129 Manage dimensional inspection (A0): Activity that includes all aspects of dimensional inspection, in particular, administration, archiving, planning, execution, and analysis.

F.1.130 manufactured product: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The commodity produced as a result of one or more manufacturing operations being applied to a piece of raw material or previously produced components.

F.1.131 manufacturing knowledge: Knowledge concerning the kinds of form error - ?? that can be produced from a manufacturing process.

F.1.132 manufacturing plans: (Term may be deleted because it is no longer, or was never, contained in the activity model.) A plan for the production of manufactured products based on the order requirement. Specifies the number of units for each configuration item.

F.1.133 manufacturing process plan: All of the data on the design for a part, including related tolerances and nominals, nominal part data, design tolerances, and feature labels, as well as all of the data on how the part was manufactured, including particular machine tools and the order in which they are used.

F.1.134 manufacturing processes: (Term may be deleted because it is no longer, or was never, contained in the activity model.)

F.1.135 manufacturing processes information: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The steps and activities identified in the manufacturing process plan. One question that arises here is what level of detail of manufacturing processes should be entered as controls. It is possible to add value in designing the inspection if we know the manufacturing machine used, the tool, fixturing, speeds, feeds, and lubricants. This all helps the inspection planners decide the algorithms (including the number of points) used to fit the data.

F.1.136 material form: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The size and shape of the material stock to be used to manufacture the part based on the size, shape, and envelope of the product, such as sheet, plate, bar, casting, or forging.

F.1.137 material ID: (Term may be deleted because it is no longer, or was never, contained in the activity model.) A unique identification of a class of materials. This is not to be confused with the identification of a specific piece of material.

F.1.138 material requirements :(Term may be deleted because it is no longer, or was never, contained in the activity model.) The information regarding the specific materials and form required for the part process.

F.1.139 measure part: See *measure* in *COD*, *part* in this dictionary.

F.1.140 measurement complete status: See individual terms in *COD*.

F.1.141 measurement parameters: Parameters that describe the operation of a measuring machine, such as the probe speed or table speeds, or on a touch probe, the force required to trigger it.

F.1.142 measurement positions: Need definition.

F.1.143 measurement system capabilities: (Term may be deleted because it is no longer, or was never, contained in the activity model.) All information about the use of any dimensional measurement system available for the inspection process, including limitations resulting from the use of any particular machine such as part size capacity, speed, acceleration, machine geometry (for example, x,y,z vs. r,θ,z).

F.1.144 measuring sequence: (Term may be deleted because it is no longer, or was never, contained in the activity model.) Order of going through different part orientations; order of measuring tolerances in a specific orientation, surfaces of a tolerance, points on a surface.

F.1.145 measuring system capacity constraints: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The collective information about the physical and machine-related limitations of a measurement facility, which are necessary in the inspection planning process.

Data Examples: sizes of the parts, speed/velocity, acceleration, measurement uncertainty, probe technology, fixturing compatibility.

F.1.146 MRP (manufacturing resource planning) data: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The information managed by a manufacturing resource planning system. Manufacturing capabilities of the enterprise includes machine types, machine characteristics, machine capabilities, and process capabilities.

F.1.147 NC data package: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The NC data package contains all required information needed for the NC operator to produce the part. This includes a collection of documents sent to the shop floor that specifies machine setup, part loading, and tooling requirements as well as NC tape/file or identification.

F.1.148 NC distribution package: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The combination of the NC program, diagrams, and setup instructions necessary for the NC program to operate as designed. It may also include NC program verification run data.

F.1.149 NC package change request(s): (Term may be deleted because it is no longer, or was never, contained in the activity model.) A formal means, that can be electronic or hard copy, of notifying the NC department of the need for a change to one or more of the documents contained within the package.

F.1.150 NC strategy: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The approach, sequences, and procedures which defines the tool path motion. Consideration is given to avoiding interferences with the fixture and part features during the machining process.

F.1.151 NC strategy change request: (Term may be deleted because it is no longer, or was never, contained in the activity model.) A request to change NC strategy that results during the development of a numerical control program.

F.1.152 nominal part data (or nominals): All design dimensions and information about the form of the object to be inspected.

F.1.153 Nominals: The difference between *nominals* and nominal part data should be made clear. (If it is not possible, one of them shall be suppressed.)

F.1.154 obtain approvals: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The process of gaining approval from the appropriate responsible organizations to insure that the process plan meets the design requirements and is capable of being performed on the shop floor as described.

F.1.155 ordered list of processes: (Term may be deleted because it is no longer, or was never, contained in the activity model.) A specified sequence of activities that transform the raw material into the manufactured product.

F.1.156 Part:: A discrete, solid object or assembly, having dimensional requirements in its specification that is to be inspected.

F.1.157 part orientation(s): The orientation(s) of the part with respect to the dimensional measuring equipment. Each orientation is often chosen to optimize the number of features that can be measured.

F.1.158 part ready status: *COD*.

F.1.159 Perform analysis of inspection(A4): The activity whereby the measured raw data points resulting from the *execute inspection* activity serve as input for the description of features and the calculation of dimensions and parameters, which are then compared with dimensional tolerances.

F.1.160 perform calibration and qualification: See *qualification* in this dictionary, *calibration* in *COD*.

F.1.161 perform dimensional inspection:" (Term may be deleted because it is no longer, or was never, contained in the activity model.)

F.1.162 perform dimensional inspection planning: (Term may be deleted because it is no longer, or was never, contained in the activity model.)

F.1.163 Perform inspection administration and archiving (A1): See *archiving* in this dictionary and *COD* for the other terms.

F.1.164 Perform inspection planning(A2): The activity that provides a dimensional inspection plan, which includes a DME program for automated dimensional measuring equipment.

F.1.165 perform manufacturing administration: (Term may be deleted because it is no longer, or was never, contained in the activity model.) This activity is concerned with developing and monitoring the methods or procedures that will support management of manufacturing the product. In particular it is responsible for ensuring that there is a viable approval, policies and procedures and contractual obligations are followed for the product order.

F.1.166 perform manufacturing planning: (Term may be deleted because it is no longer, or was never, contained in the activity model.) This activity is concerned with developing and monitoring the methods or procedures that will support manufacturing of the product. In particular it is responsible for ensuring that there is a viable source for making the part and obtaining a commitment to make the part from that source.

F.1.167 perform production manufacturing: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The activities necessary to plan, provision, and produce components. Incorporated within this activity are the sub-activities of: planning for manufacture, establishing budgets and schedules, creating production plans, providing production resources, producing materials; and producing the product.

F.1.168 permission to commence inspection task: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The collection of signatures necessary to authorize an inspection task authorized by an inspection task approval.

F.1.169 plan approval: A flag output from the inspection planning operation indicating that the inspection plan has been validated and may now be executed and archived.

F.1.170 planning authorization: (Term may be deleted because it is no longer, or was never, contained in the activity model.) A contract required and/or internal enterprise required document approving the manufacturing function to begin the manufacturing planning function.

F.1.171 planning change request: (Term may be deleted because it is no longer, or was never, contained in the activity model.) A formal method of documenting and controlling requested changes to the process plan per the manufacturing detail plan.

F.1.172 planning constraints: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The enterprise specific policies and procedures, including other influences such as costs, priorities, etc., that are placed on the manufacturing planning process.

F.1.173 policies and procedures: Enterprise specific guidelines established to enforce customer or company requirements. The requirements often reflect corporate goals and objectives. This includes documentation standards, programming efficiency rules, release procedures, and other company specific factors.

F.1.174 prepare part for inspection: *COD*.

F.1.175 process data: (Term may be deleted because it is no longer, or was never, contained in the activity model.) Enterprise specific and standard data necessary to influence the process selection for manufacturing a part.

F.1.176 process notes : (Term may be deleted because it is no longer, or was never, contained in the activity model.) A narrative description that adds meaning or clarity to the specified process identified in the manufacturing plan.

F.1.177 process parameters: Need definition.

F.1.178 process plan change disposition: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The current status of a pending process change, such as in-process or released.

F.1.179 process plan change request: (Term may be deleted because it is no longer, or was never, contained in the activity model.) A formal written request for a modification to the existing process plan. This written request is normally tracked and under configuration control.

F.1.180 product model: An information model for a part containing all the data needed to describe its dimensions and tolerances.

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F.1.181 product order: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The initial documentation necessary to start a project requiring the manufacture of a piece part. A request from either an enterprise internal or external person or organization requesting manufacture and/or design of a particular product.

F.1.182 program loaded status: *COD*.

F.1.183 program manager's decision: (Term may be deleted because it is no longer, or was never, contained in the activity model.) Decisions on technical direction based on program directives.

F.1.184 programming efficiency rules: (Term may be deleted because it is no longer, or was never, contained in the activity model.) General programming and machining rules for effective NC program generation, where the cutter contact with the part is maximized and other cost proven machining steps are used.

F.1.185 purchased equipment: See individual terms in *COD*.

F.1.186 Qualification: A series of measurements to test the proper operation of a piece of dimensional measurement equipment or one of its components, independent of the operations of testing or changing the scale calibration .

F.1.187 raw data points: The collection of numbers resulting from the *execute inspection* activity.

F.1.188 raw material: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The material transformed, such as the input shape, physical or chemical properties, in the manufacture of the product. This typically includes bar stock, billets, and make-from castings. This does not include such things as operational supplies, such as cutting oils, degreasers, and other shop floor consumables.

F.1.189 regulations and policies: Rules to regulate the inspection plan validation and approval process.

F.1.190 related tolerance: Maybe not necessary. What was meant here was that a tolerance is always associated with a feature or dimension; therefore, there has to be a pointer to that.

F.1.191 related tolerances and nominals: See individual terms in this dictionary.

F.1.192 release and control inspection package: (Useful term, but could be deleted because it is not contained in the activity model.) The process of cataloging and making generally available the formal inspection process data. The activity of releasing, controlling and distributing the inspection data package to support part manufacture.

F.1.193 release and control NC package (Term may be deleted because it is no longer, or was never, contained in the activity model.) The process of releasing, controlling and distributing an NC data package within an enterprise. This includes the modification of the data package to include any enterprise specific configuration control data. Either manual and/or automated, such as direct numerical control (DNC) control systems may be used to accomplish this task.

F.1.194 release and control tooling package: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The process of releasing and controlling a tooling distribution package within an enterprise. This includes the modification of the distribution package to include all necessary configuration data.

F.1.195 report of environmental condition: A record of ambient temperature, pressure, and humidity, as well as part and machine temperatures, date, and time, and other related factors. Also, a document containing all appropriate statements about the environmental conditions.

F.1.196 Requisitions: An authorization that can be manual or electronic, for specific materials and/or supplies to be obtained either from a parts vendor or the stockroom in a specified quantity at a certain time.

F.1.197 resource requests: A formal petition that can be manual or electronic, stating the needs and/or wants for machines, materials, or supplies required to perform a specific manufacturing function.

F.1.198 results from execution: The collective output from the execution of dimensional inspection that includes specifically setup results, a report of environmental conditions, feature labels, and raw data points.

F.1.199 retrieve identified tooling and sensors : *COD*.

F.1.200 retrieve product model: Action of reading or inputting the engineering product definition data for a part.

F.1.201 schedules and budgets: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The timetables for delivery of material and the availability of machines along with the cost of buying the material and the cost of running the desired machines. Also included are the costs for facilities and labor.

F.1.202 select data analysis functions: *See data analysis functions.*

F.1.203 select DME, tools, and fixtures: *See individual terms.*

F.1.204 select DME, tools, fixtures, and functions: *See individual terms.*

F.1.205 select equipment: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The identification of individual items of equipment required to manufacture the product through the specification of an enterprise specific reference number. This selection process is constrained by the previously selected manufacturing facility and by the current material properties or characteristics. This activity will include the selection of both manufacturing NC machines and inspection machines as dictated by the manufacturing. This equipment is typically in a fixed location within the facility. The selection process will utilize any available MRP equipment capability, such as machine type, horsepower, or envelope size.

F.1.206 select facility (Term may be deleted because it is no longer, or was never, contained in the activity model.) The identification of an enterprise's specific manufacturing site or sites that will be used in the manufacture of the subject product. This selection will be made based on consideration of business or economic factors and site-specific or unique manufacturing capabilities. The result of this selection

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process will be an enterprise specific facility or building identification reference. This activity does not include the determination of any sub-contracting requirements, such as, using a vendor's facility, but it does include the identification, in the form of a requisition, of any facility upgrade in current or new manufacturing capability.

F.1.207 select features for global inspection: See *feature* and *global inspection*.

F.1.208 select process(es): (Term may be deleted because it is no longer, or was never, contained in the activity model.) Selection of the appropriate machining, inspection, and/or tooling processes required to completely manufacture the product as defined by the engineering PDD and constrained by the in-process shape/feature definitions. Processing details, associated resources, and other descriptive information will be provided on an operation by operation basis. This selection activity will identify primary and alternate processes, and will utilize any available MRP process oriented databases.

F.1.209 select raw materials: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The identification of the specific raw materials or make-from component, on which the manufacturing processing is initiated. This selection process will consider shape/size requirements, physical/chemical properties and economic factors. Availability will only be considered on an order of magnitude scale since production scheduling is not involved. The specification of material will be in the form of an enterprise specific or commercially accepted reference number. The selection process will utilize, if available, any MRP material databases. Requisitions will be initiated only for unique or special material requirements which cannot be acquired during normal production lead times.

F.1.210 select resource(s): (Term may be deleted because it is no longer, or was never, contained in the activity model.) The identification of goods and services required to manufacture the product. This function provides the following resource areas: facilities to house the production process and support services; equipment to transform the material into products; cutting tools, jigs, fixtures, and gages. This may include both existing and to-be-acquired resources. Site-specific MRP resource databases, such as the tool crib inventory, material stores, process knowledge-bases, etc., are accessed or consulted during the selection process. A resource requisition may be initiated if necessary. This requisition will reference sufficient technical information to acquire the resource from either external procurement or internal inventory sources.

F.1.211 select sensors: See *sensor*.

F.1.212 select tolerances to be inspected See *tolerance*.

F.1.213 select tooling: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The identification of individual tools, jigs, fixtures and gages required in the manufacturing of a product through the specification of a recognizable reference number. The selection process will utilize, if available, any MRP databases. Requisitions will be initiated for commercially available tooling as necessary.

F.1.214 selected data analysis functions: See *data analysis functions*.

F.1.215 selected DME: The measuring machine(s), sensor(s), and data analysis function(s) that are chosen by the inspection planner for dimensional inspection of parts.

F.1.216 selected features: See *feature*.

F.1.217 selected illustration ID: (Term may be deleted because it is no longer, or was never, contained in the activity model.) A unique identification of the pictorial representation used to explicitly define the operation, such as fixturing, part loading, machine setup, in-process shape/feature, for the specified process.

F.1.218 selected resources: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The machine, tooling, and human skill level identified to perform the required process or operation.

F.1.219 selected shapes, features & attributes: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The representation form chosen for the part that will be the product of the process plan.

F.1.220 selected tolerance: Tolerance that is selected by the inspection planner as needing to be inspected.

F.1.221 selected tolerances and associated features: See *selected tolerance* and *feature*.

F.1.222 selections of DME, tools, and fixtures: See individual terms.

F.1.223 Selections of DME, tools, fixtures, and functions (A23): See individual terms.

F.1.224 selections of sensors: See *sensor*.

F.1.225 Sensor: A device used in inspection to collect dimensional information for a part. Sensors include (but are not limited to) the following device types: touch-trigger probe, analog contact probe, laser probe, vision (video sensing) system and capacitance probe.

F.1.226 sensor calibration data: The dimensional information describing a sensor calibration artifact such as coordinate systems (Note: This is an artifact?), sphere diameter, and other information depending on the sensor technology. This control may not be required for all dimensional measurement systems.

F.1.227 sensor configuration: The description of a specific sensor or a combination of sensors required to accomplish a dimensional inspection task.

F.1.228 sequence operations: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The ordering and integration of the identified detailed operations required to manufacture the product. This activity includes the consolidation of material processing operations, inspection and tooling plans into the process plan which will be utilized by all manufacturing disciplines.

F.1.229 Setup: The actual configuration of a part to be inspected, the fixtures to hold it, and the chosen orientation of this assembly with respect to the dimensional measuring equipment.

F.1.230 setup complete status: Assertion that states that the setup has been completed and that the system is ready for the next step.

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F.1.231 setup for inspection: The activity of preparing a measuring instrument or DME to perform dimensional inspection. The activity may include retrieving sensors, fixturing the part, fixturing a standard part, and calibrating the instrument..

F.1.232 setup results : The results of measurement checks of the part and sensor setup on the DME as well as the results of recalibration of the DME.

F.1.233 software tools: Software codes, usually commercially available, for enabling all aspects of the dimensional inspection operation.

F.1.234 software tools for administration: See *software tools* in this dictionary and *administration* in *COD*.

F.1.235 software tools for analysis: See *software tools* and *perform analysis of inspection*.

F.1.236 software tools for execution: See *software tools* and *execute inspection*.

F.1.237 software tools for planning: See *software tools* and *perform inspection planning*.

F.1.238 Specifications: See *COD*.

F.1.239 specifications of DME, tools, and fixtures: See individual terms.

F.1.240 specifications of special required resources: Special information output from the inspection planning function requesting hardware or software resources from the administration function, which are not currently available in the database of resources for the planning function.

F.1.241 specify inspection plan: See *specify* in *COD* and *dimensional inspection plan* in this dictionary.

F.1.242 specify uncertainty requirements: standard tooling. Any tooling that can be purchased from a tooling vendor, such as perishable tools and conventional fixtures.

F.1.243 Standards: *COD*.

F.1.244 standards, policies and procedures: See *standards* in *COD* and *policies and procedures* in this dictionary.

F.1.245 statistical results: *COD*.

F.1.246 statistics software: Software tools used to perform statistical calculations.

F.1.247 status : *status* is an assertion that states that a specified activity (X) has been completed and that the system is ready for the next step.

F.1.248 stores availability: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The resources ready for immediate use which are kept in stock so they do not need to be ordered from suppliers everyday.

F.1.249 substitute feature: An ideal geometric feature (such as a circle, cylinder, plane, cone) or a mathematically defined surface or contour to which the measurement data is fit and which may be used to replace that actual measurement data in subsequent operations. (*Note:* Creation of a coordinate system, evaluation of a tolerance.)

F.1.250 support data: A general term for specifications of fixtures, probes and probe accessories, clamps, machines and other resources needed for inspection.

F.1.251 support document guidelines: Rules, policies and procedures that guide inspection planners to generate support data.

F.1.252 synthesize plan: *COD*.

F.1.253 tolerance (or design tolerance): The permitted variation of dimension or other geometrical parameter. Operationally, it is a data structure specifying a tolerance type, tolerance value, applicable tolerance modifiers (material condition, projected zone, etc.), the tolerated feature (either composite feature or simple feature) and, for certain tolerance types, the datum reference frame. (*Note:* Check elsewhere for additional information.)

F.1.254 tolerance extractor: A mechanism that examines the design and pulls out tolerances and their underlying features from a STEP model of a part.

F.1.255 Tool: Usually a hardware accessory for performing dimensional inspection such as a probe, a sensor, or an adaptor. Tools are understood to be hardware unless the word *software* is included.

F.1.256 Tooling: General term synonymous with either *tool*, singular, or *tools*, plural.

F.1.257 tooling data package: (Term may be deleted because it is no longer, or was never, contained in the activity model.) A set of specifications and documents required to describe or specify the manufacture and assembly of the cutters, fixtures, and jigs necessary to the manufacture a specified product.

F.1.258 tooling ID: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The unique identification of a specific occurrence of a cutter, fixture or jig.

F.1.259 tooling in place status: See *status* and *tooling* in this dictionary.

F.1.260 tooling order: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The authorization and requirement for the issuance of a tool number and version for the control of an NC data package.

F.1.261 tooling package: (Term may be deleted because it is no longer, or was never, contained in the activity model.) A collection of the forms and documents necessary to describe the design and manufacturing and/or requisition of the cutters, jigs, and fixtures necessary to process the design.

F.1.262 tooling package change request(s): (Term may be deleted because it is no longer, or was never, contained in the activity model.) A formal method of documenting and controlling requested changes to the tooling.

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F.1.263 tooling request: (Term may be deleted because it is no longer, or was never, contained in the activity model.) A formal procedure of petitioning for a specific cutter, fixture, or jig to be used within the manufacturing process of a product.

F.1.264 tooling requirements: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The criteria for standard tooling, perishable tools, designed tooling, or special tooling, which are necessary for each setup.

F.1.265 tooling strategy: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The approach, sequence, and procedures which defines the tooling requirements.

F.1.266 tooling strategy change request: (Term may be deleted because it is no longer, or was never, contained in the activity model.) A formal procedure of petitioning for a specific strategy for standard tooling, perishable tools and special purpose tooling required for production.

F.1.267 validate and approve the inspection plan: The iterative process of debugging and simulating the inspection plan in order to test its function and correctness and the subsequent act of approving the inspection plan for use.

F.1.268 validate and approve manufacturing process plan: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The compilation of the process plan data into an interpretable and distributable form. All components of the process plan, such as tooling package, inspection package, NC distribution package, are identified and accumulated. This activity includes the identification of sub-references, such as Inspection Plan XXX, paragraph Visual Workmanship Standards and standard process plans.

F.1.269 validate manufacturing plan(s): (Term may be deleted because it is no longer, or was never, contained in the activity model.) The process of combining and checking consistency and flow of processes and resources to produce a process plan. Organize and consolidate the planning information into the enterprise specific forms.

F.1.270 validated manufacturing plan: (Term may be deleted because it is no longer, or was never, contained in the activity model.) A package of documents made up of individual plans that have been assured of their accuracy via checking, production of a sample part, or other means.

F.1.271 verify inspection package: See *validate and approve the inspection plan*. The process of validating the human or machine readable data to be used in the inspection process; the evaluation of the inspection package by reviewing the data and trying out the control data for inspection equipment. - ??
The inspection package approval requirements are determined, the appropriate approvals are acquired and approval disposition is monitored for change requests.

F.1.272 verify NC data package: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The evaluation of the NC program and associated data by testing or trying out the program. This activity can include both on-machine program validation for cutter path checking and off-line techniques such as workstation program validation. Approval steps of the package are followed and the package is forwarded to the release and control activity.

F.1.273 verify tooling package: (Term may be deleted because it is no longer, or was never, contained in the activity model.) Formal review of the tool design data to ensure its content and context. In some cases this may require the signature of the responsible engineering authority.

F.1.274 work center requirements: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The criteria for specific workstations, shopfloor, tooling storage area, and environmental conditions necessary to operate the work center.

F.1.275 work holding specifications: The description of specific models of fixtures, their positions, the associated clamps and fasteners, and their positions and orientations required for holding the part in the chosen orientation(s). *Alternate definition:* Data that specify how a part is clamped on a machine table. Data include specifications of clamping devices, clamping method to be used during inspection, clamping configurations, the sequence of clamping configurations, etc.

F.1.276 workstation ID: (Term may be deleted because it is no longer, or was never, contained in the activity model.) The unique identification of a specific location where work is performed.

F.2 Application activity model diagrams

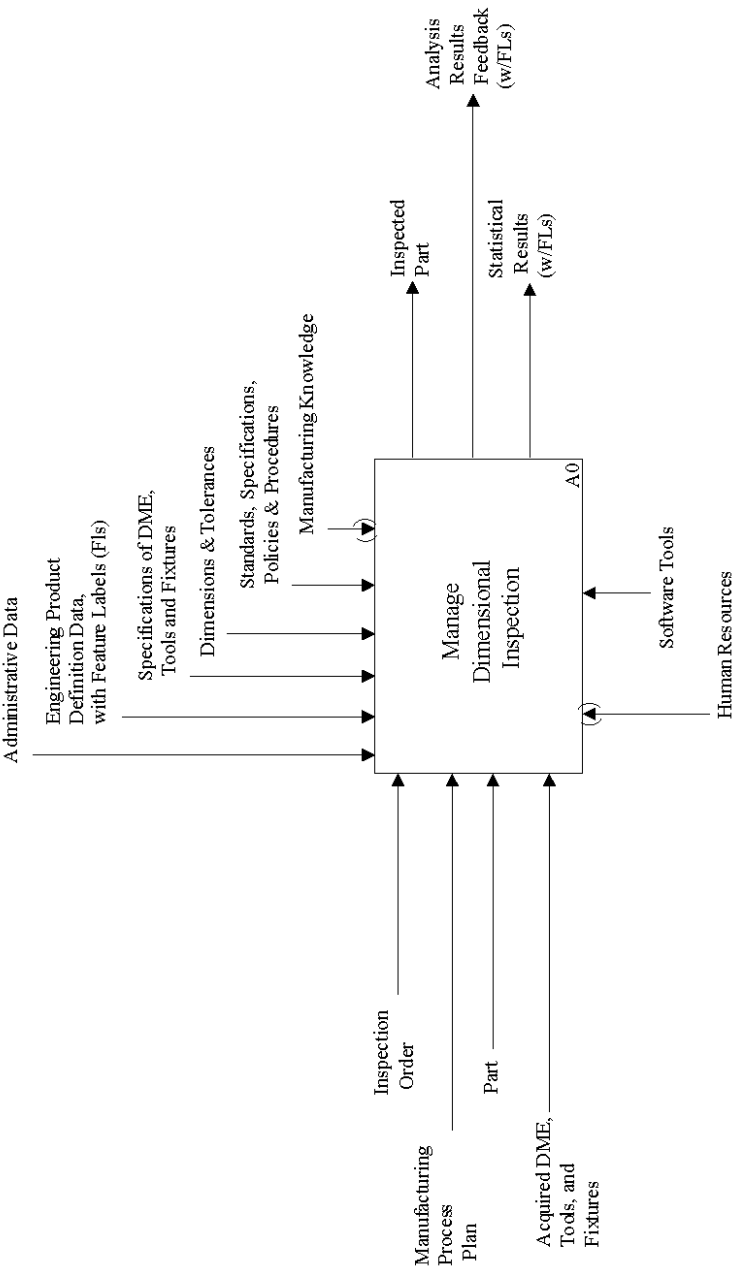


Figure F.2 - A0 Manage Dimensional Inspection

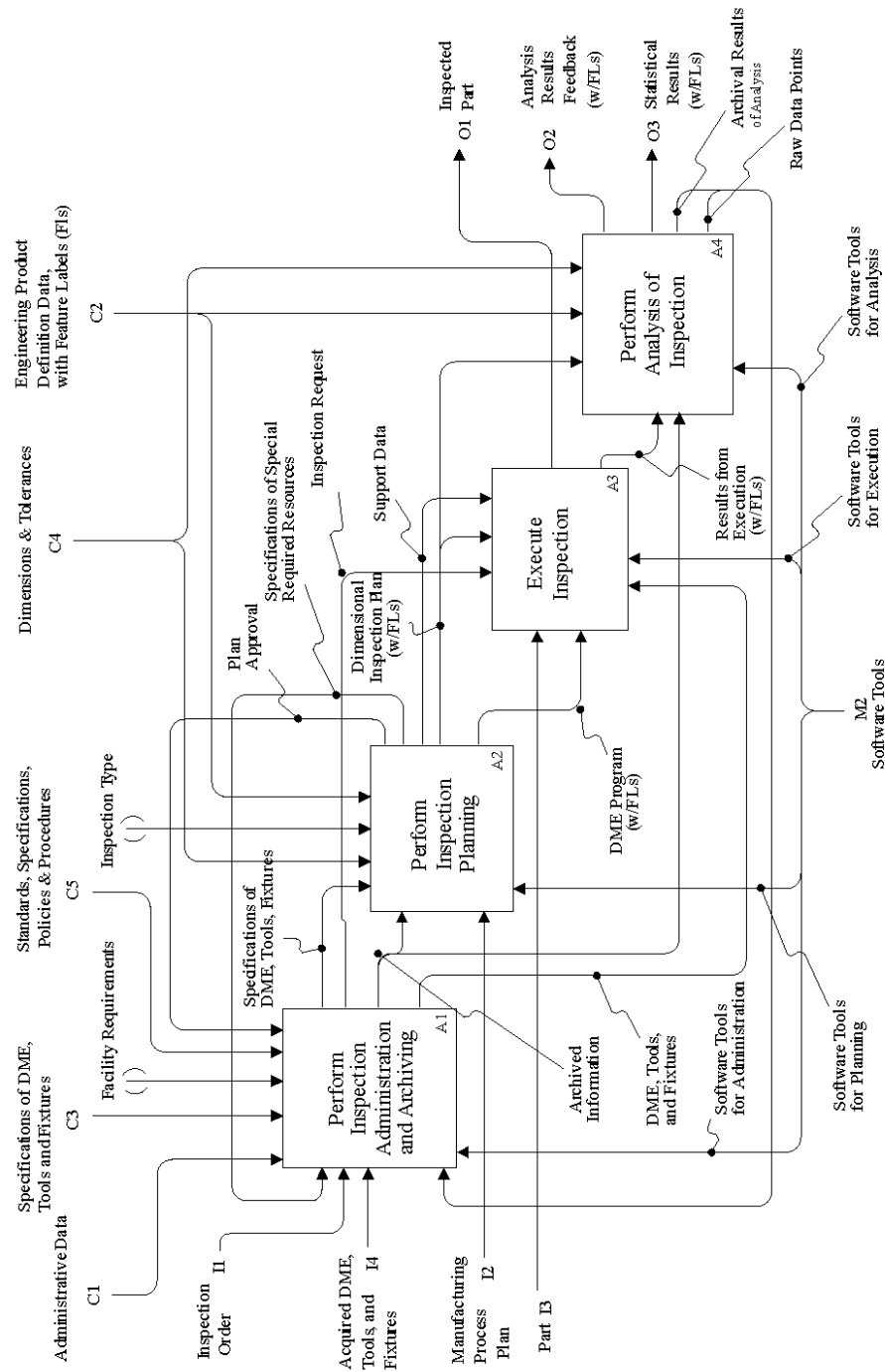


Figure F.3 - A0 Manage Dimensional Inspection

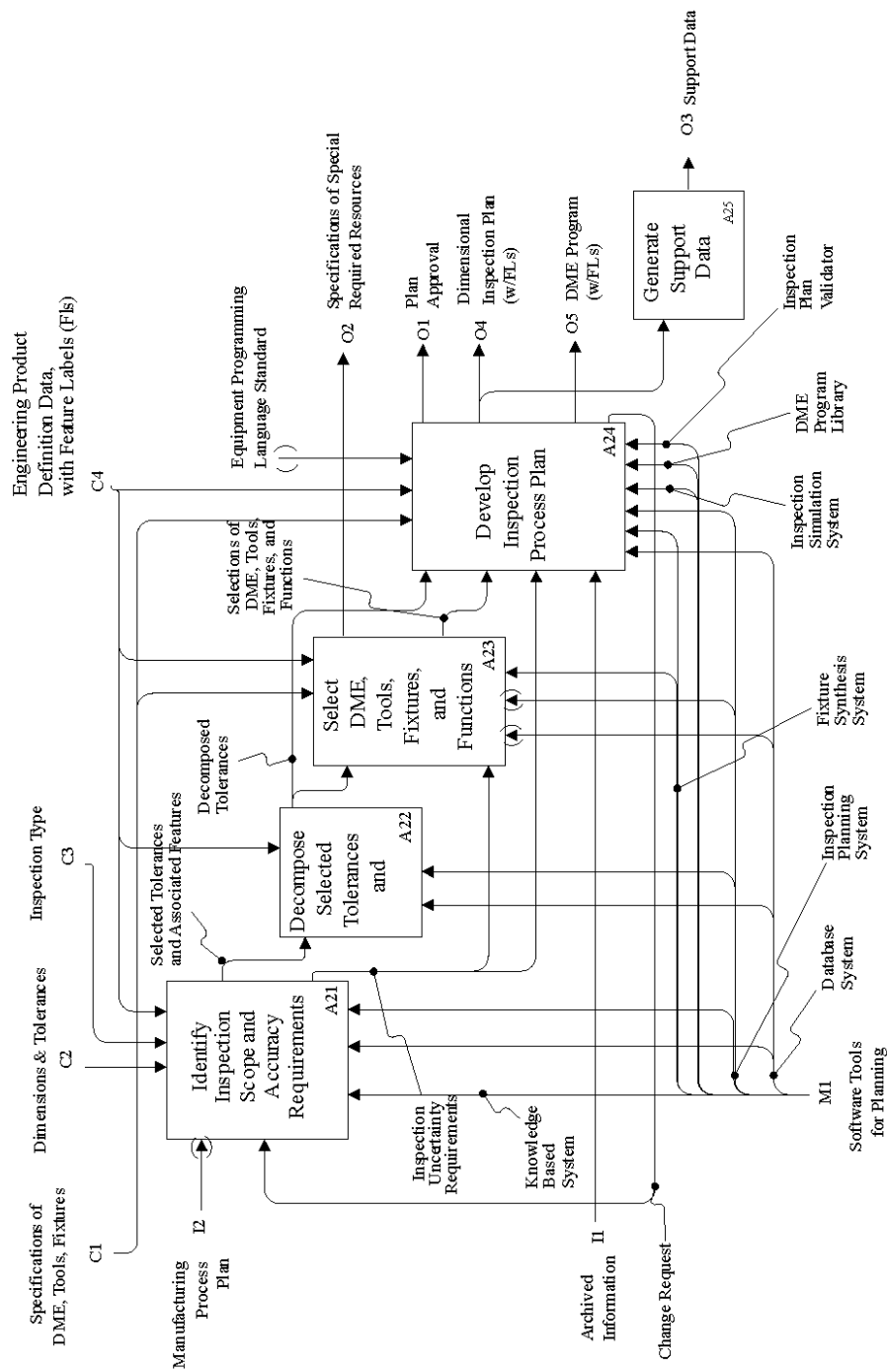


Figure F.4 - A2 Perform Inspection Planning

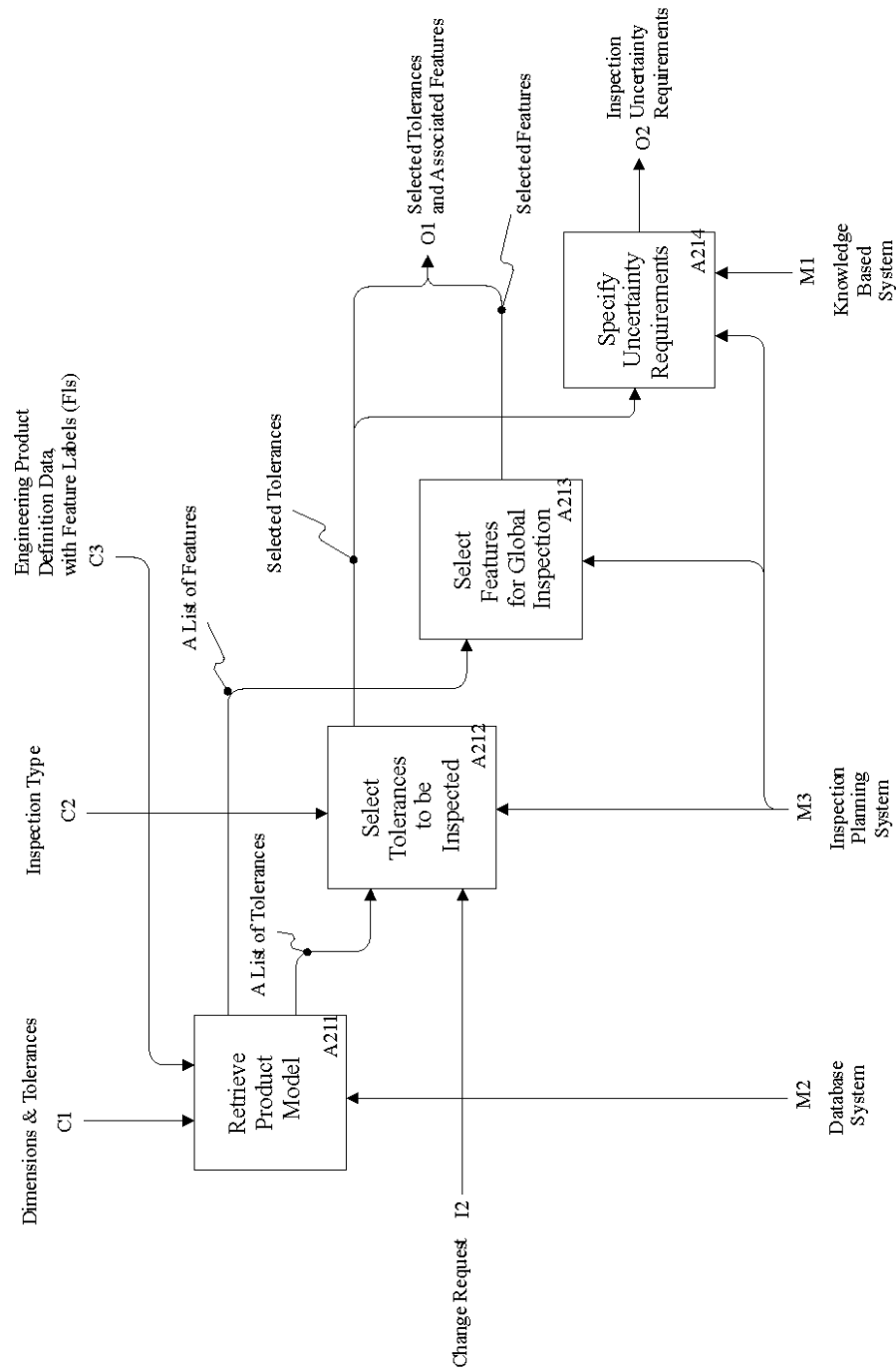


Figure F.5 - A21 Identify Inspection Scope and Accuracy Requirements

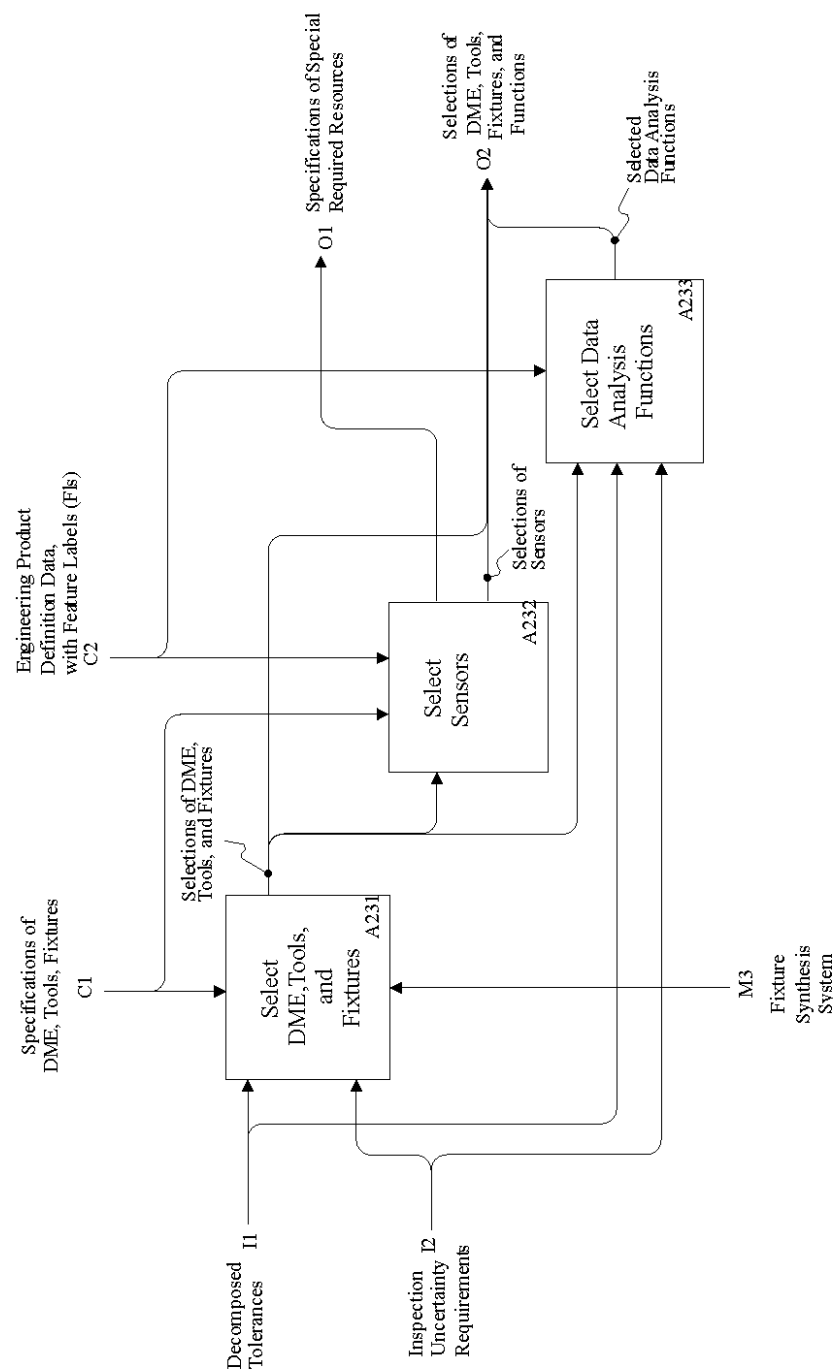


Figure F.6 - A23 Select DME, Tools, Fixtures and Functions

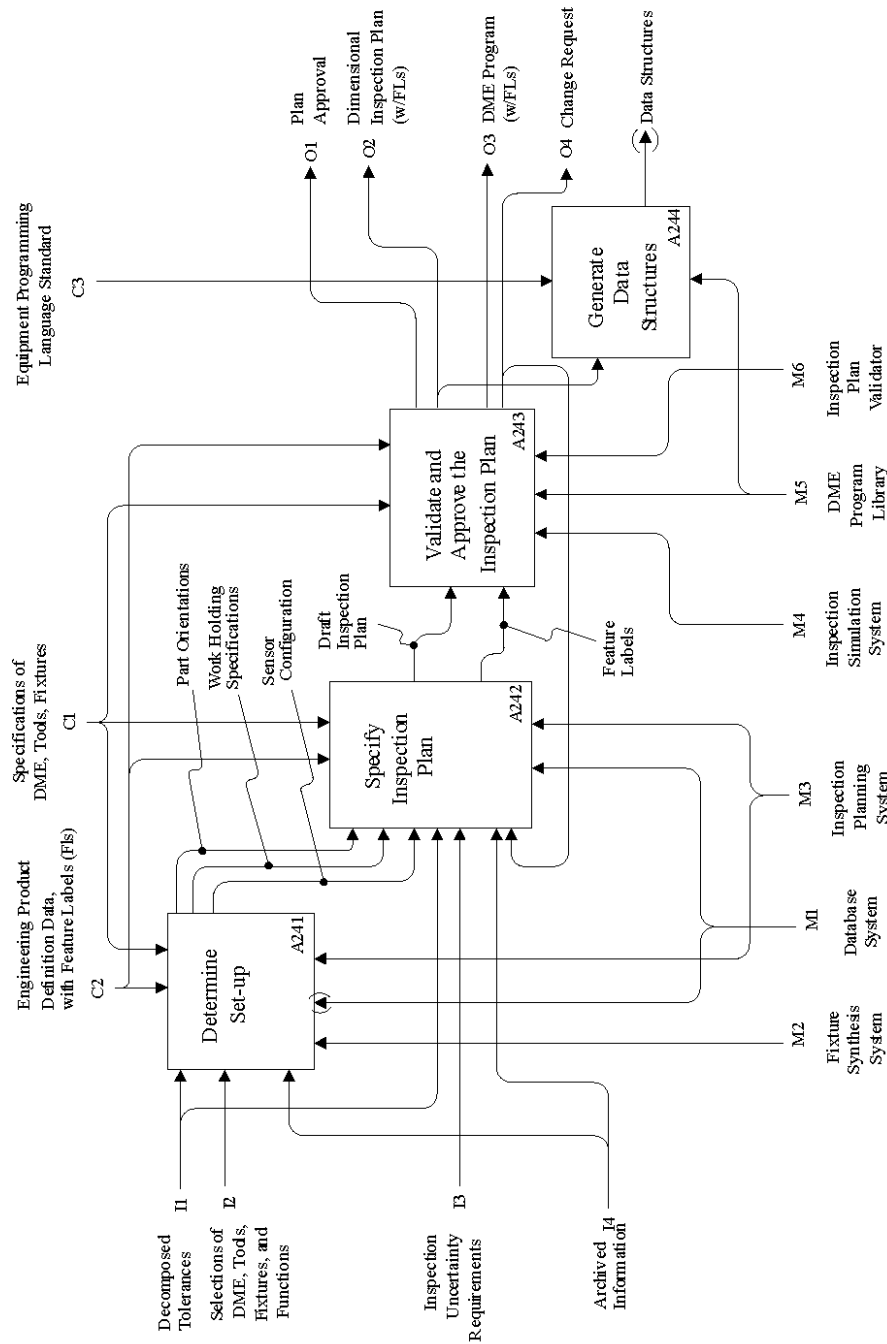


Figure F.7 - A24 Develop Inspection Process Plan

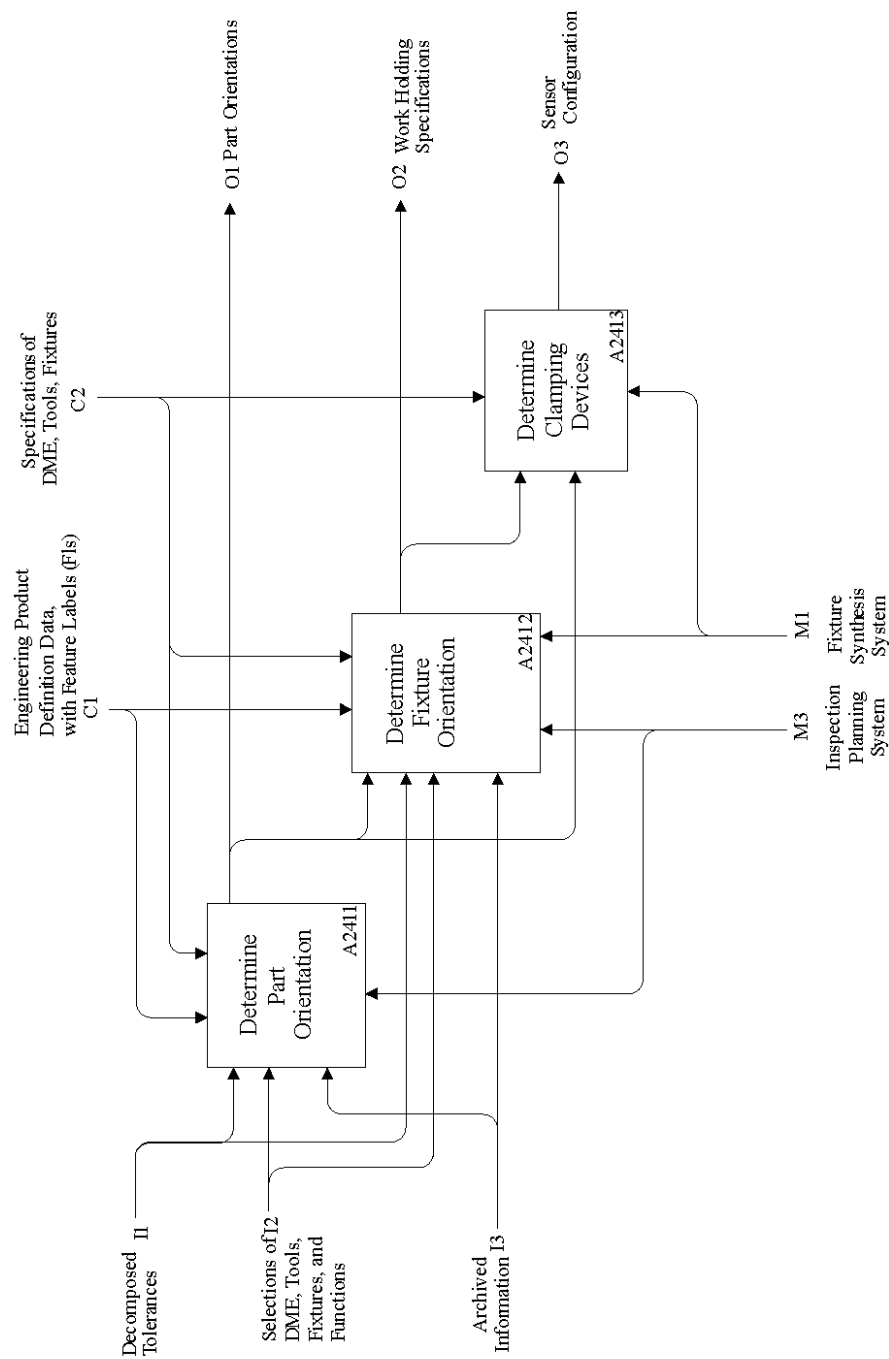


Figure F.8 - A241 Determine Setup

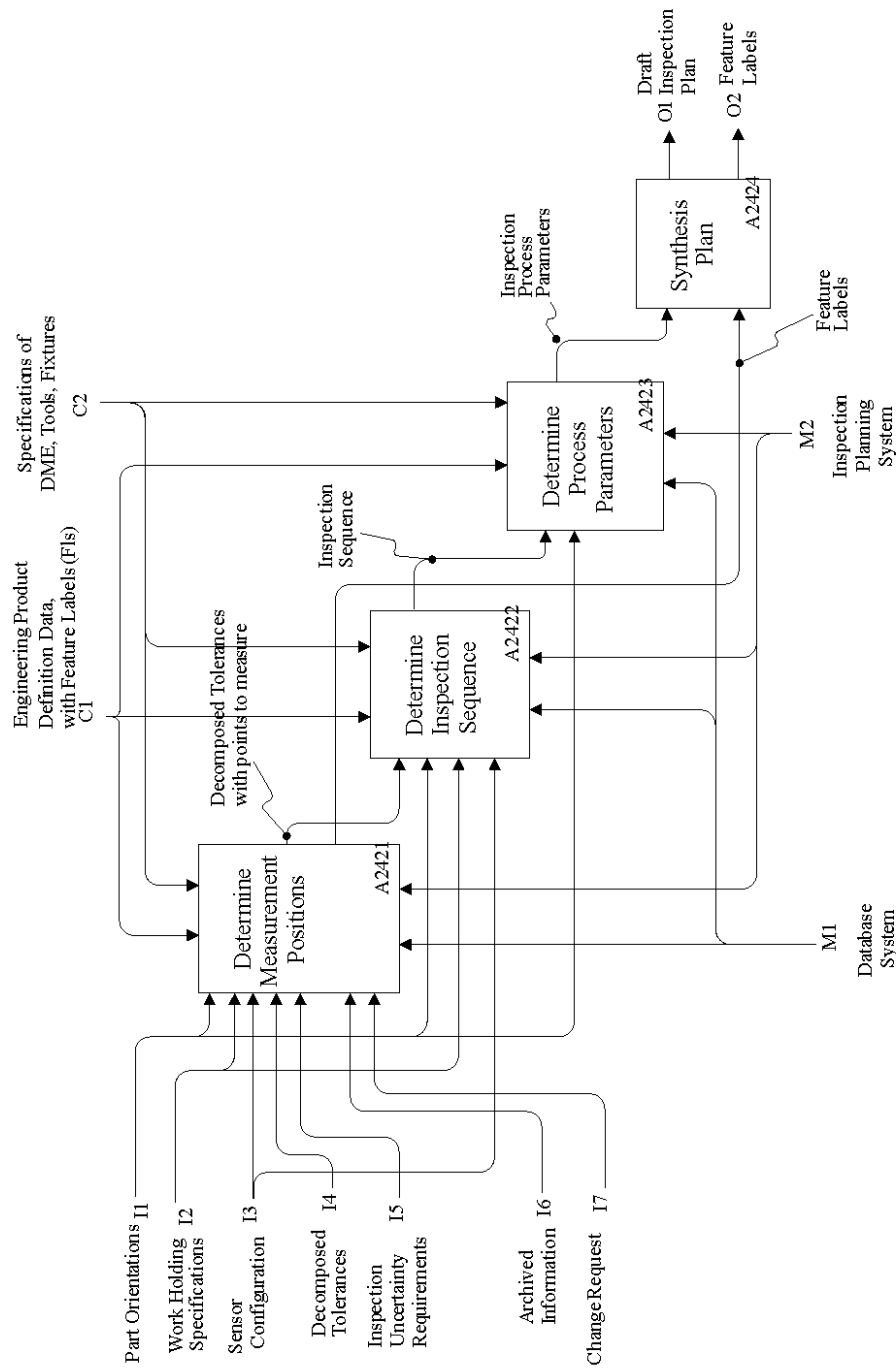


Figure F.9 - A242 Specify Inspection Plan

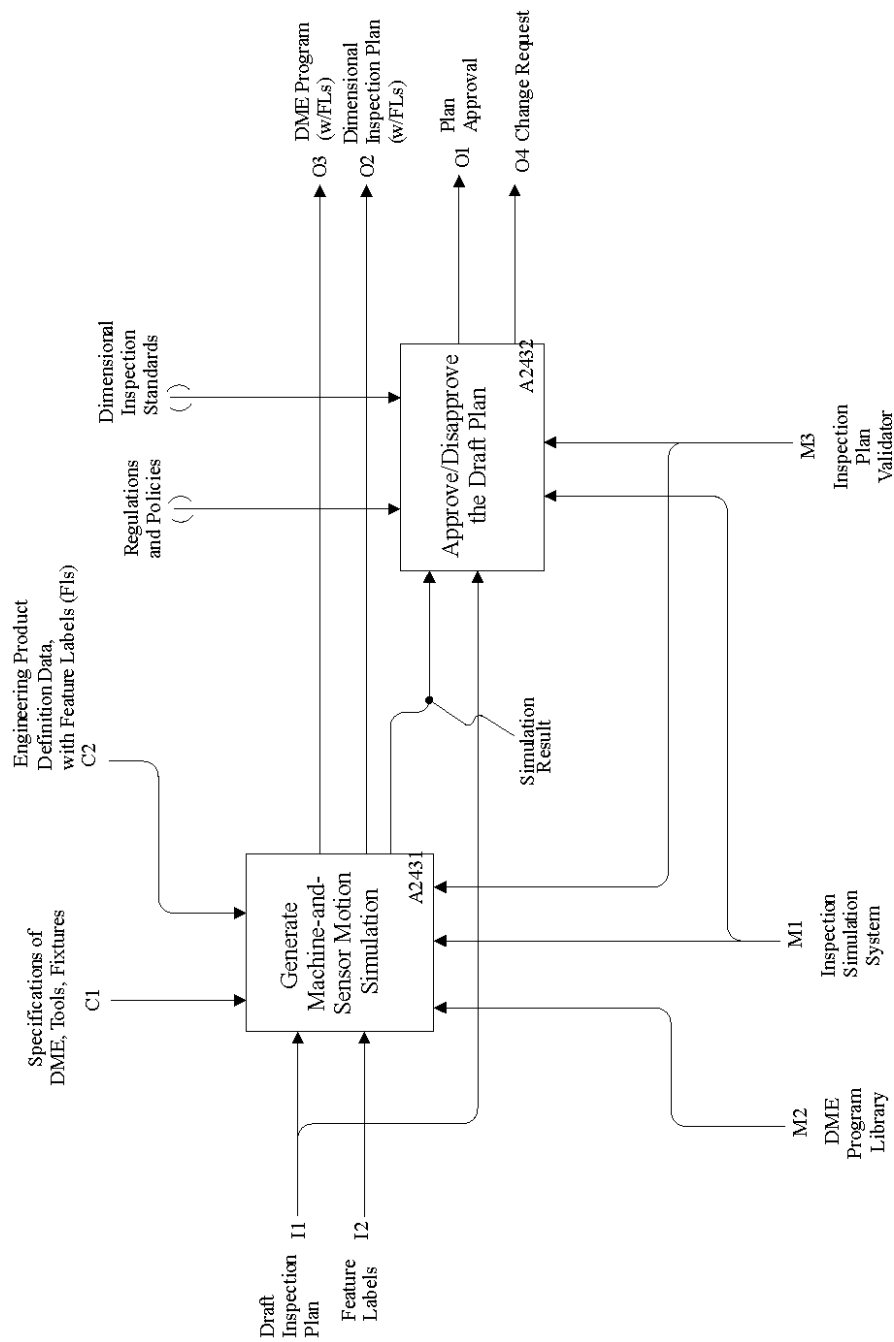


Figure F.10 - A243 Validate and Approve the Inspection Plan

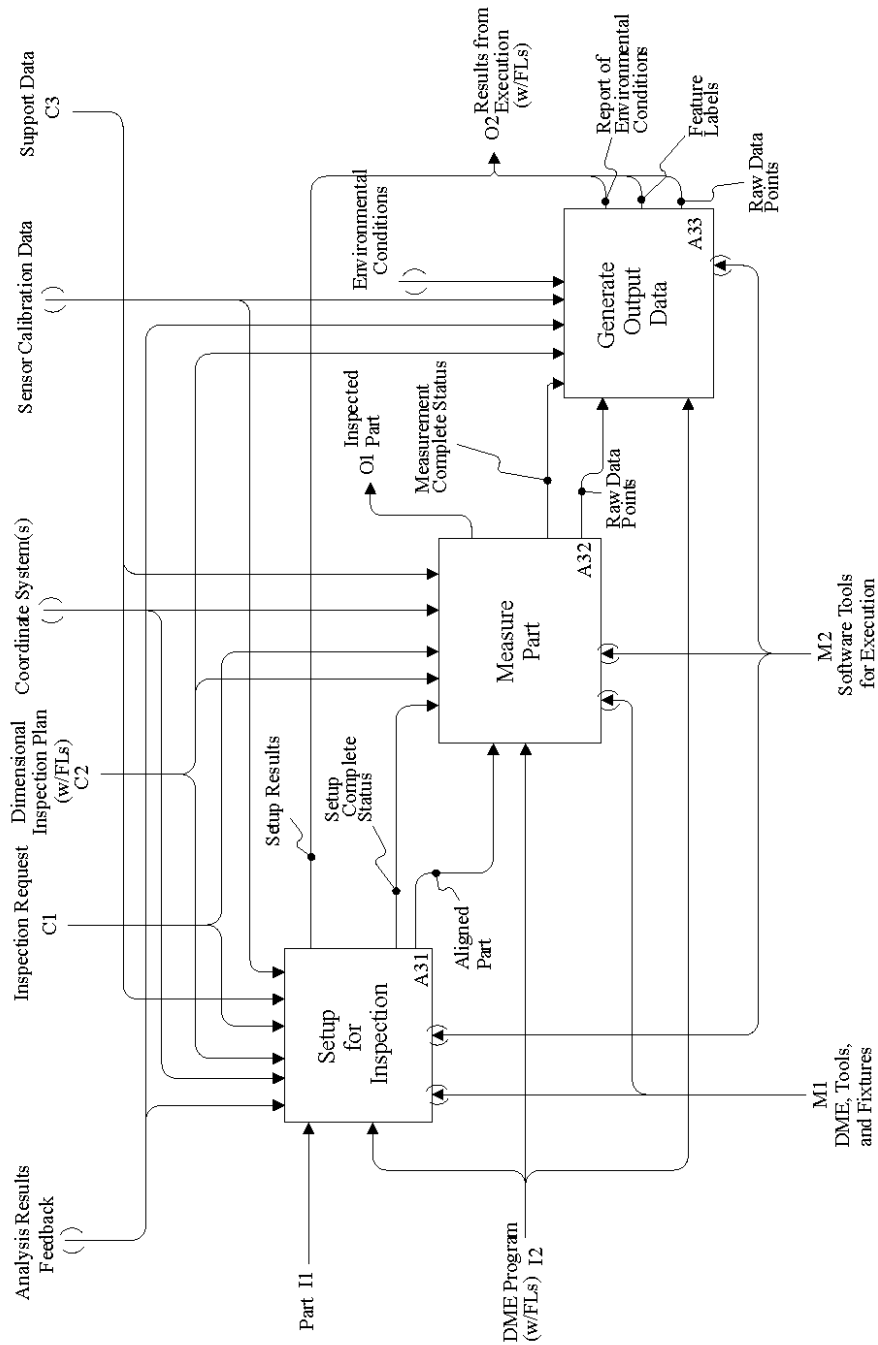


Figure F.11 - A3 Execute Inspection

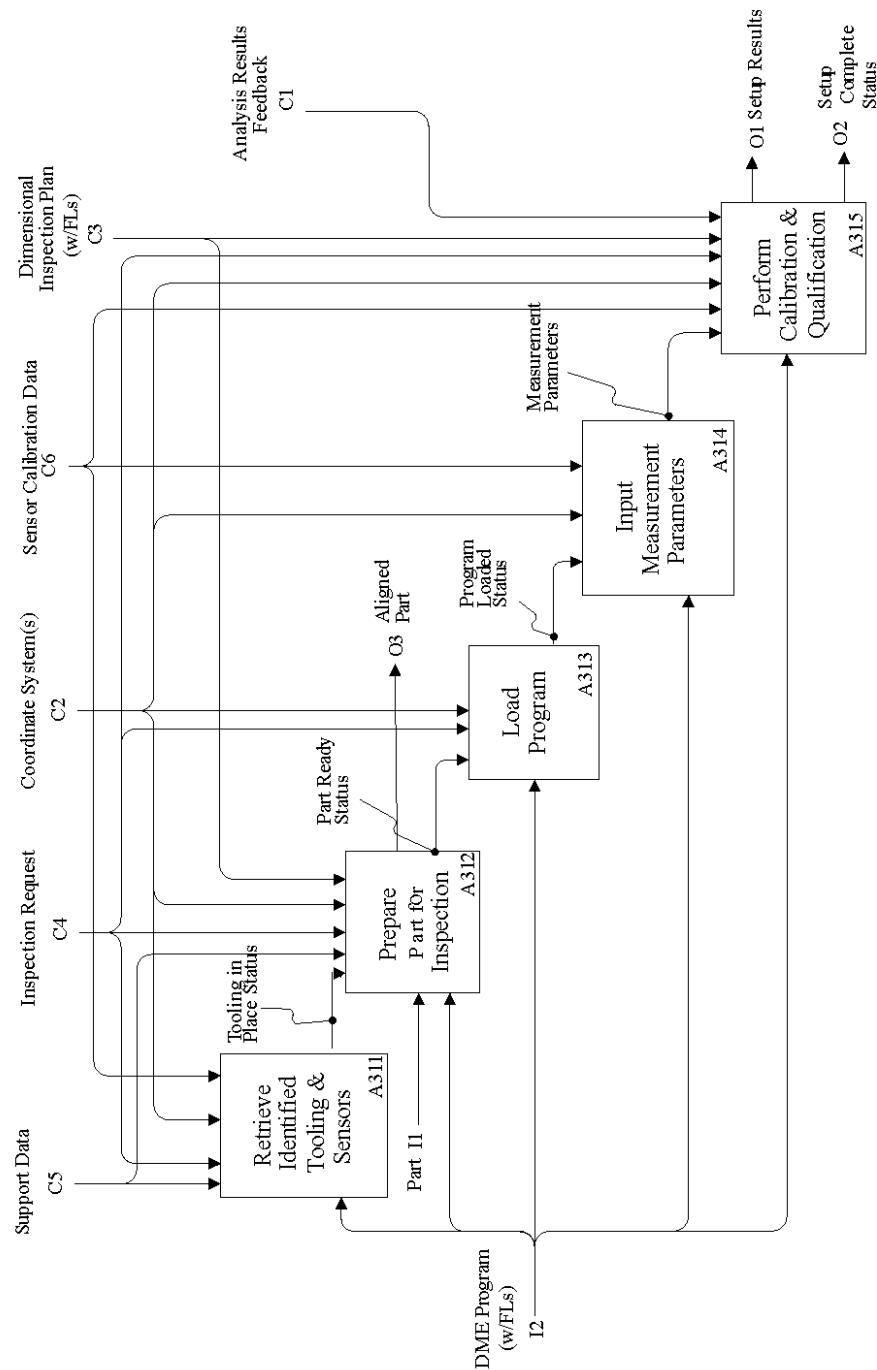


Figure F.12 - A31 Setup for Inspection

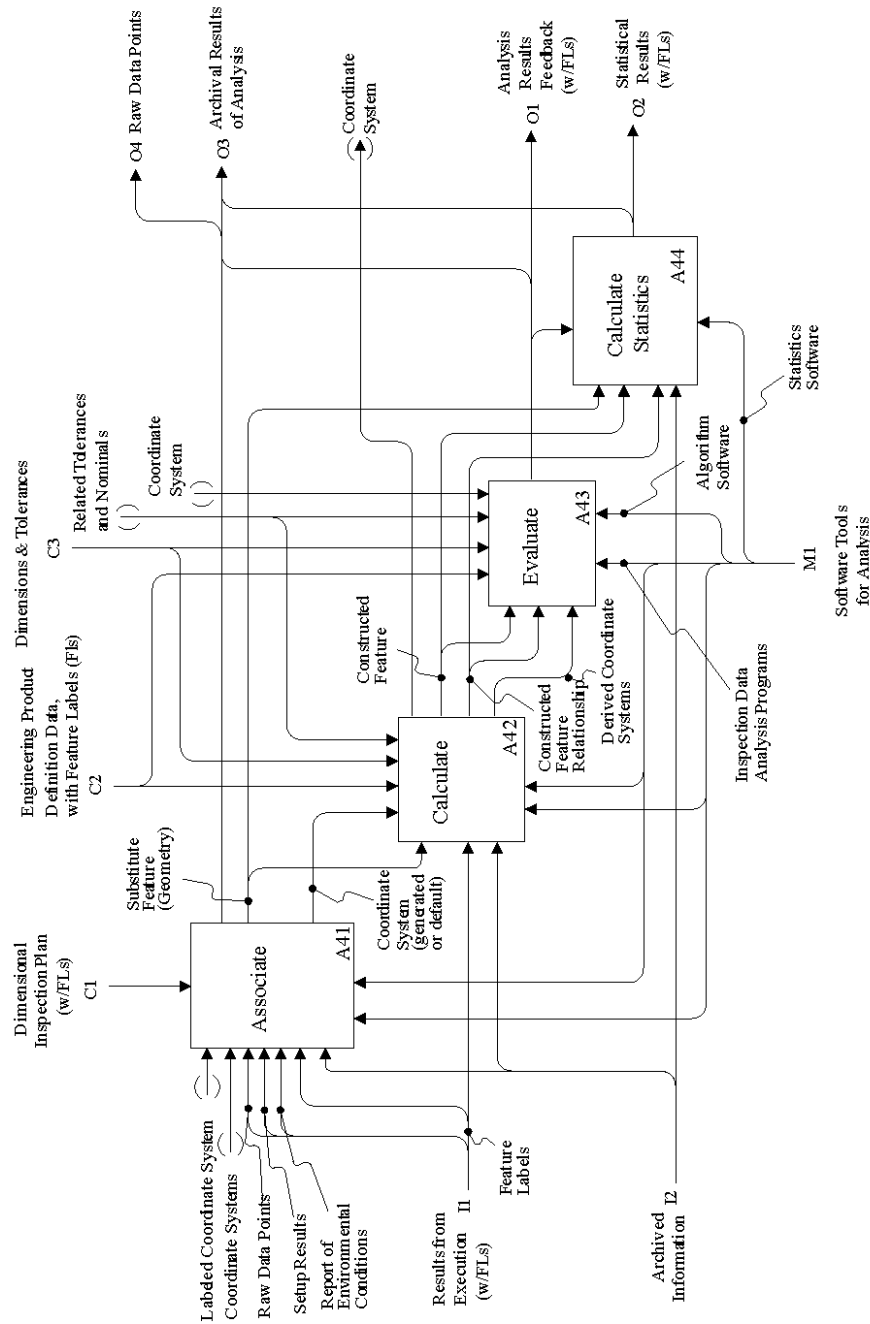


Figure F.13 - A4 Perform Analysis of Inspection

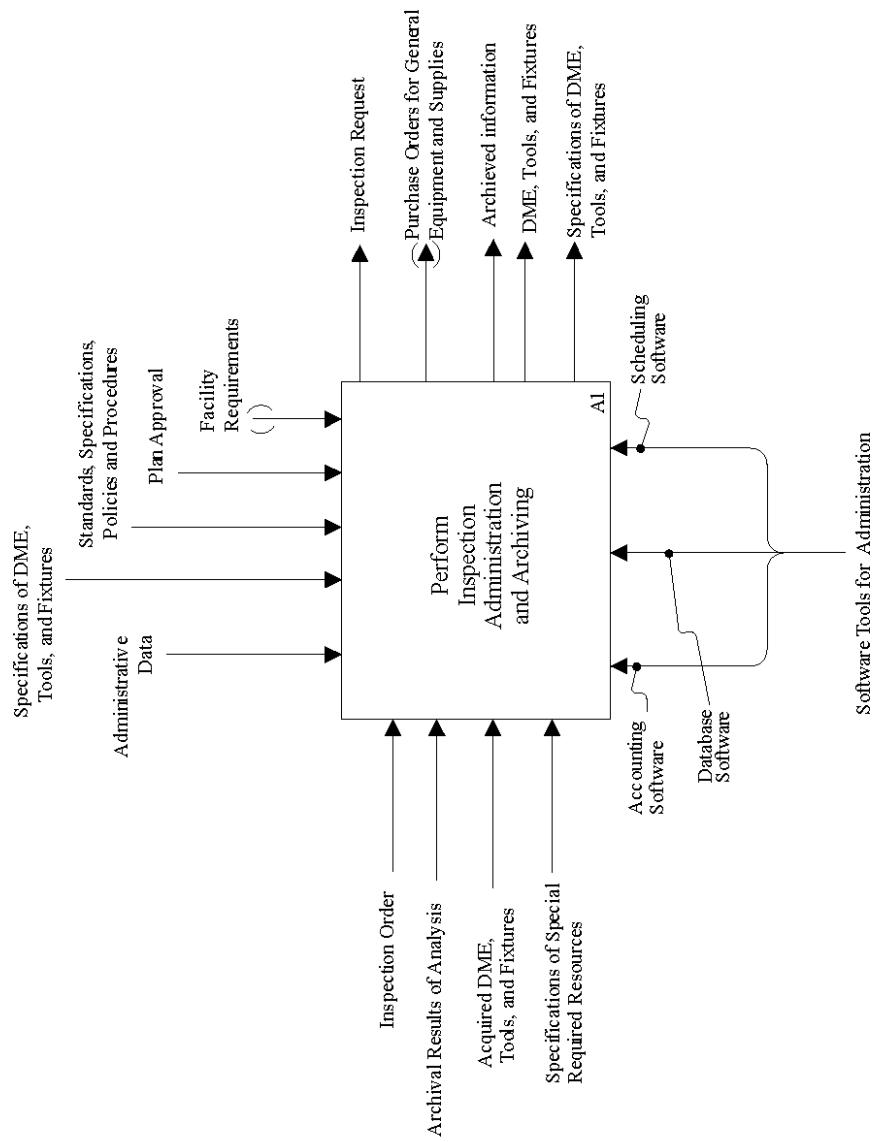


Figure F.14 - A1 Perform Inspection Administration and Archiving

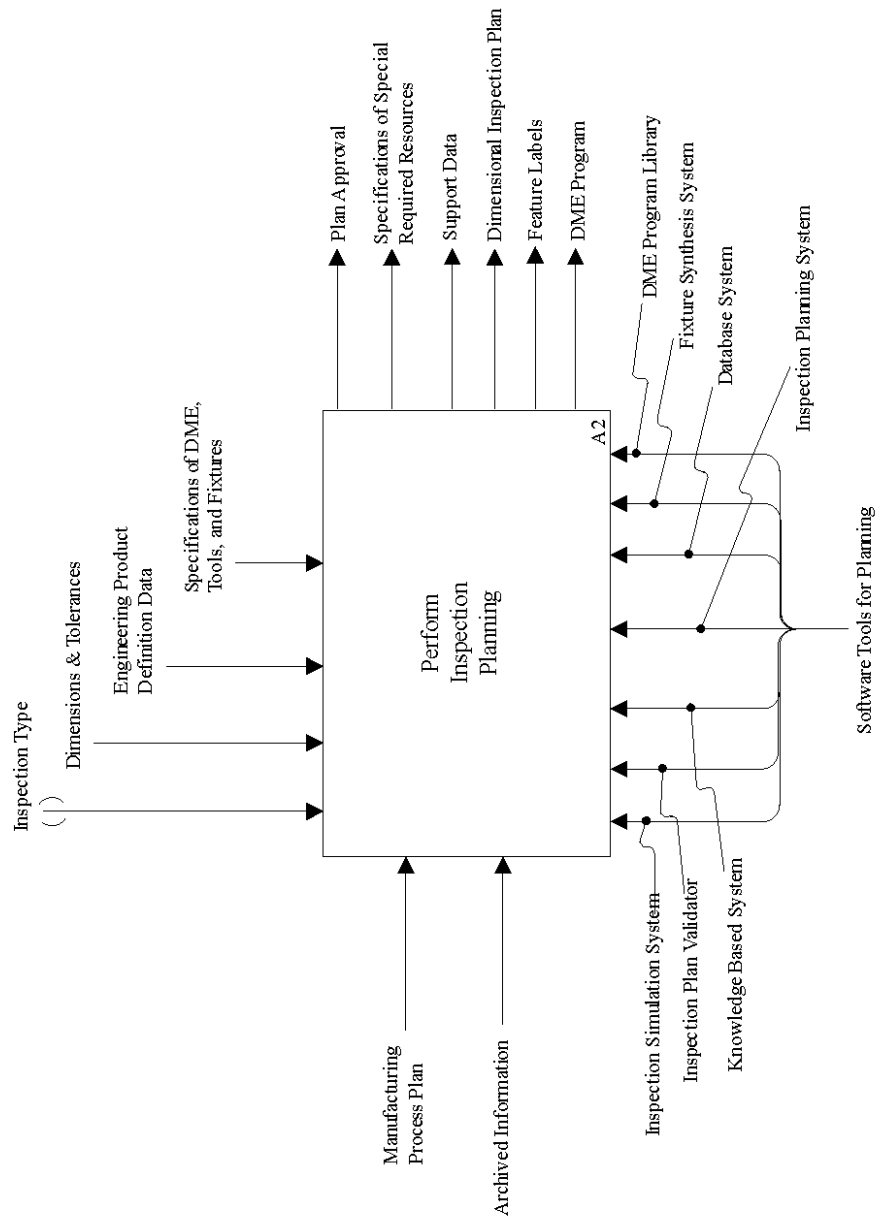


Figure F.15 - A2 Perform Inspection Planning

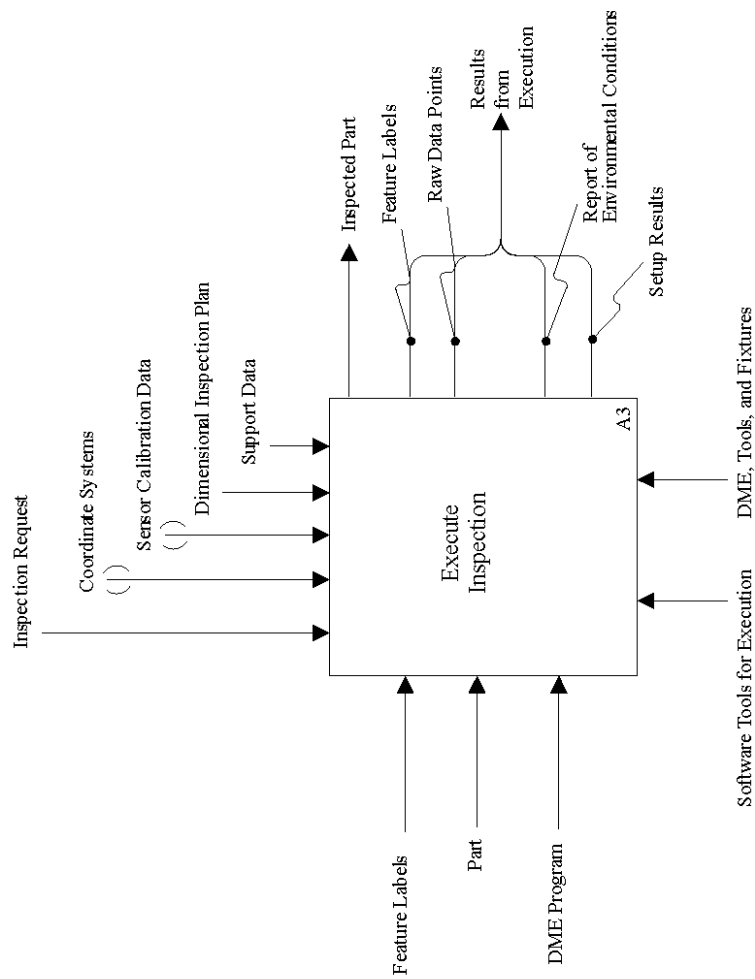


Figure F.16 - A3 Execute Inspection

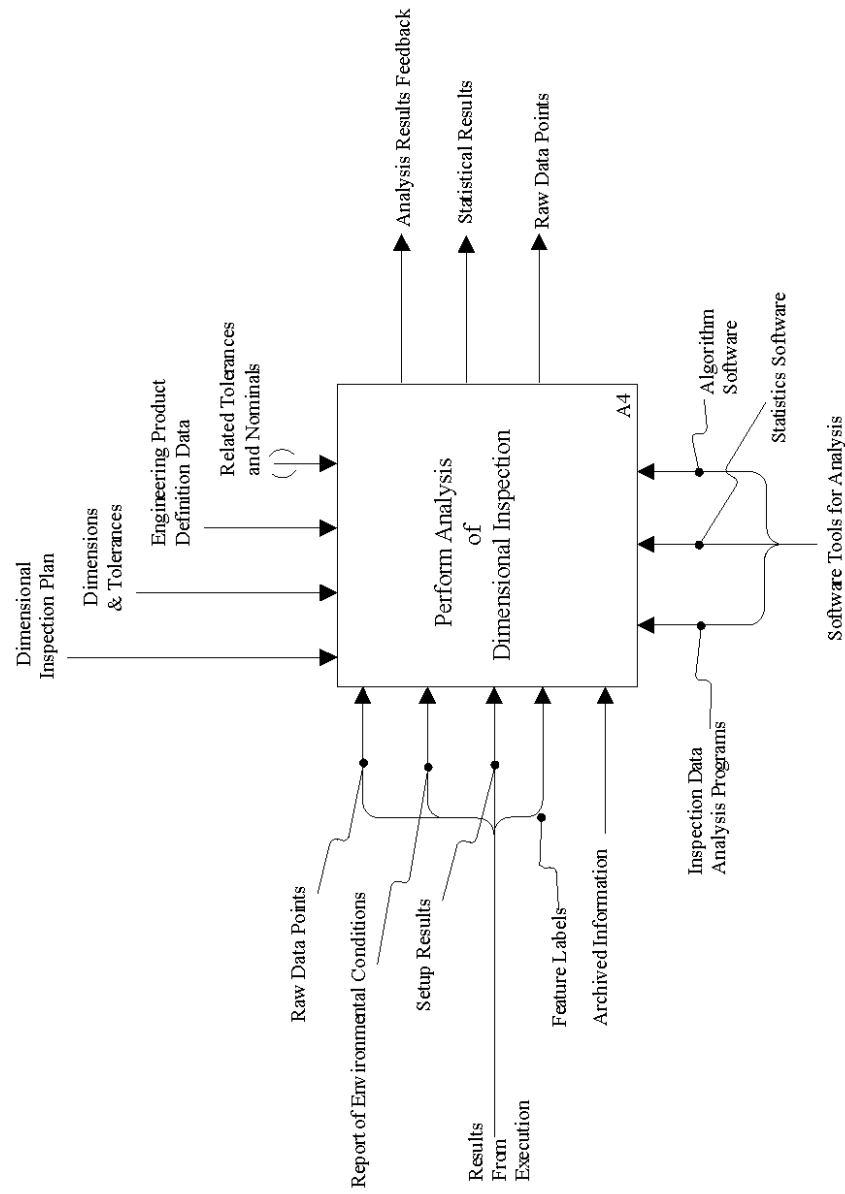


Figure F.17 - A4 Perform Analysis of Dimensional Inspection

Annex G

(informative)

Application reference model

This annex provides the application reference model for this part of ISO 10303 and is given in figures G.1 through G.28. The application reference model is a graphical representation of the structure and constraints of the application objects specified in clause 4. The graphical form of the application reference model is presented in the EXPRESS-G. The application reference model is independent from any implementation method.

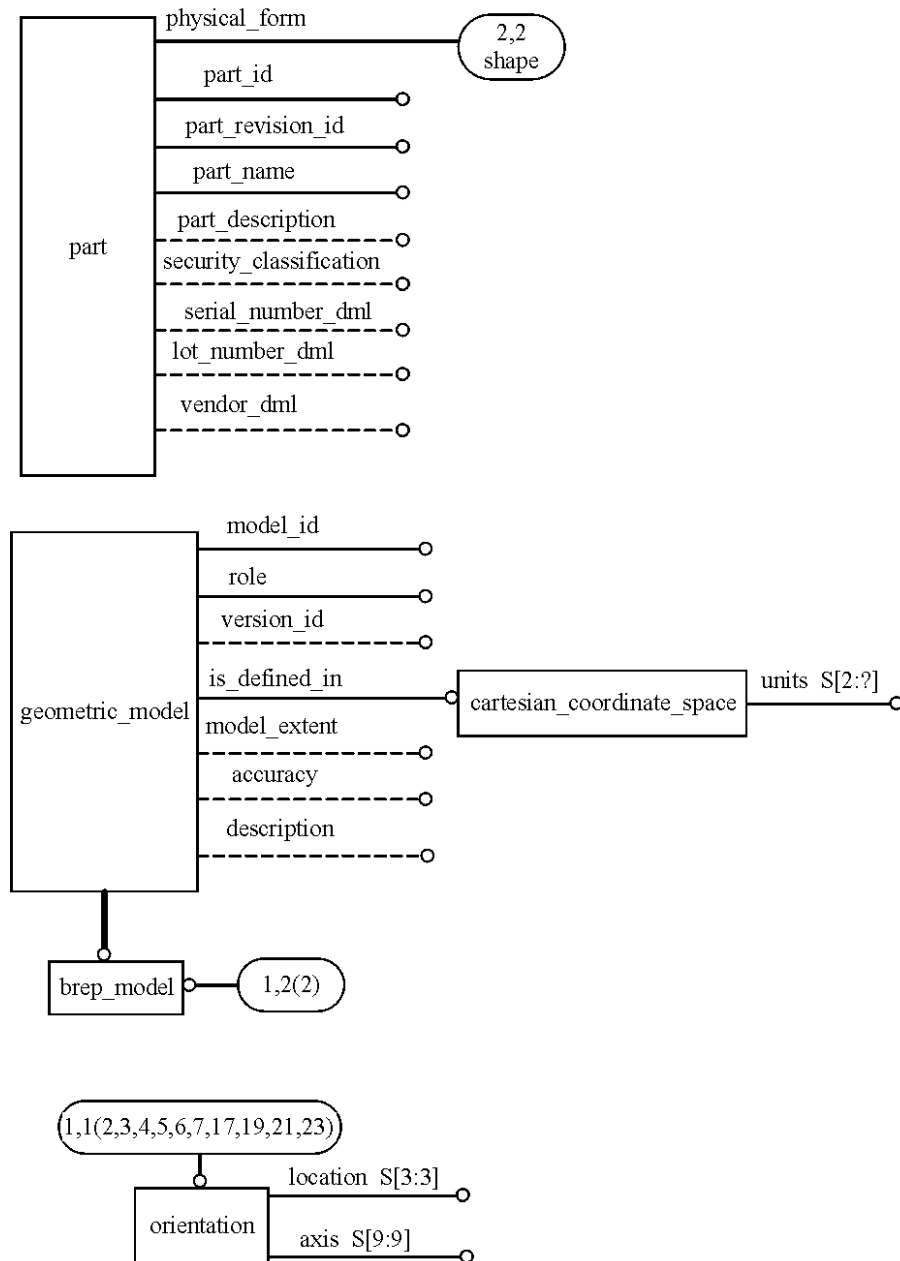


Figure G. 1 - ARM EXPRESS-G diagram 1 of 32

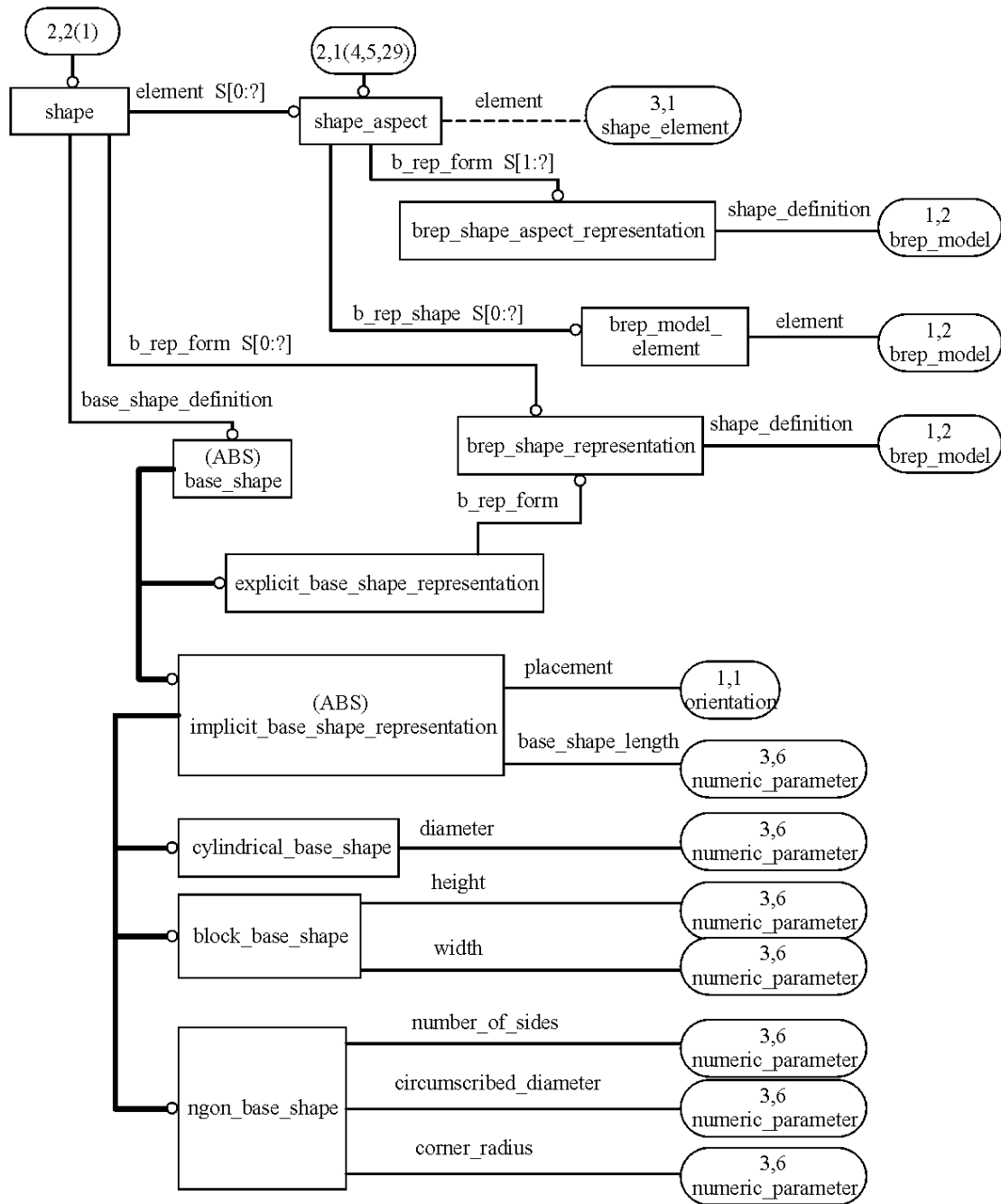


Figure G. 2 - ARM EXPRESS-G diagram 2 of 32

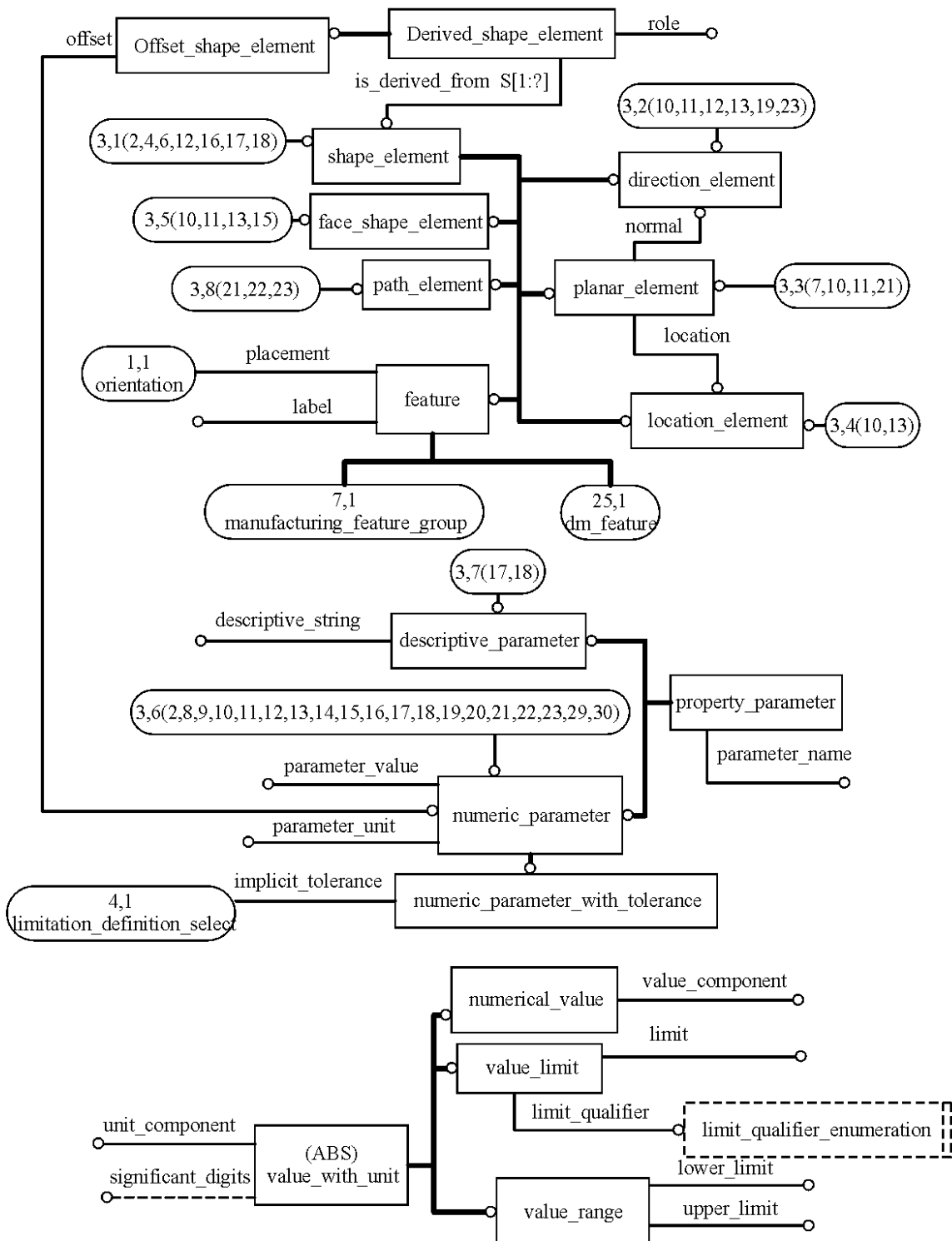


Figure G. 3 - ARM EXPRESS-G diagram 3 of 32

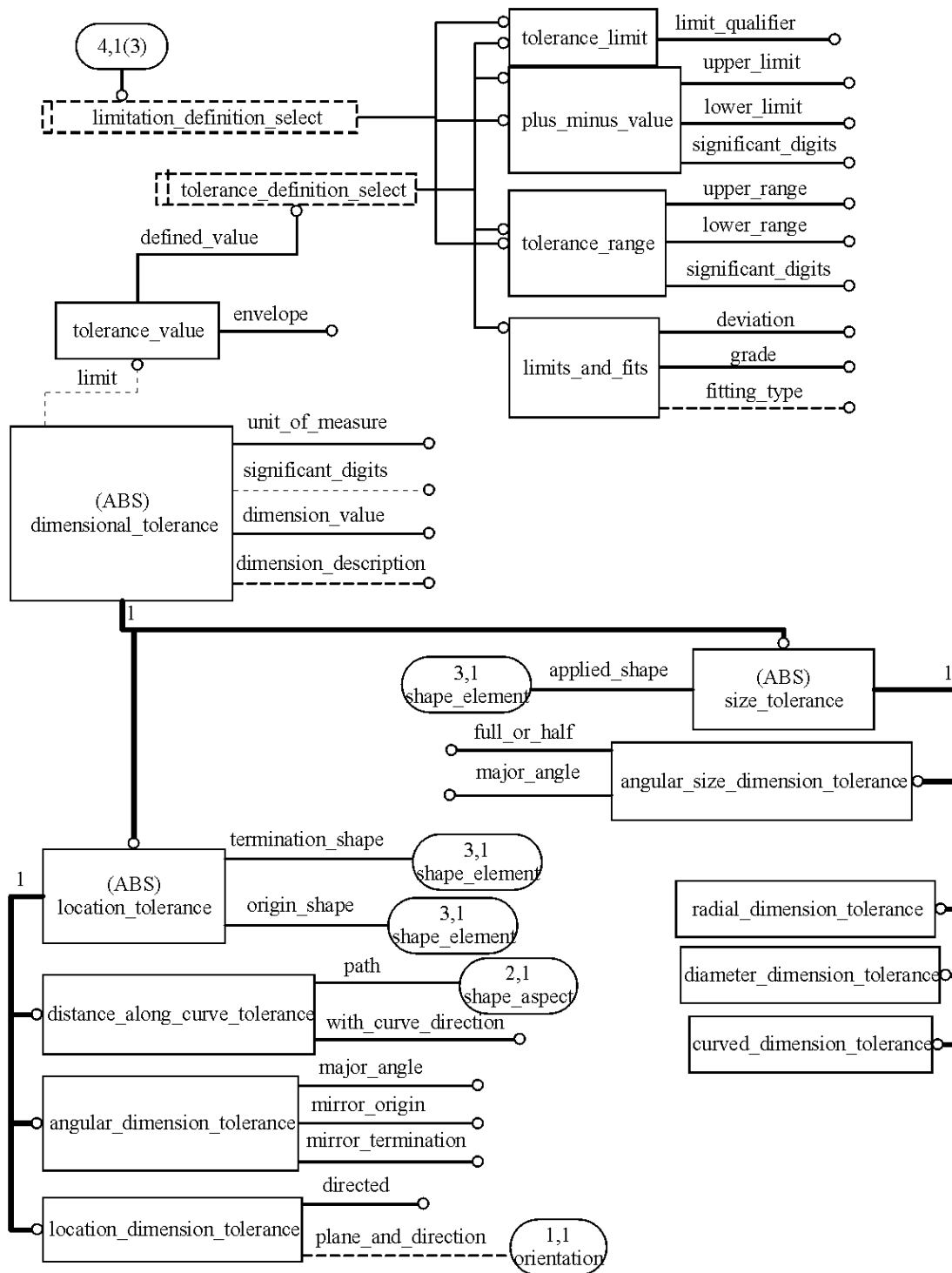


Figure G. 4 - ARM EXPRESS-G diagram 4 of 32

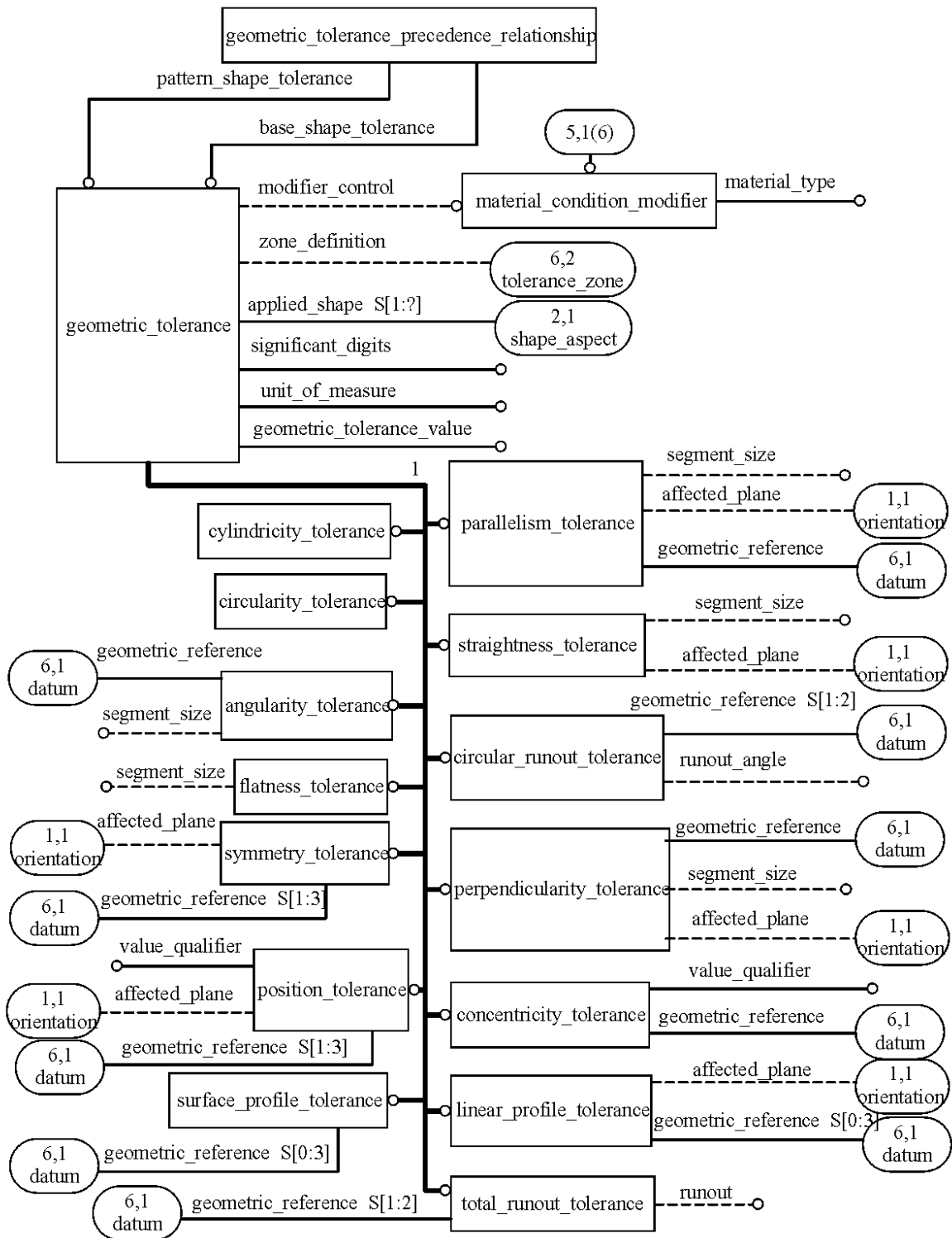


Figure G. 5 - ARM EXPRESS-G diagram 5 of 32

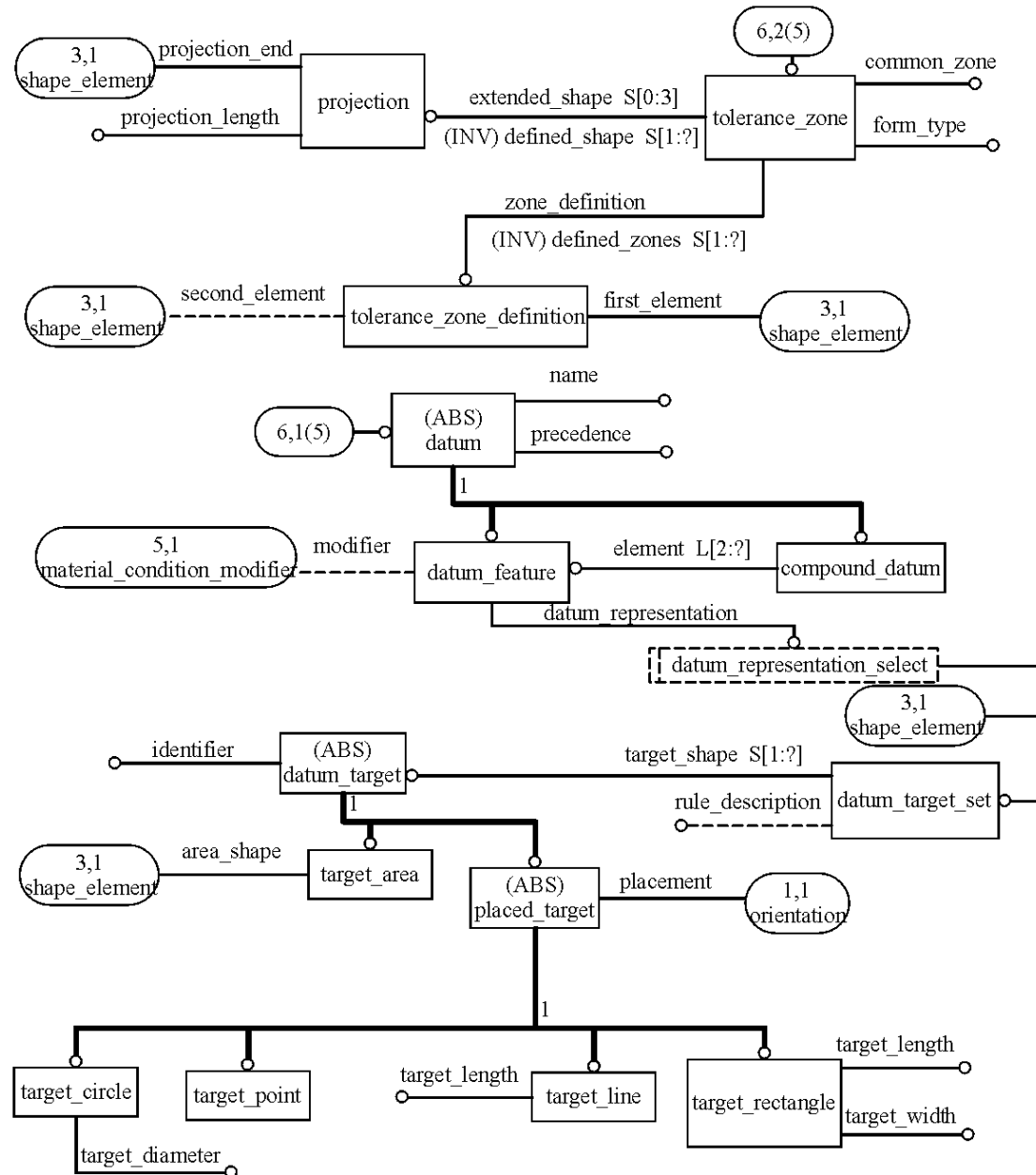


Figure G. 6 - ARM EXPRESS-G diagram 6 of 32

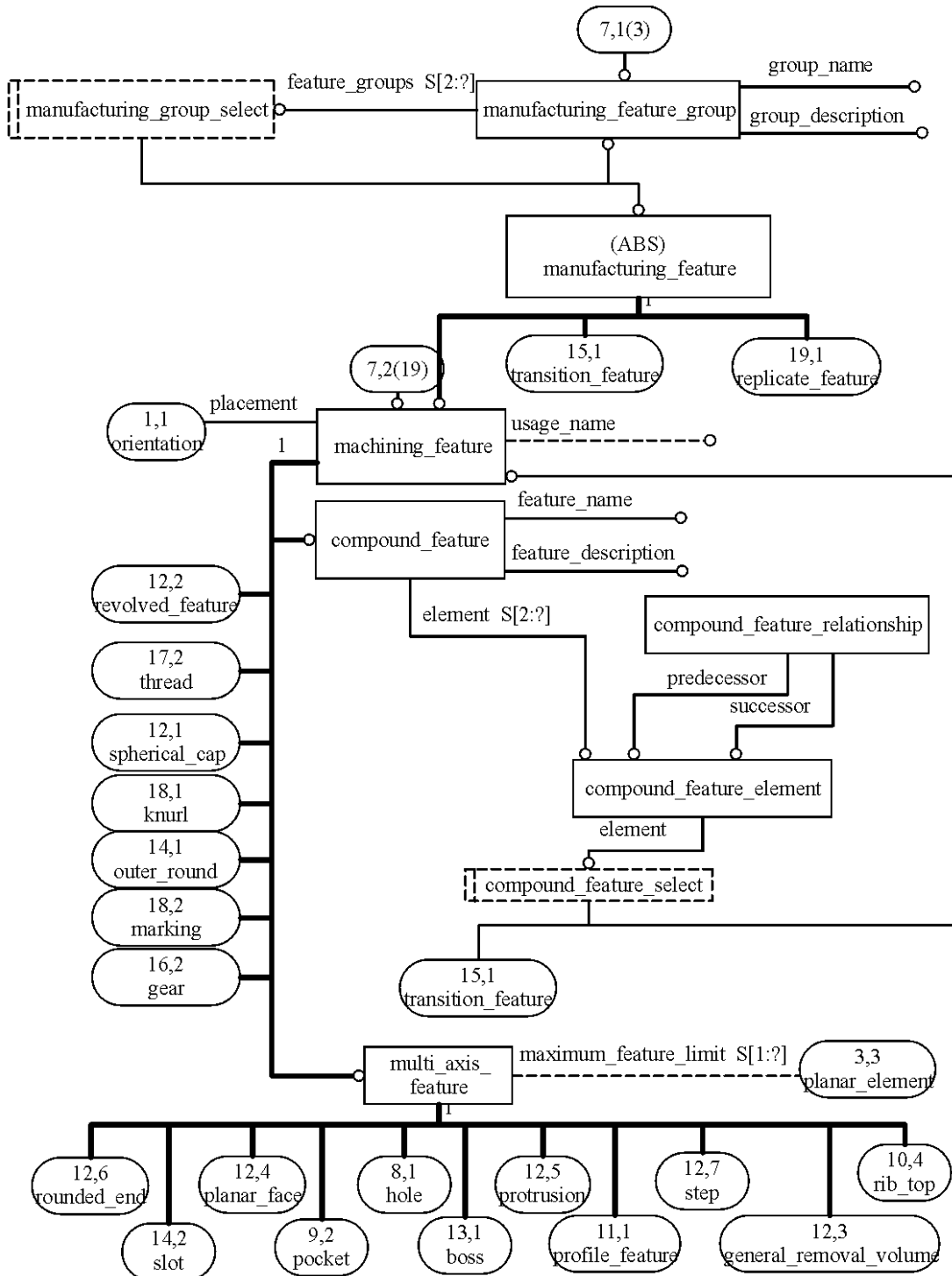


Figure G. 7 - ARM EXPRESS-G diagram 7 of 32

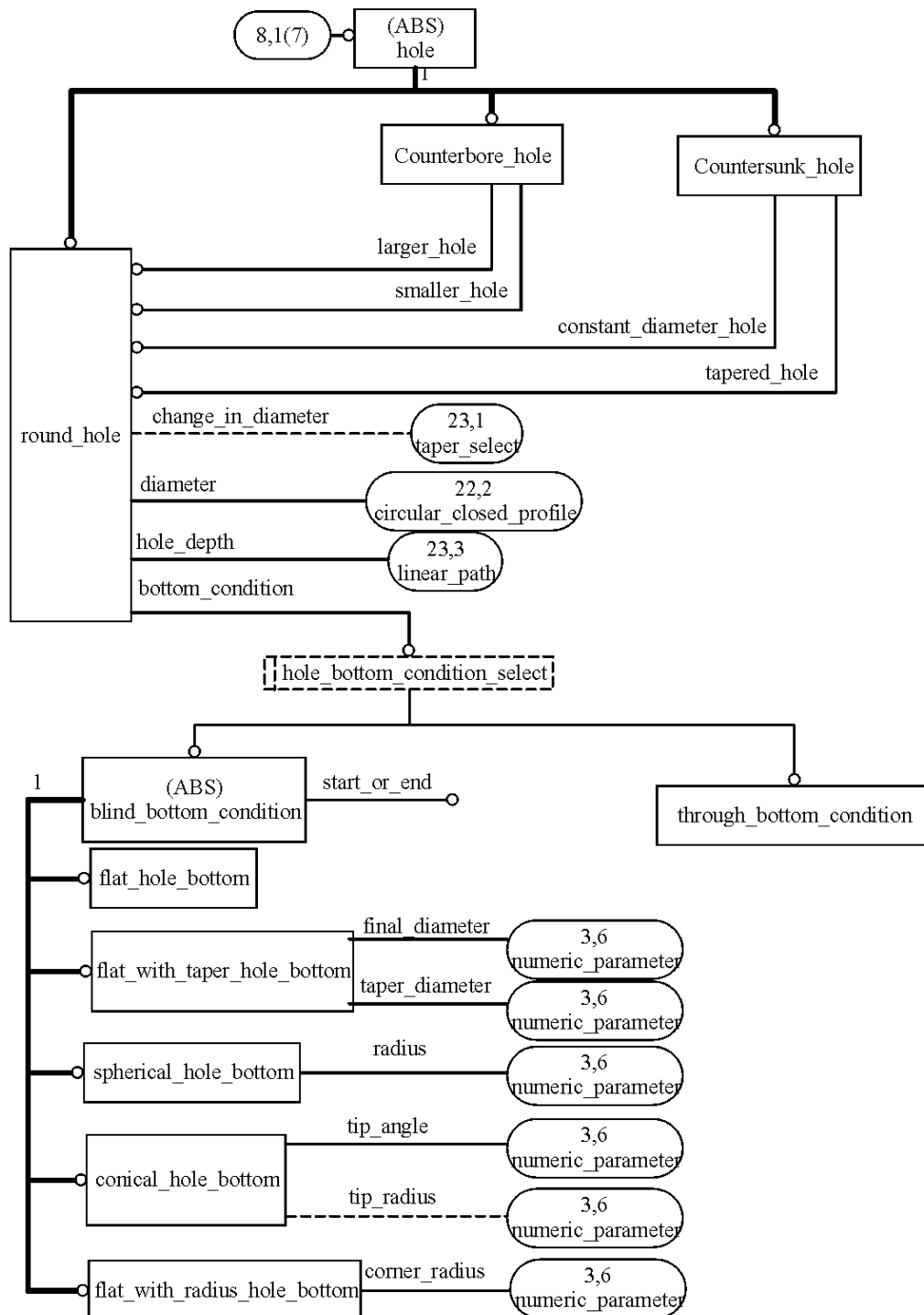


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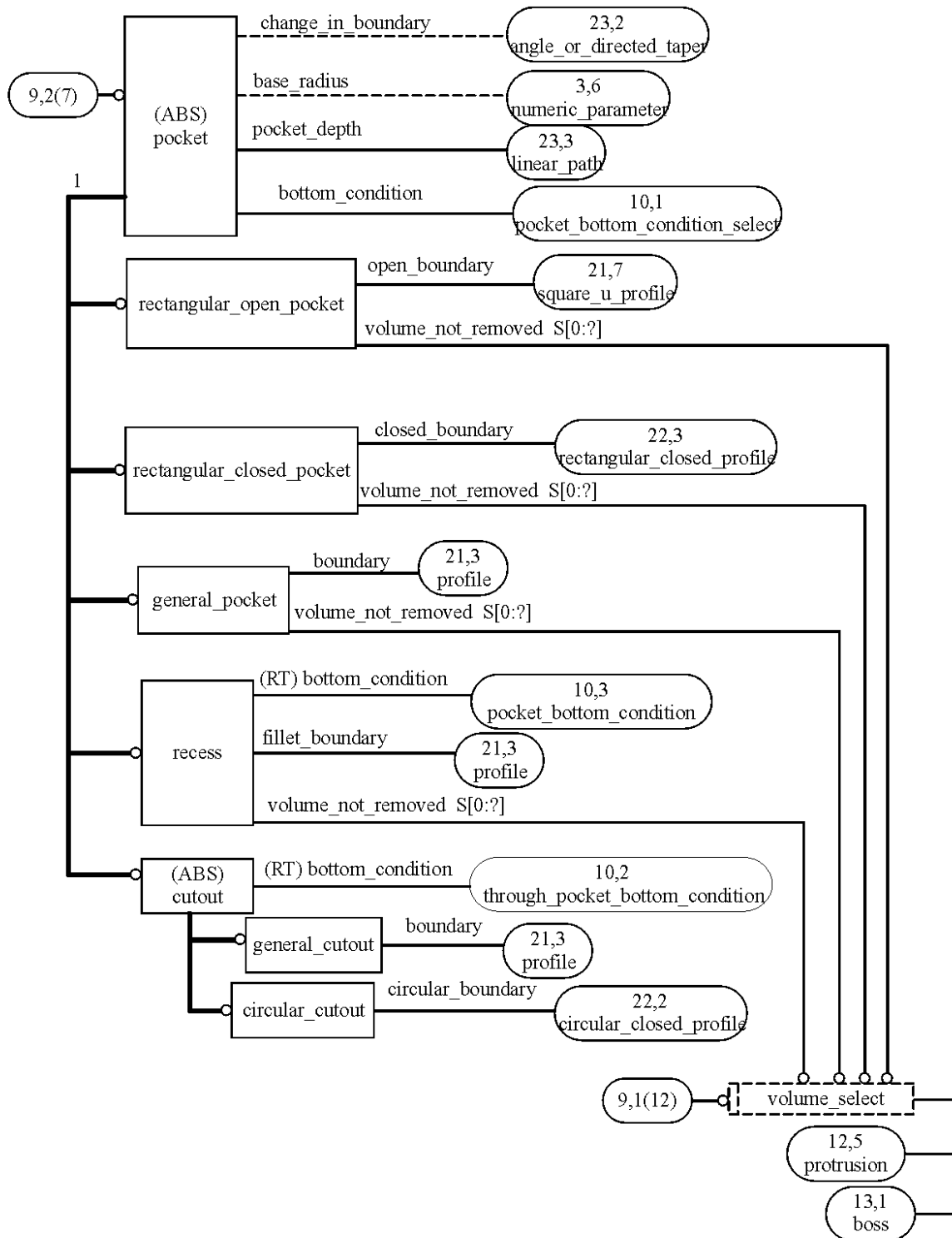


Figure G. 9 - ARM EXPRESS-G diagram 9 of 32

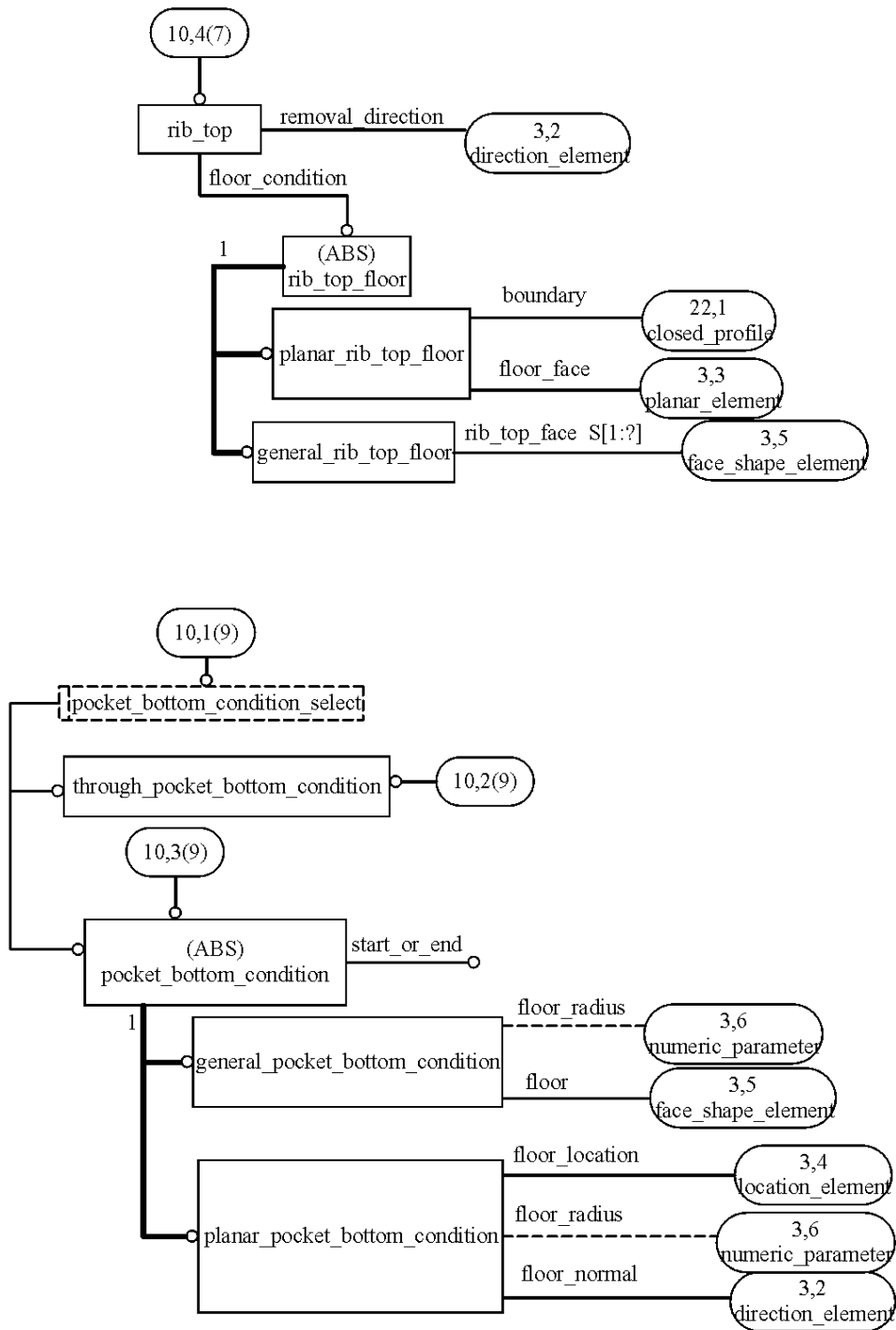


Figure G. 10 - ARM EXPRESS-G diagram 10 of 32

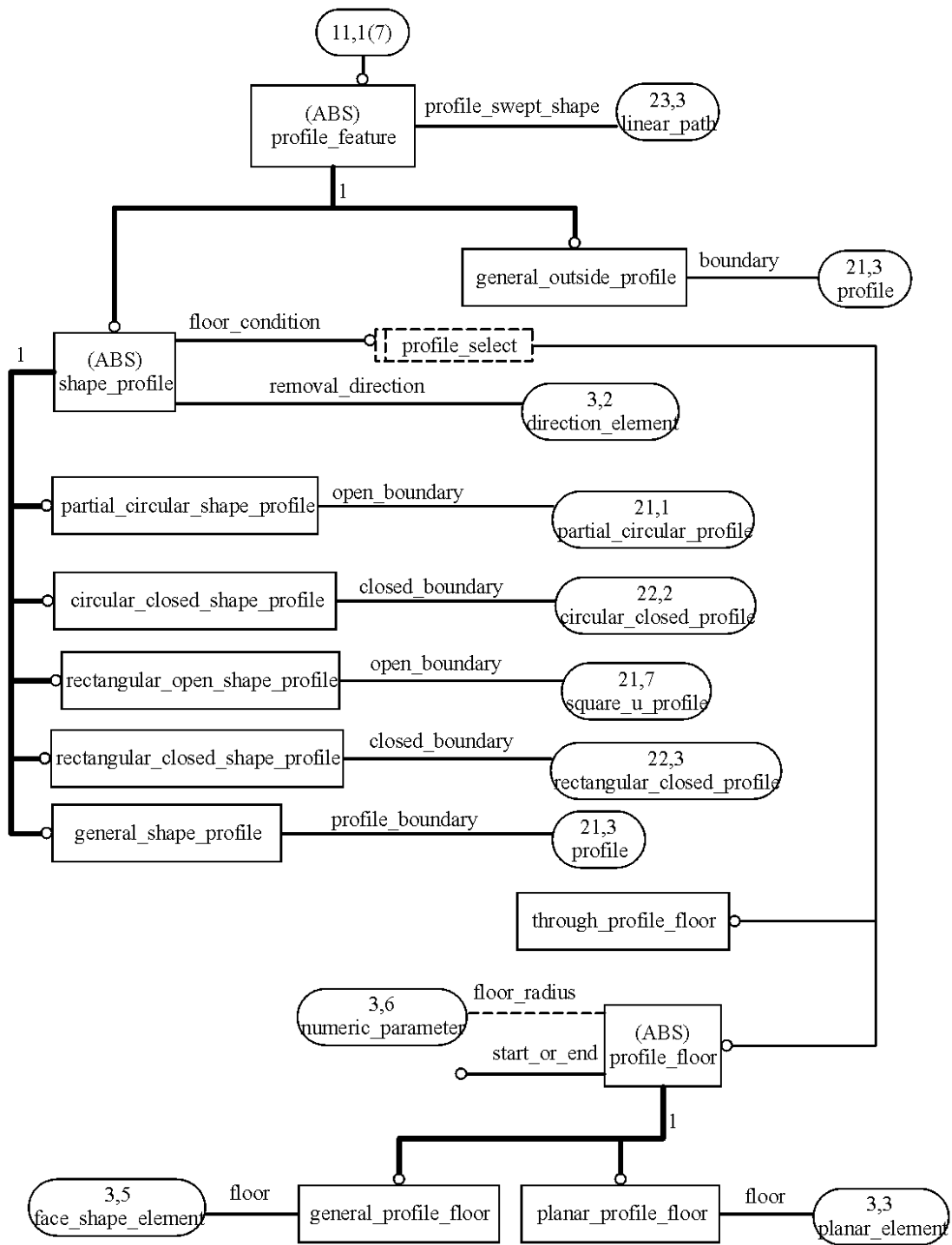


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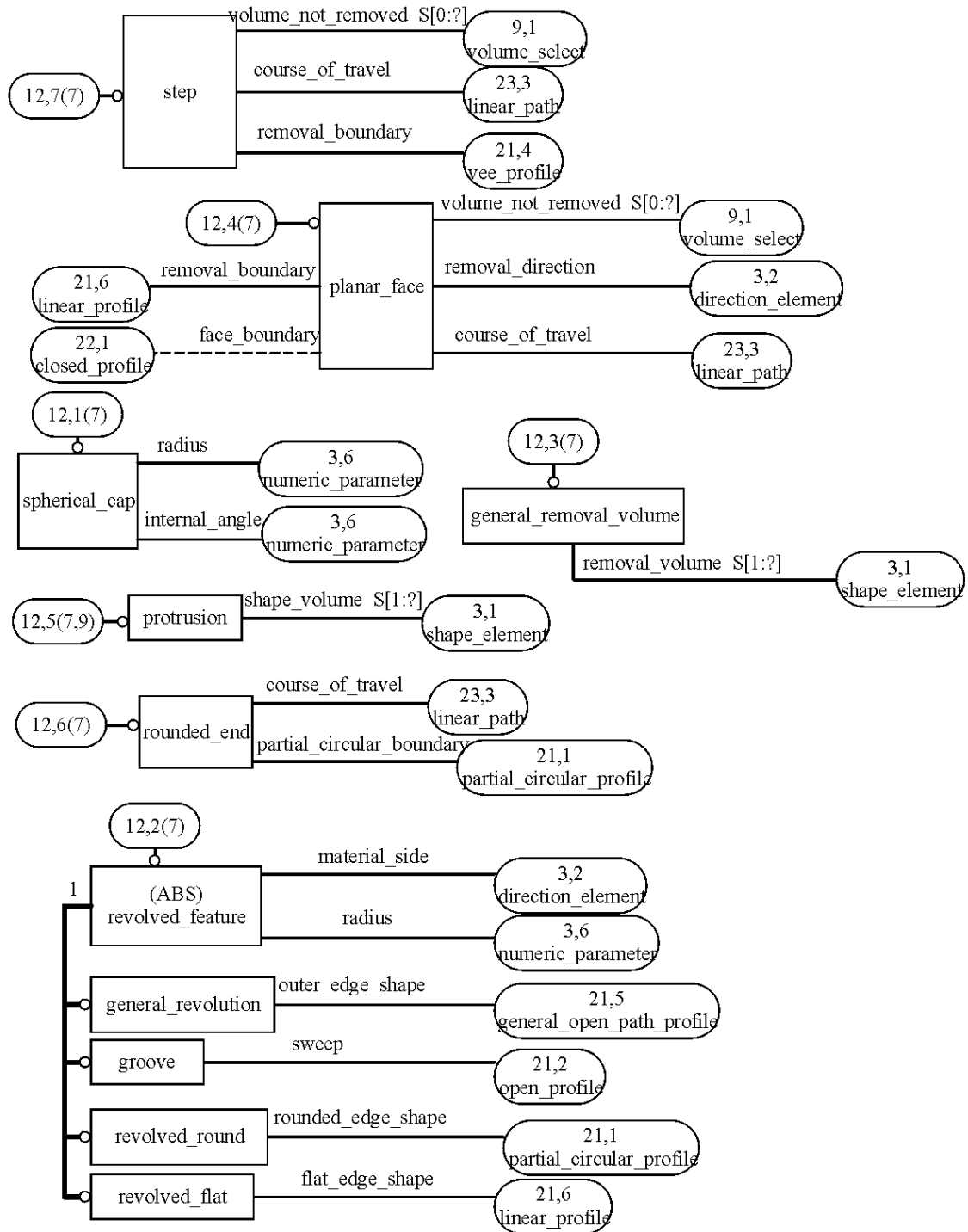


Figure G. 12 - ARM EXPRESS-G diagram 12 of 32

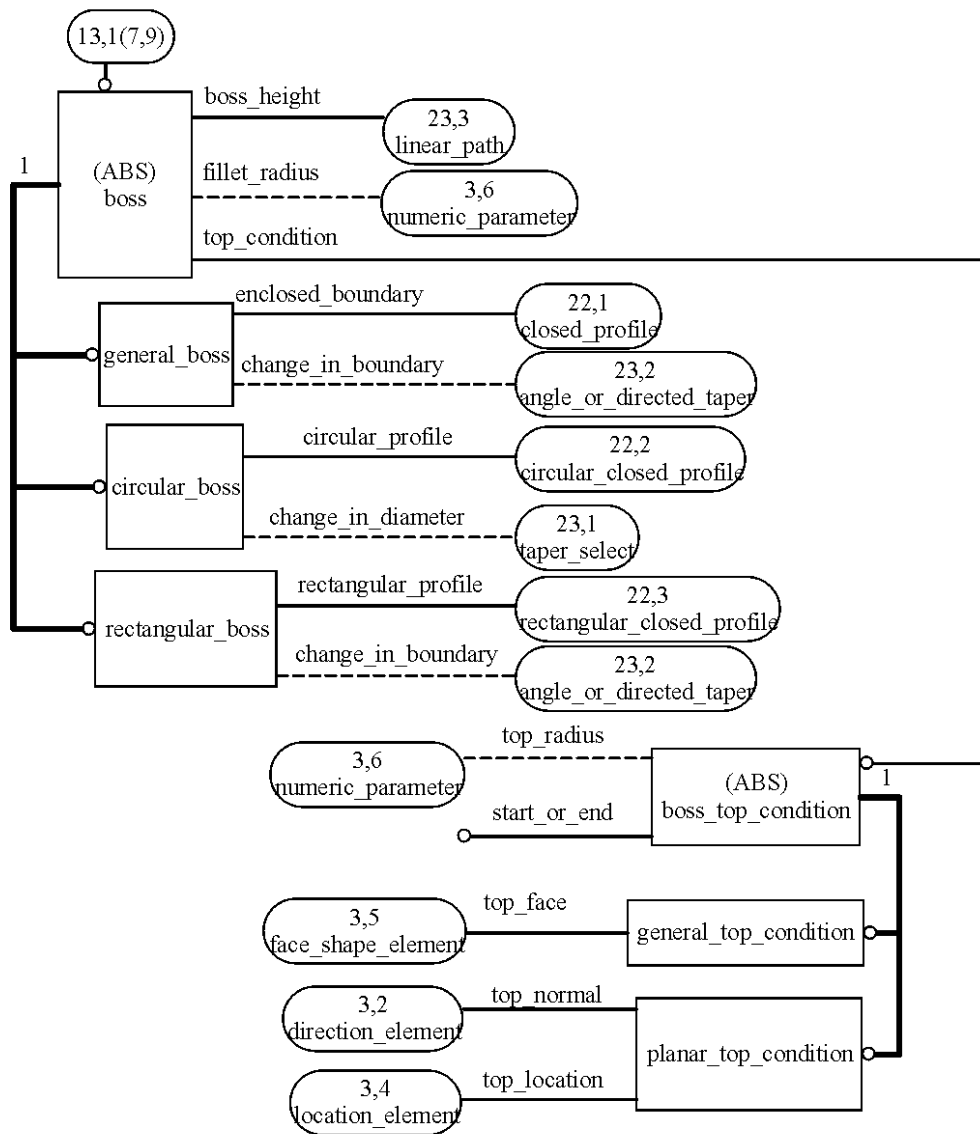


Figure G. 13 - ARM EXPRESS-G diagram 13 of 32

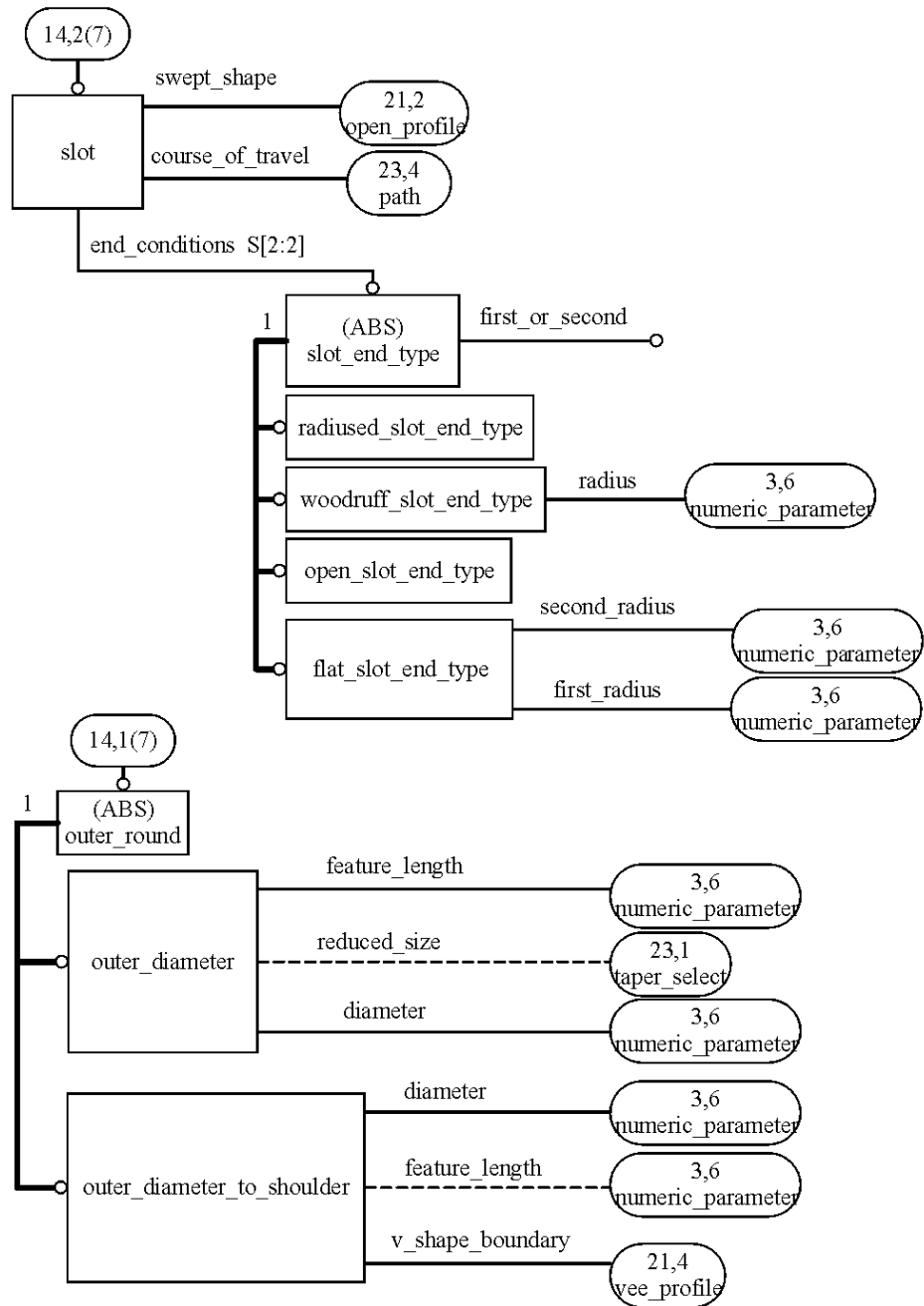


Figure G. 14 - ARM EXPRESS-G diagram 2 of 32

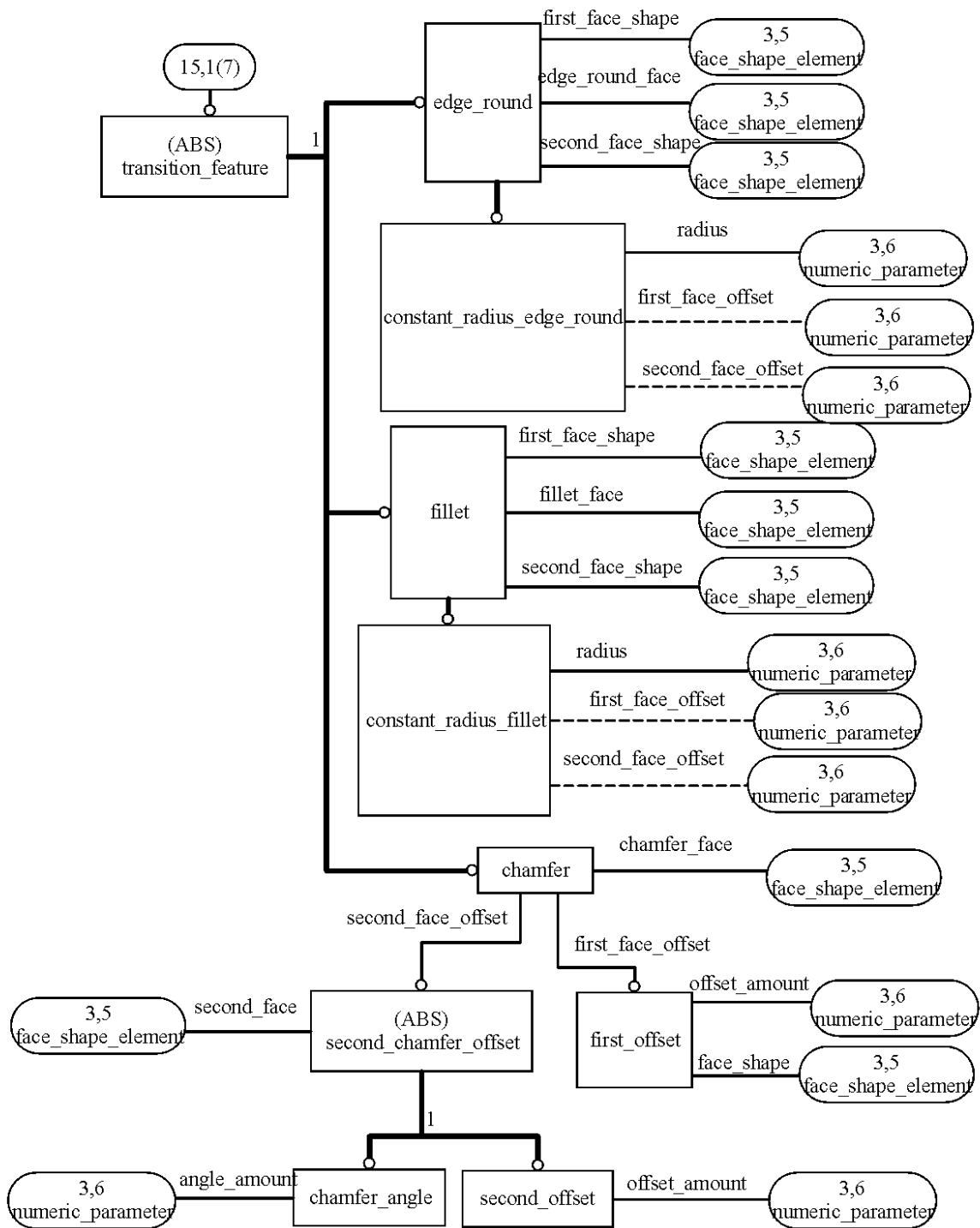


Figure G. 15 - ARM EXPRESS-G diagram 15 of 32

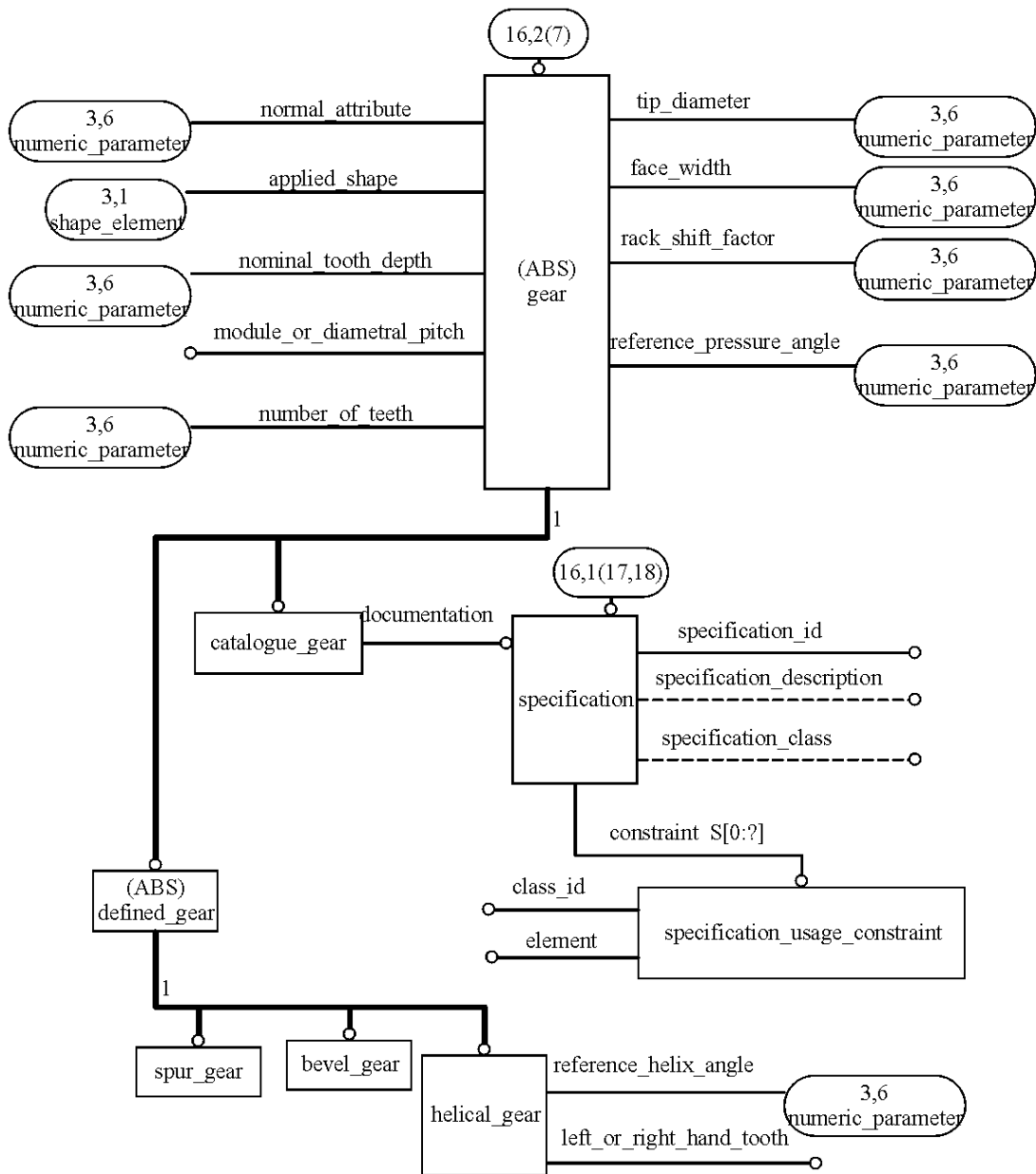


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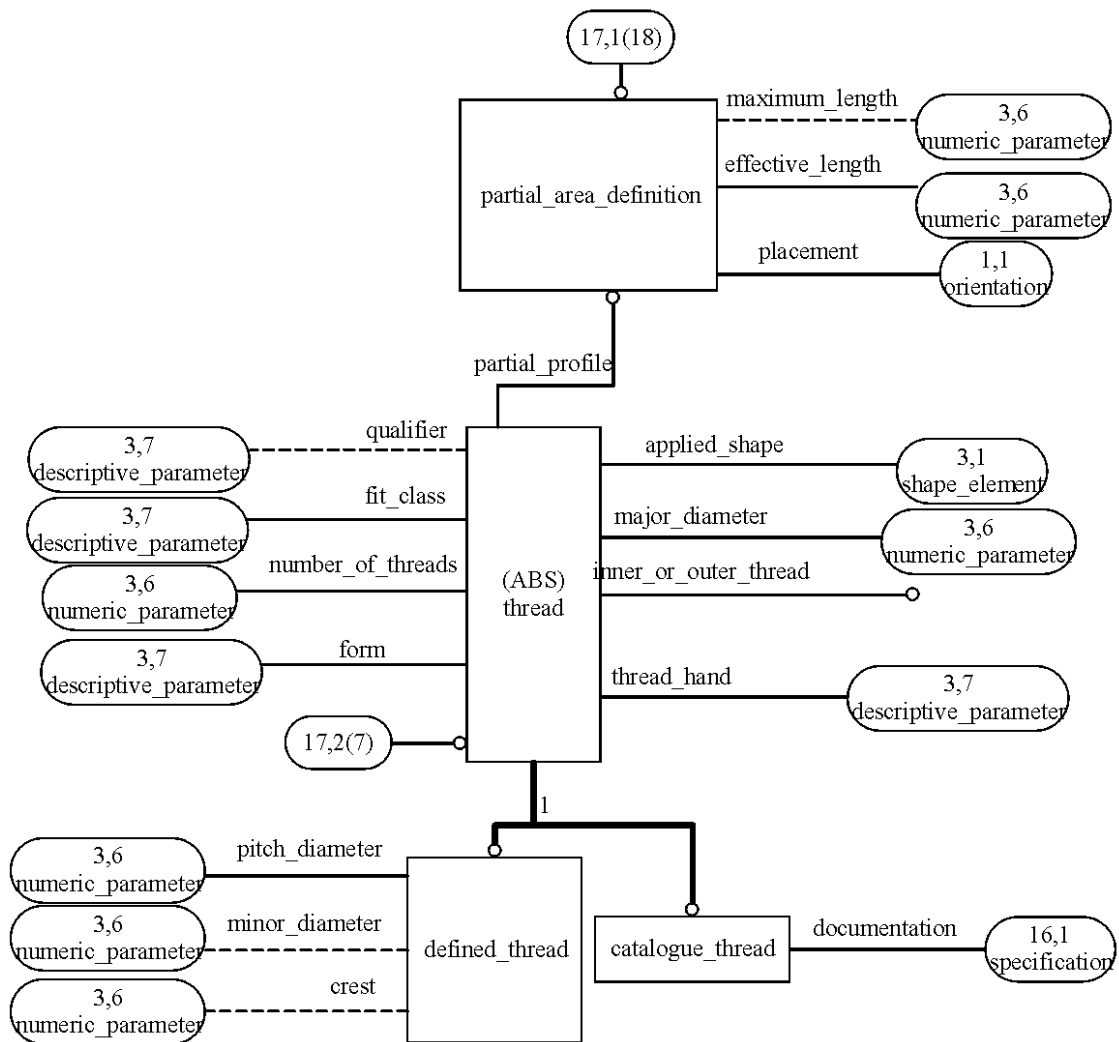


Figure G. 17 - ARM EXPRESS-G diagram 17 of 32

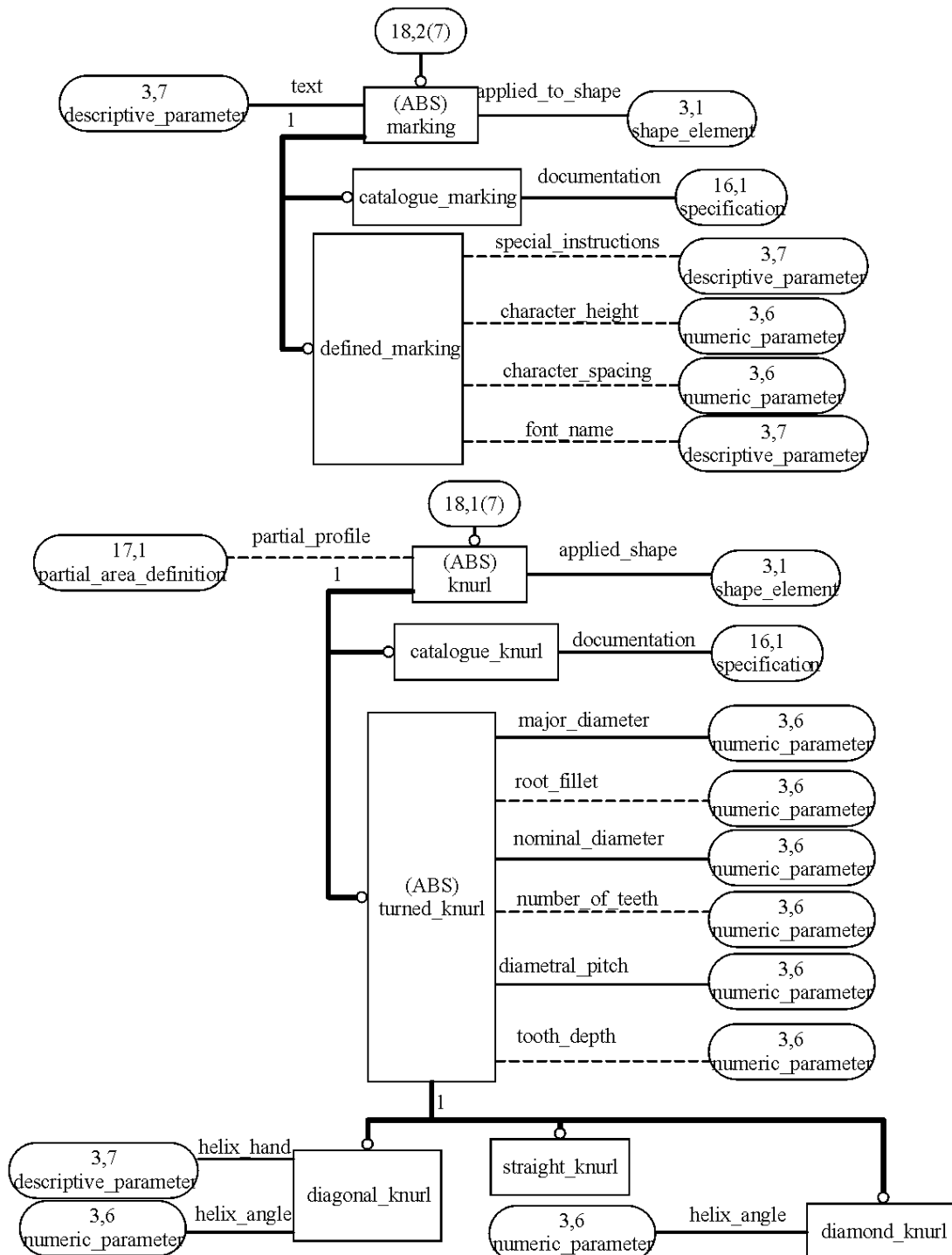


Figure G. 18 - ARM EXPRESS-G diagram 18 of 32

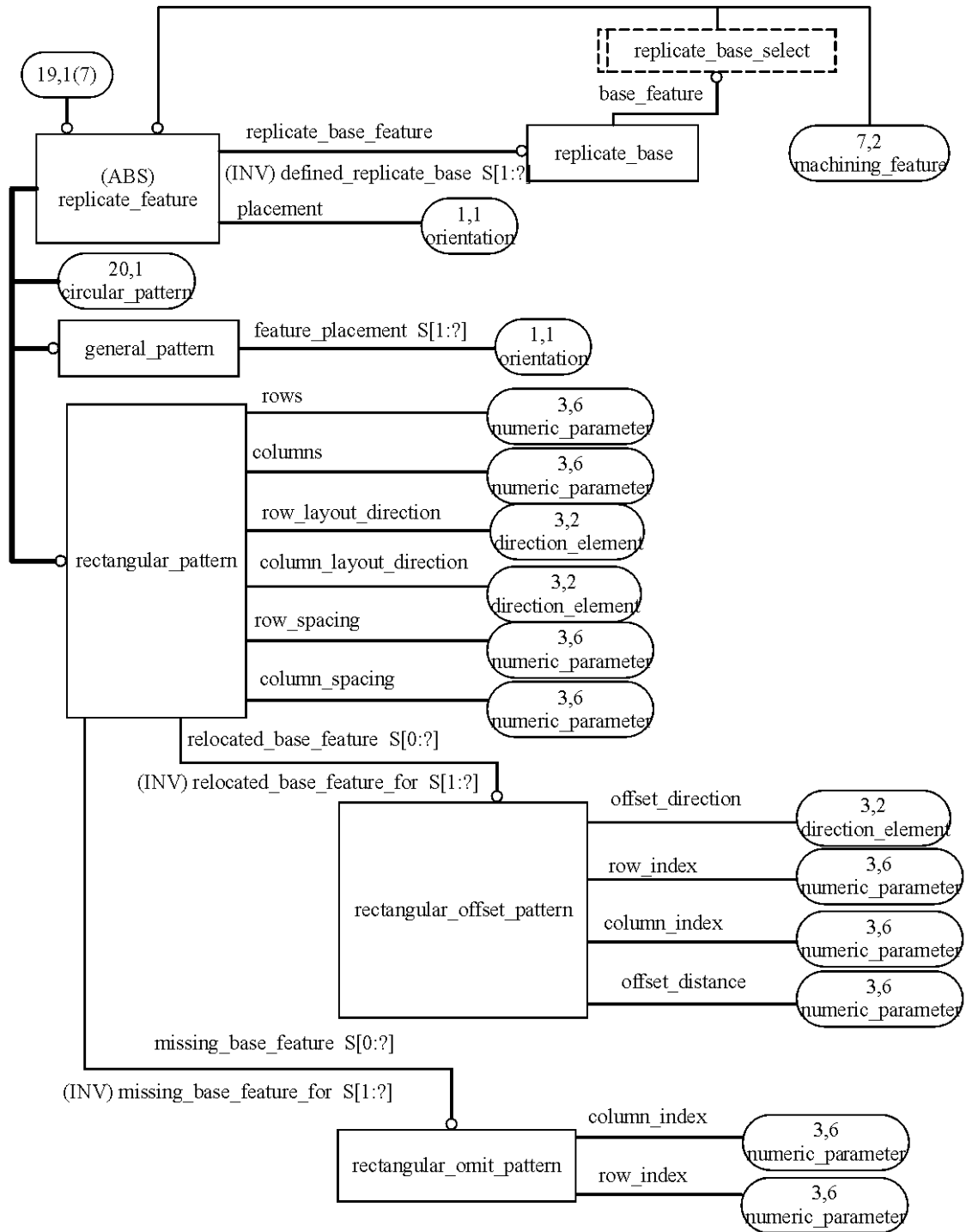


Figure G. 19 - ARM EXPRESS-G diagram 19 of 32

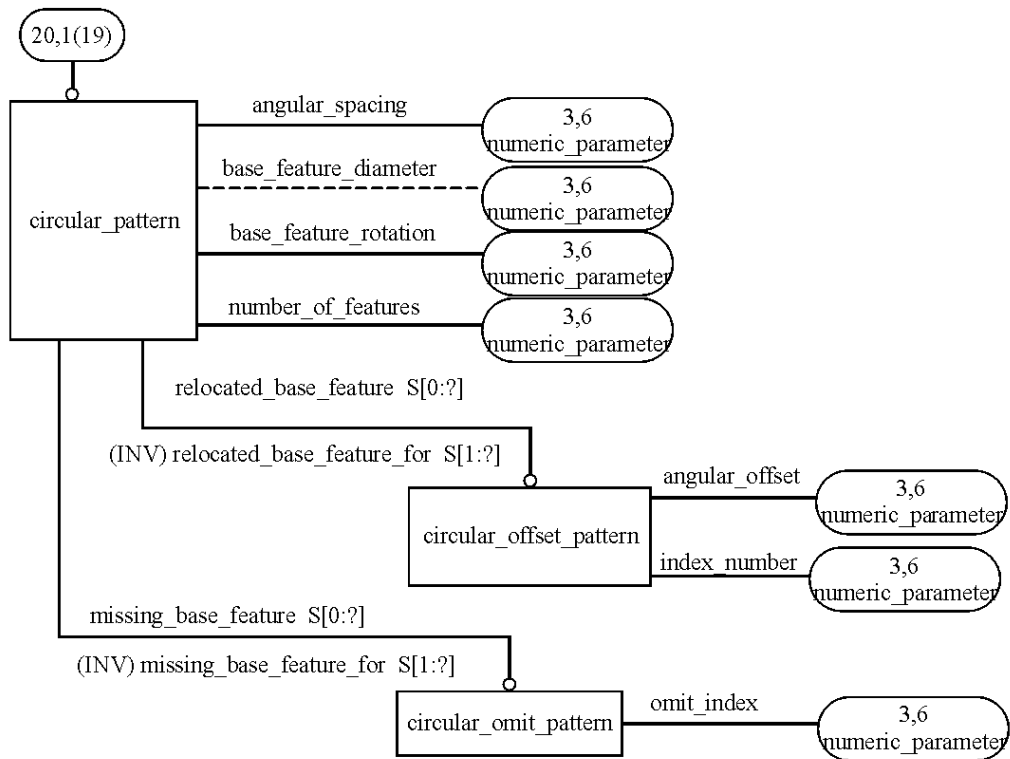


Figure G. 20 - ARM EXPRESS-G diagram 20 of 32

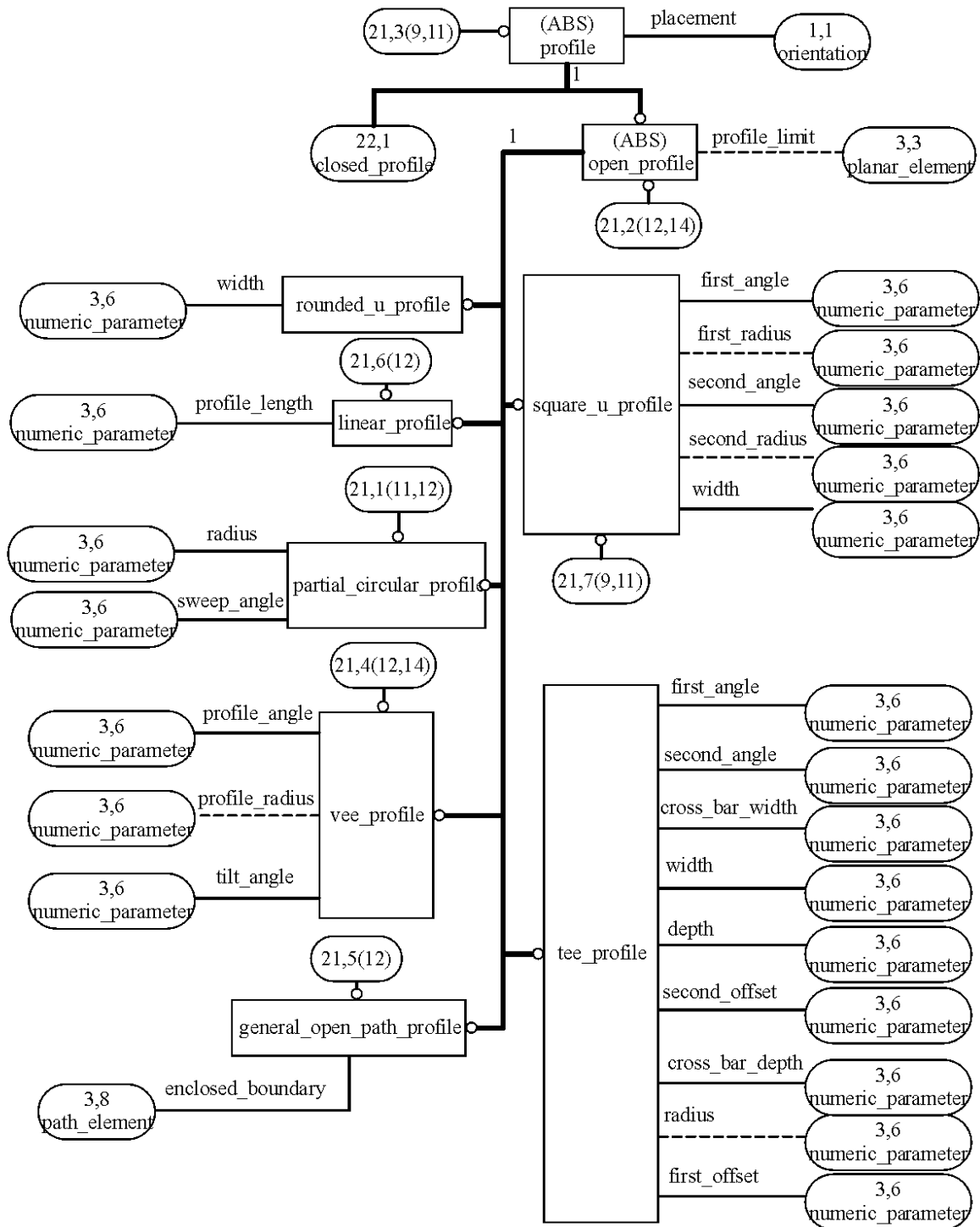


Figure G. 21 - ARM EXPRESS-G diagram 21 of 32

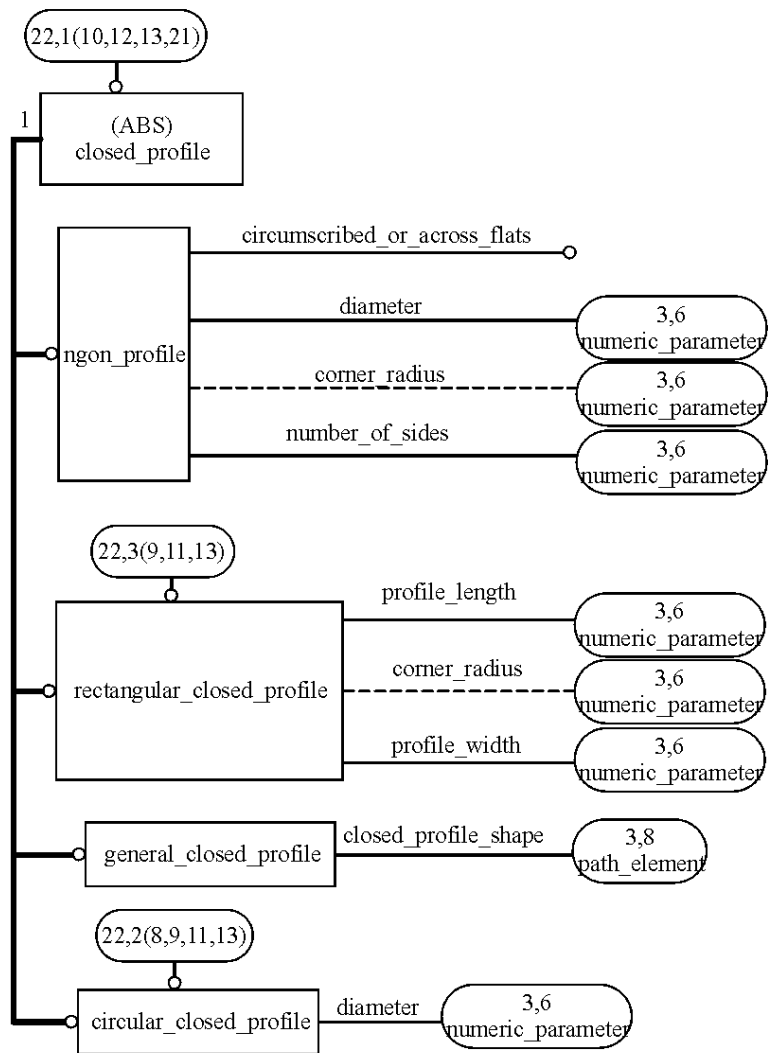


Figure G. 22 - ARM EXPRESS-G diagram 22 of 32

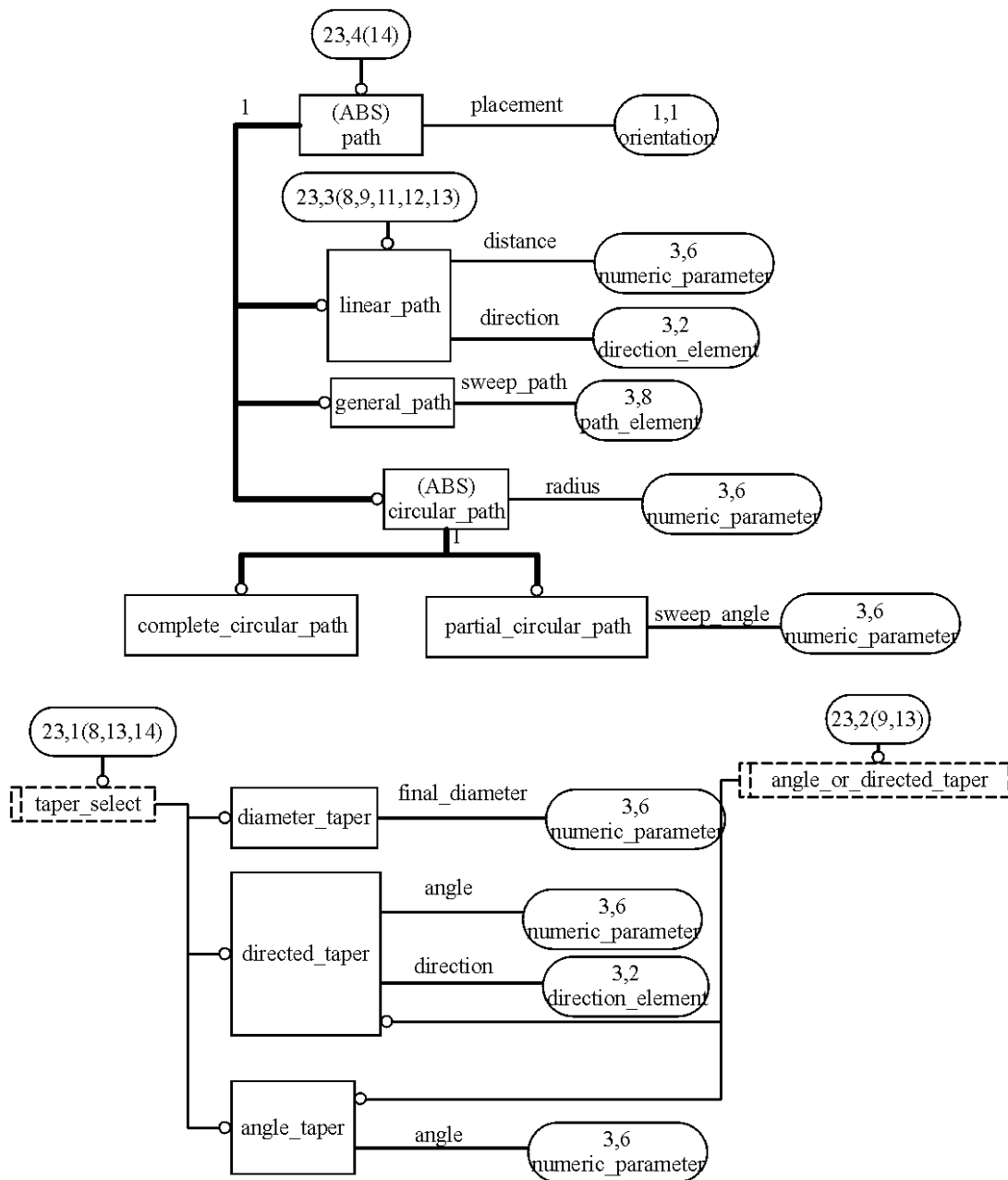


Figure G. 23 - ARM EXPRESS-G diagram 23 of 32

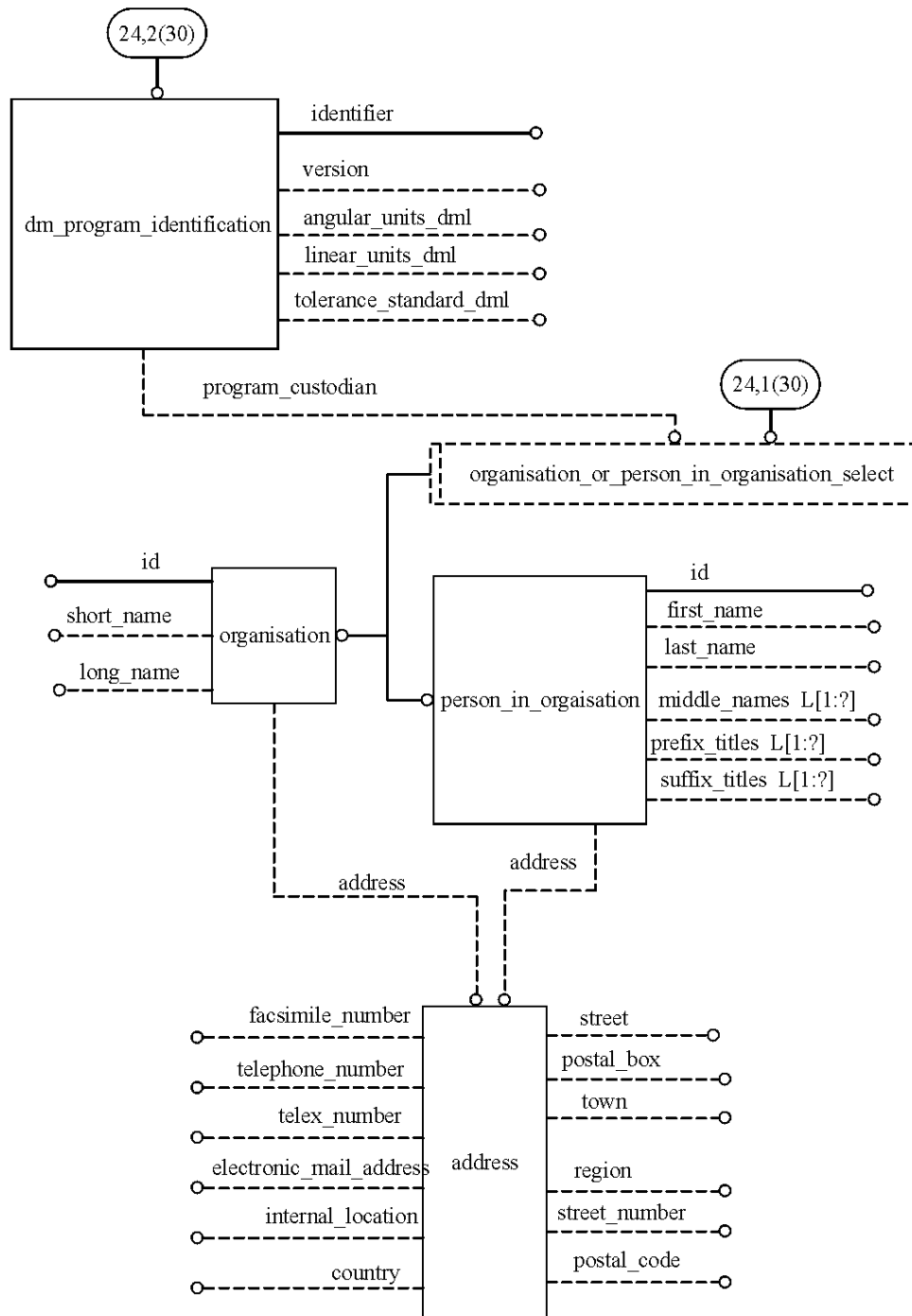


Figure G. 24 - ARM EXPRESS-G diagram 24 of 32

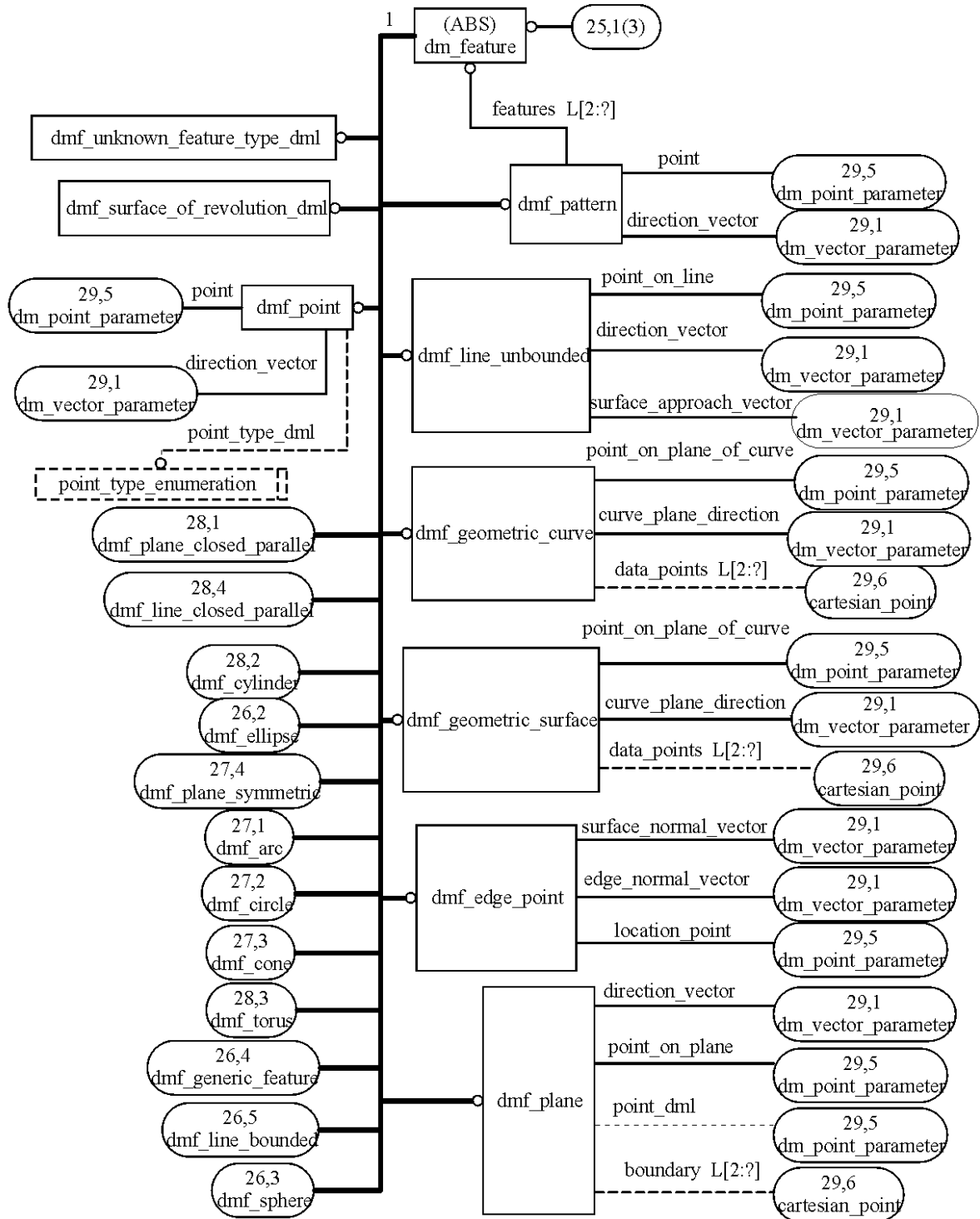


Figure G. 25- ARM EXPRESS-G diagram 25 of 32

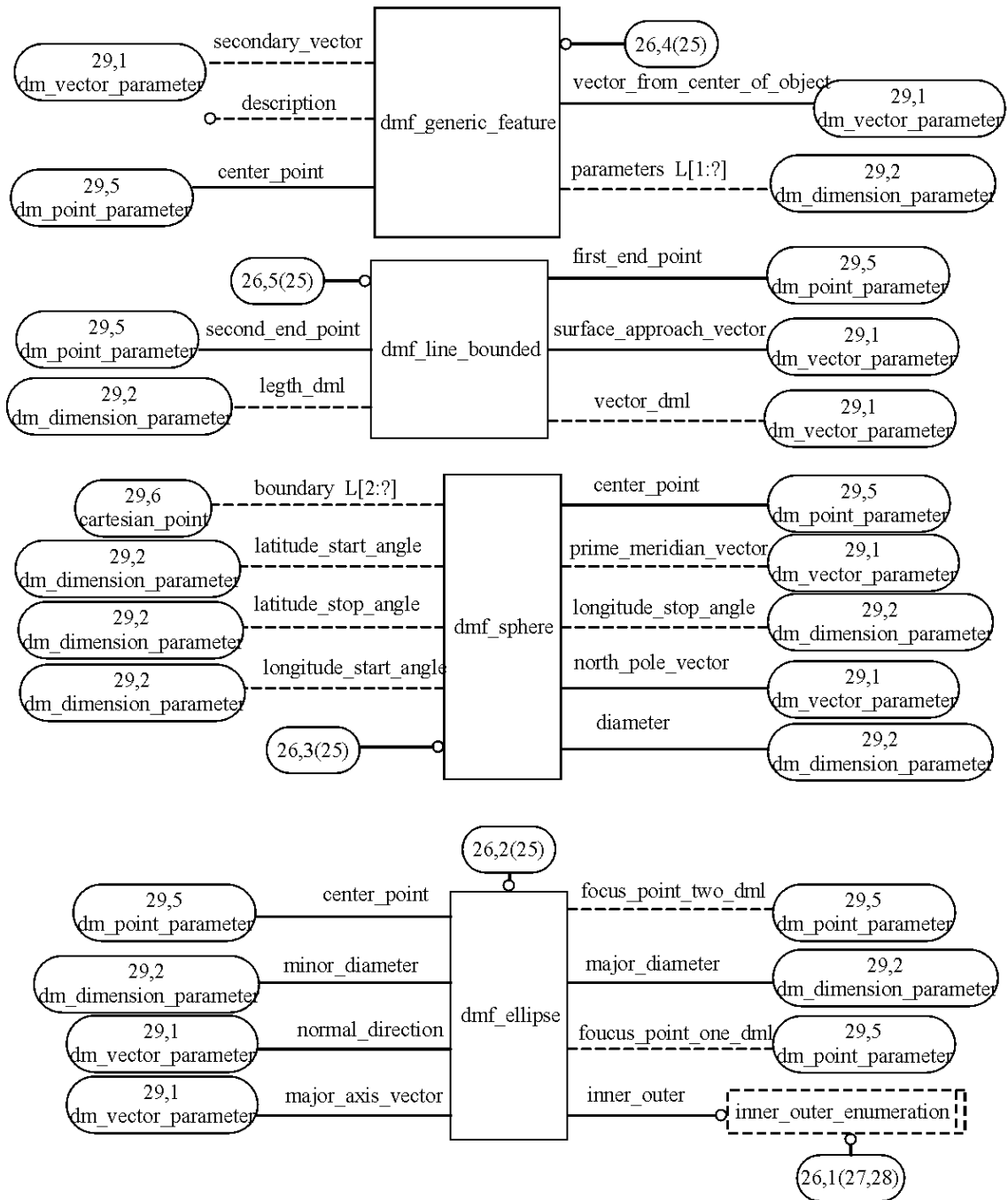


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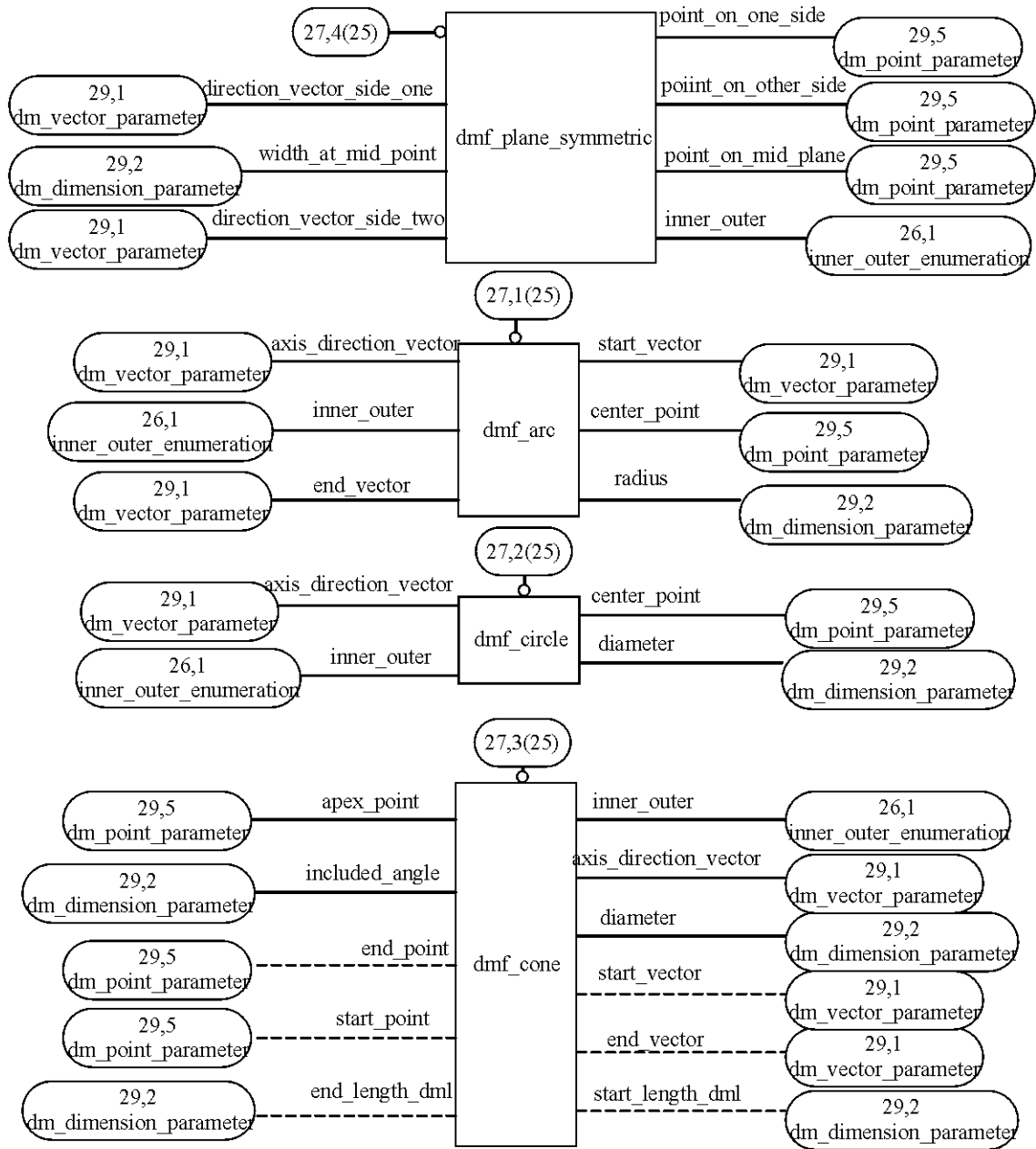


Figure G. 27 - ARM EXPRESS-G diagram 27 of 32

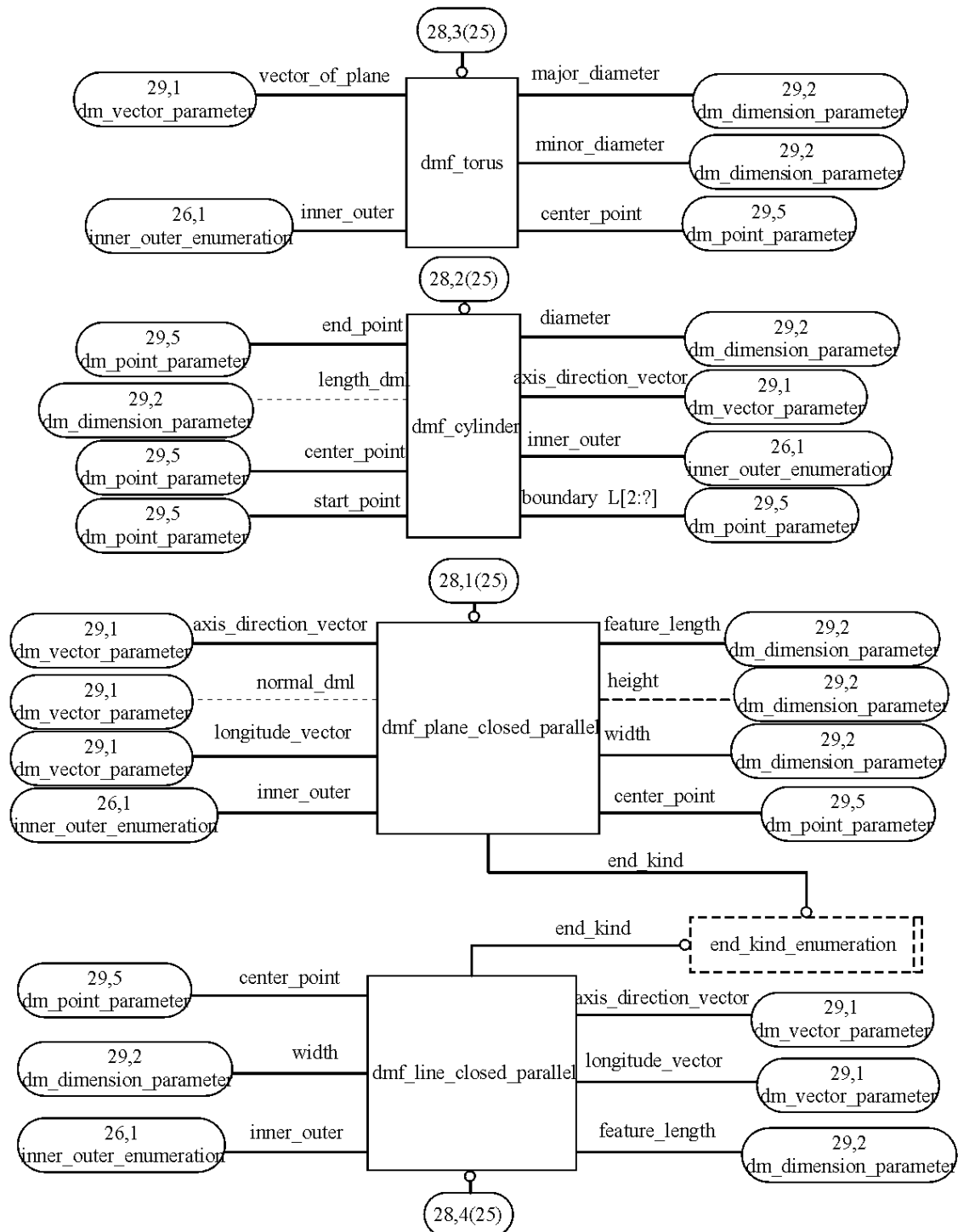


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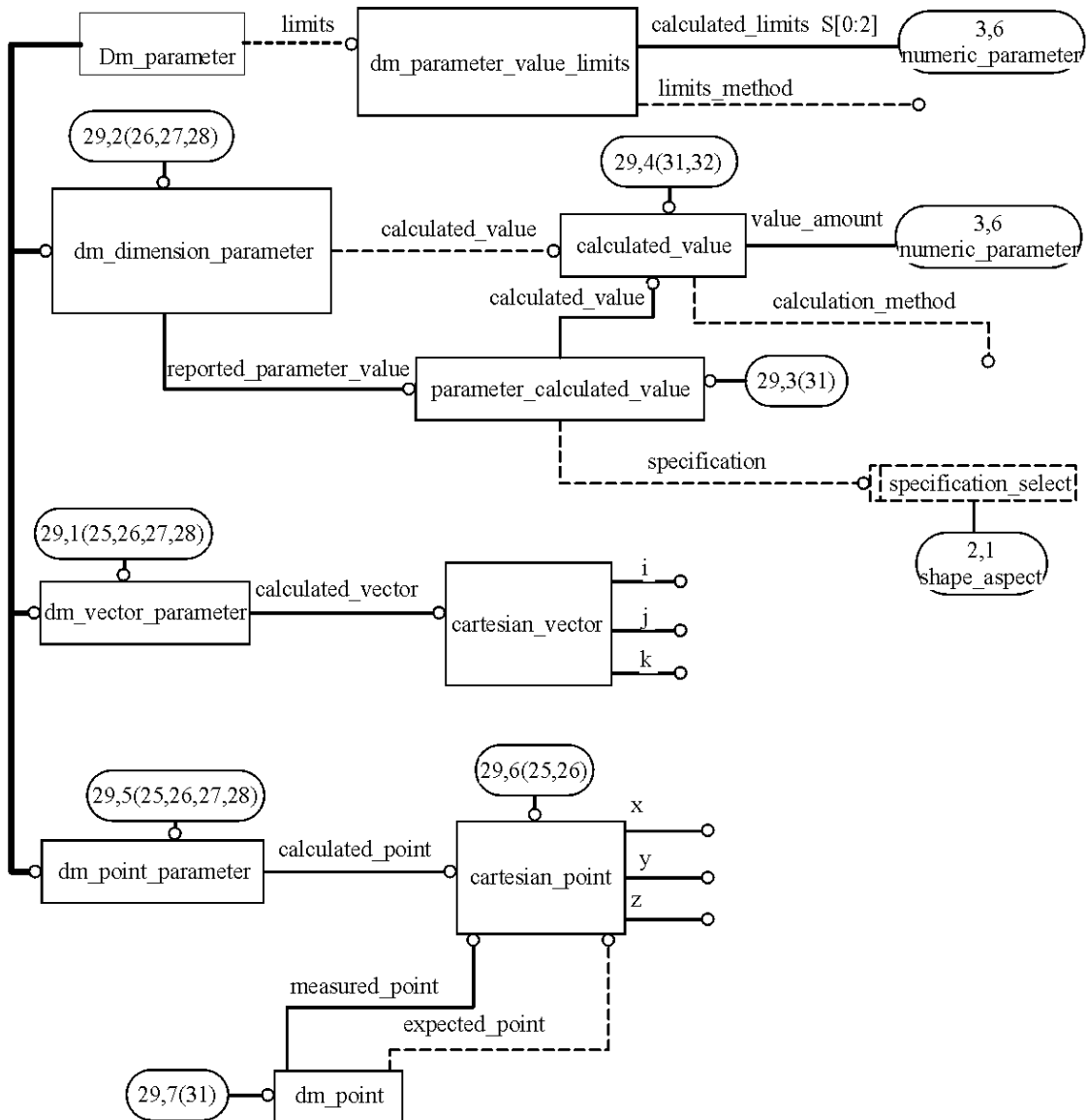


Figure G. 29 - ARM EXPRESS-G diagram 2 of 32

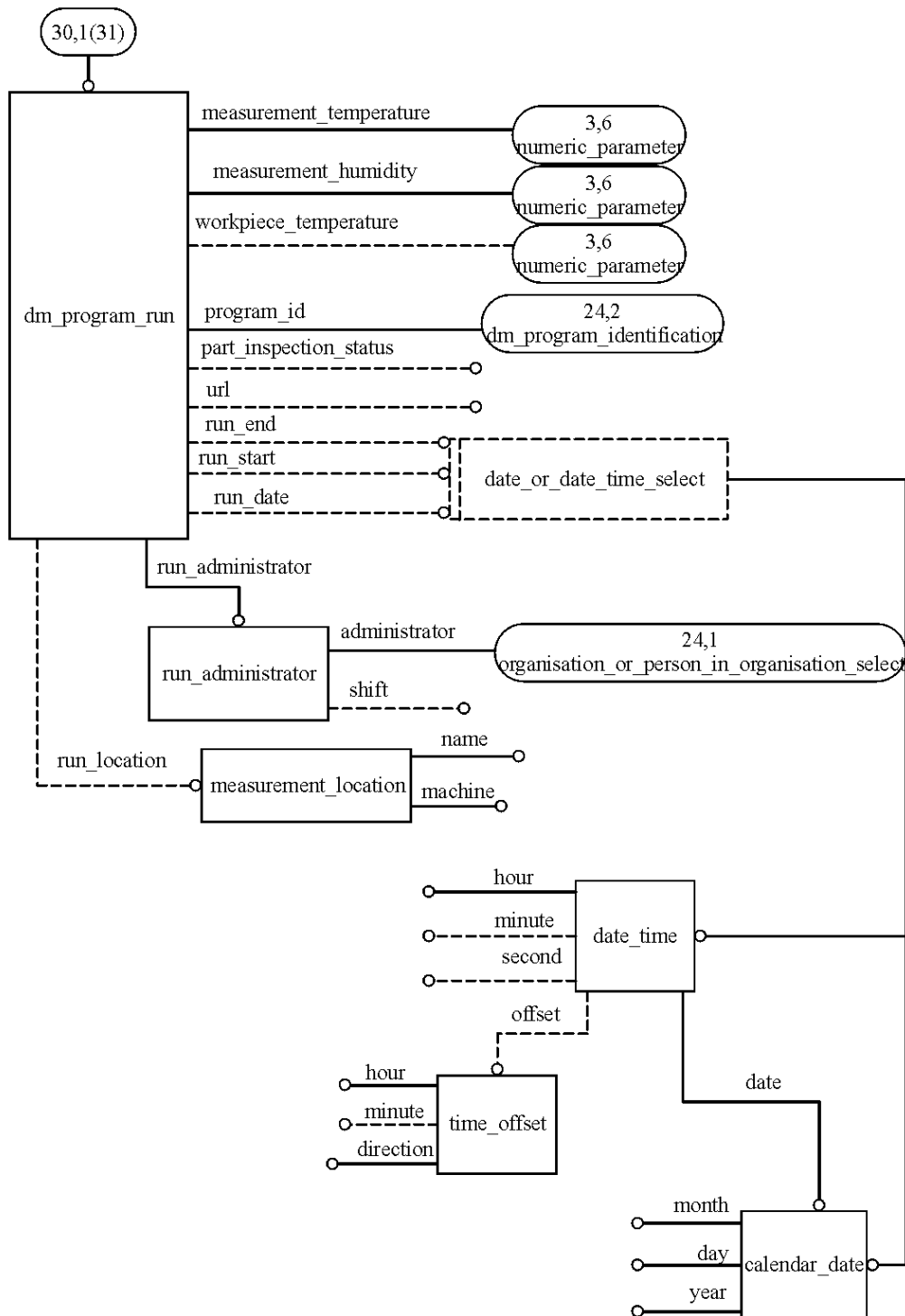


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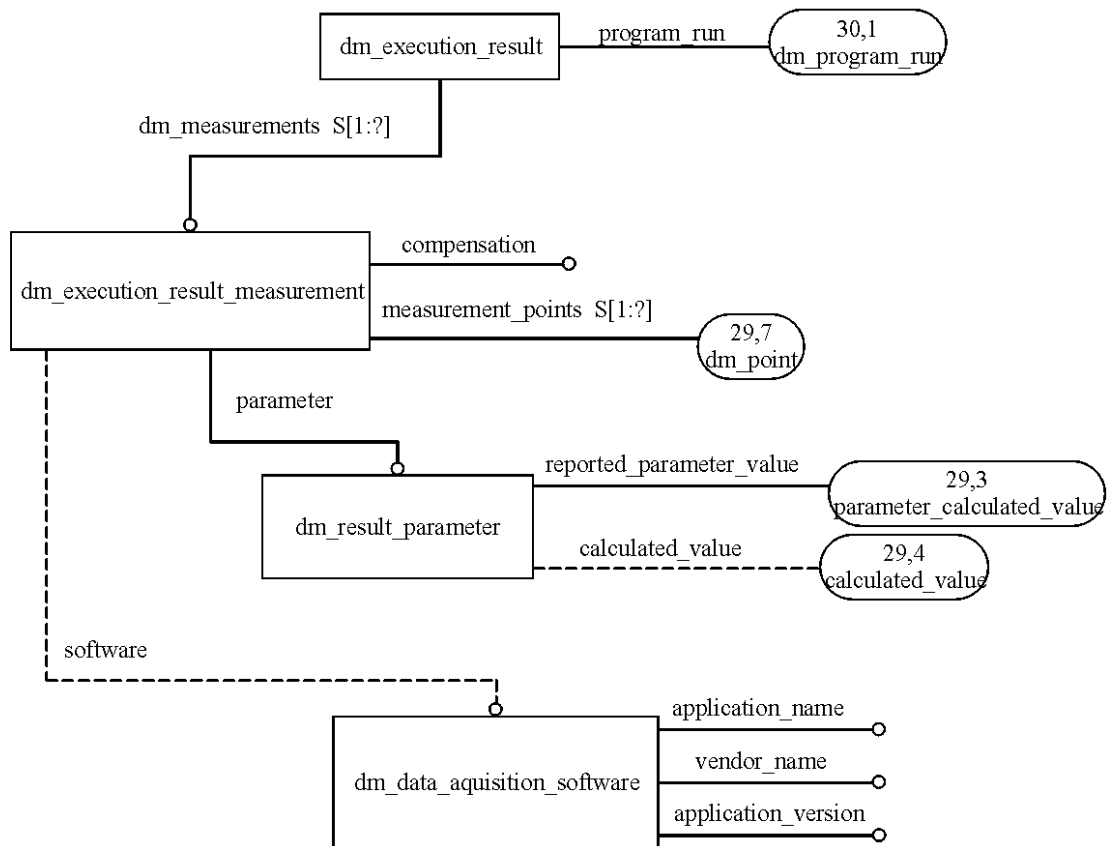


Figure G. 31 - ARM EXPRESS-G diagram 31 of 32

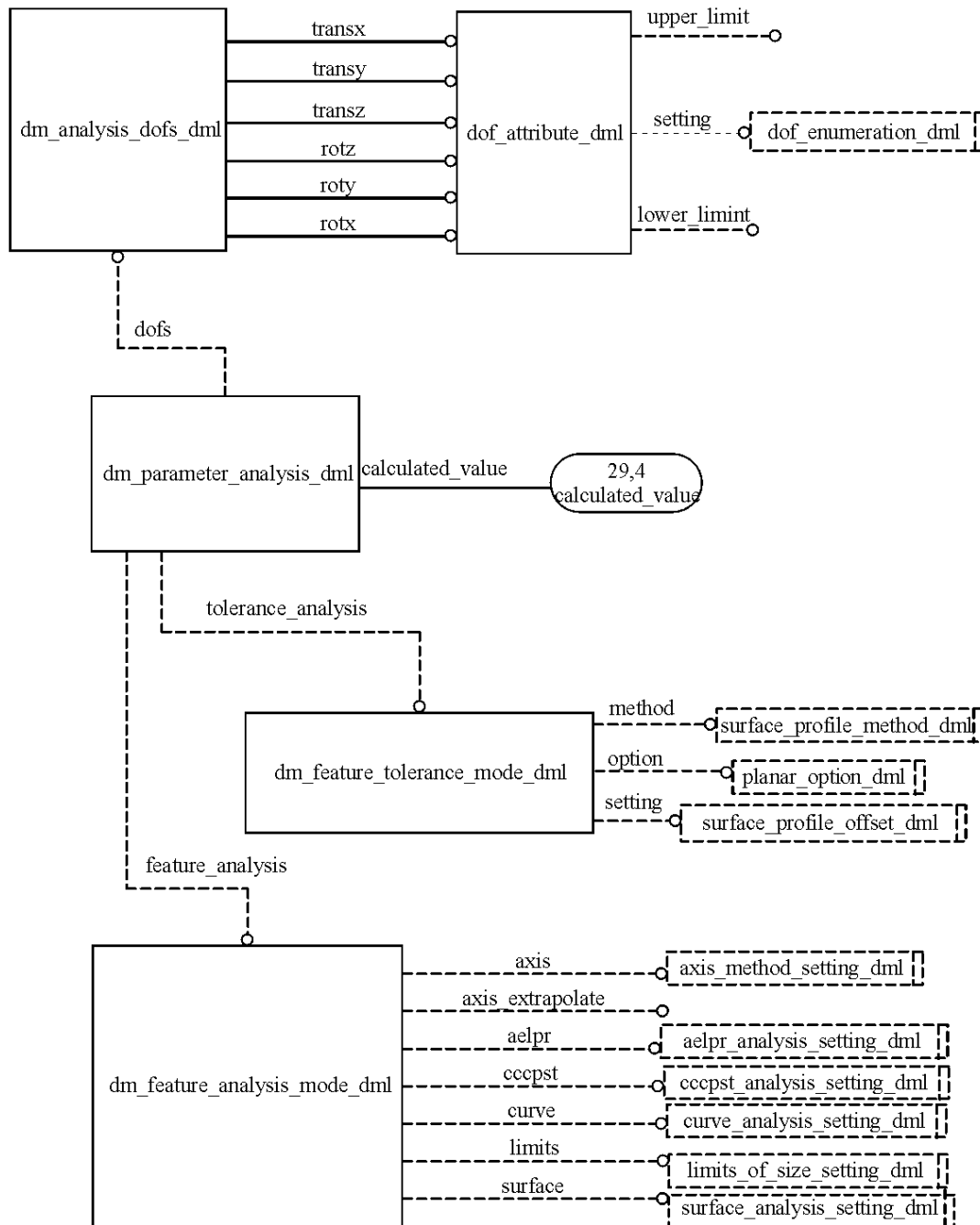


Figure G. 32 - ARM EXPRESS-G diagram 32 of 32

Annex H

(informative)

AIM EXPRESS-G

Figure H.1 through H.37 correspond to the AIM EXPRESS annotated listing given in annex A. The figures use the EXPRESS-G graphical notation for the EXPRESS language. EXPRESS-G is defined in annex A of ISO 10303-11.

Annex J

(informative)

Computer interpretable listings

It also provides a listing of each EXPRESS schema specified in this part of ISO 10303 without comments or other explanatory text. These listings are available in computer-interpretable form and can be found at the following URLs:

Short names: http://www.tc184-sc4.org/Short_Names

EXPRESS: <http://www.tc184-sc4.org/EXPRESS>

If there is difficulty accessing these sites contact ISO Central Secretariat or contact the ISO TC 184/SC4 Secretariat directly at: sc4sec@cme.nist.gov.

NOTE The information provided in computer-interpretable form at the above URLs is informative. The information that is contained in the body of this part of ISO 10303 is normative.

Annex K

(informative)

Application protocol usage guide

This chapter will answer some questions to the ARM of this part of ISO 10303.

K.1 Usage guidelines and test case definitions

The usage guide is documentation that describes the guidelines describing the usage scenarios, and example test cases. This documentation will be develop for the draft international standard of this part of ISO 10303.

Annex L
(informative)
Technical Discussion

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