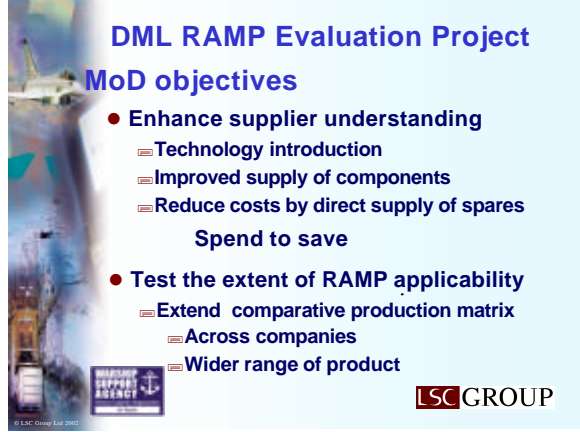


WARSHIP SUPPORT AGENCY
Technical Support Agency for the Royal Navy

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Tony Fry, Alan Crawford

Tuesday, 12 March 2002

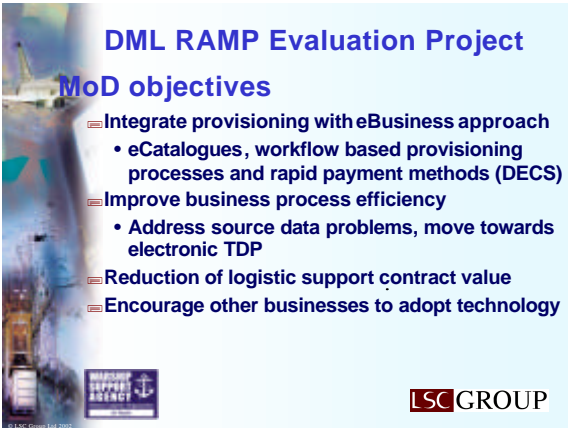


DML RAMP Evaluation Project

MoD objectives

- Enhance supplier understanding
 - ▢ Technology introduction
 - ▢ Improved supply of components
 - ▢ Reduce costs by direct supply of spares
- Spend to save
- Test the extent of RAMP applicability
 - ▢ Extend comparative production matrix
 - ▢ Across companies
 - ▢ Wider range of product

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DML RAMP Evaluation Project

MoD objectives

- ▢ Integrate provisioning with eBusiness approach
 - eCatalogues, workflow based provisioning processes and rapid payment methods (DECS)
- ▢ Improve business process efficiency
 - Address source data problems, move towards electronic TDP
- ▢ Reduction of logistic support contract value
- ▢ Encourage other businesses to adopt technology

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DML RAMP Evaluation Project

The participants

- Warship Support Agency
 - ▢ Organised and run the project
 - ▢ In support of the supply chain
- LSC Group Ltd
 - ▢ Managed the project on behalf of WSA
 - ▢ Generate the AP224 files
 - ▢ LOCAM manufacturing system
- DML

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DML

- £300 million turnover
- 4000 employees
- Owner/operator of Devonport Royal Dockyard
- 25 years experience refitting/refuelling nuclear submarines
- 30 years experience of refitting/design of surface ships
- Design/build/refit of premium yachts
- Rail support/overhaul facilities

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DML RAMP Evaluation Project

The software products

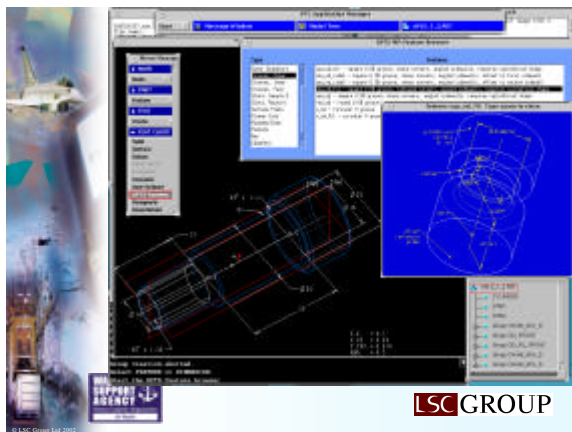
- STEPTrans from SCRA for the production of AP224 filesets
- LOCAM for design interpretation
 - process planning and
 - providing information for the CNC system to post-process.
- EdgeCAM for CNC programming
 - selected by DML
 - no STEP ability

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RAMP Fileset Generation

- STEPTrans system from SCRA provided STEP AP 224 filesets
- LOCAM AP224 Viewer & STEPView used to assist Quality Assurance
- Technical Data Packs
 - from various sources:
 - ISIS, CRISP
 - Drawings & Actual Parts.
 - Standards - NES, BS, ISO, ANSI

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DML RAMP Evaluation Project design/manufacture using RAMP

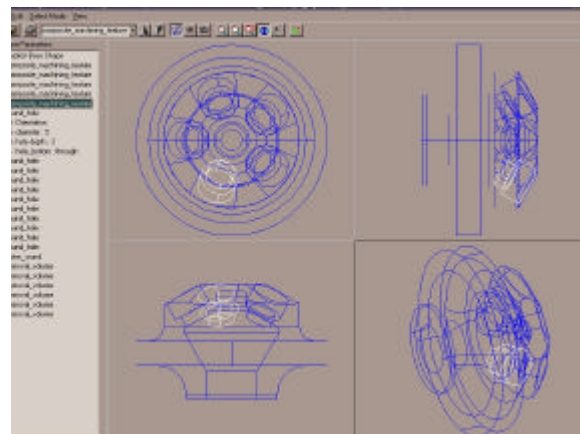
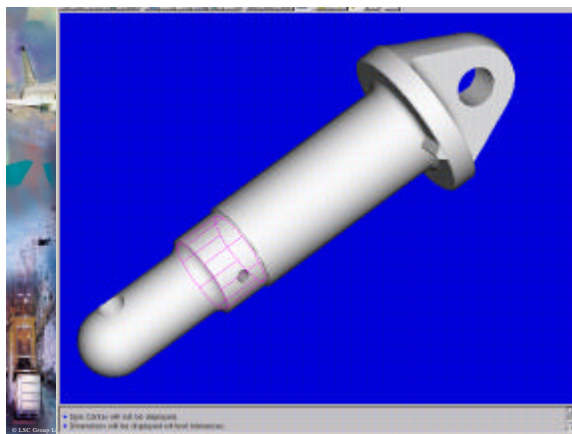
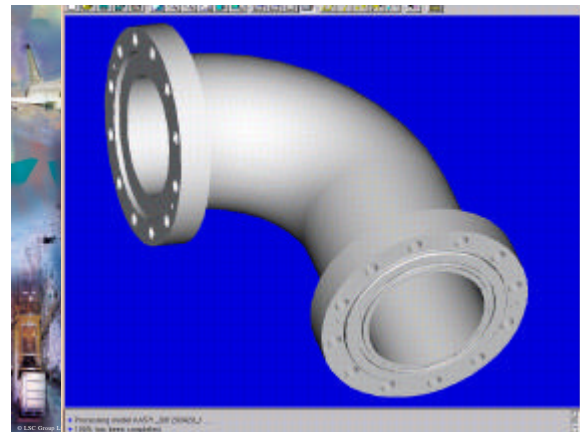
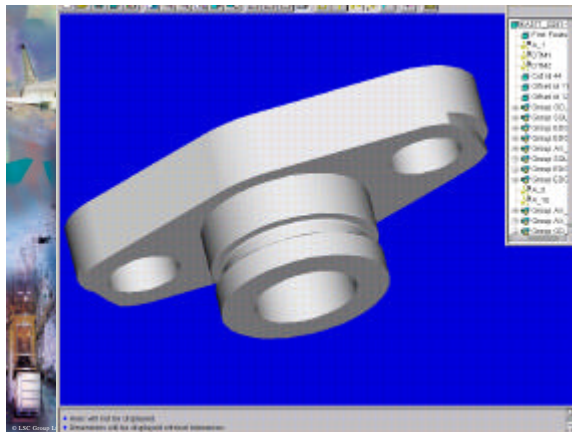
- First level fasteners - 25
 - Comparative data from UK Navy RAMP project
 - Match to a large proportion of Naval spare items
- Miscellaneous items -15
 - Complex components
 - Not in manufacturing family groups – lower level of automation
- Cast/forged items – 5
 - Test new functionality of STEPTrans and trial manufacture
 - High value stock items – store in lowest value form
 - Parts selected by DML Jan 2002
- No assemblies

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DML RAMP Evaluation Project Cast/forged items

- Evaluation in progress
 - Selection by DML complete in Jan 2002
 - Match to production requirement
- Status & comments
 - AP224 files produced
 - blank representation of the cast and forged poor
 - Can produce form
 - Base_shape modified by non machine features
 - Interpret for manufacture
 - information from features associated with an AP224 explicit base shape
- Maximise our learning opportunity

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DML RAMP Evaluation Project

Miscellaneous items

- **Design methods**
 - ▢ Designed to drawing and standards
 - ▢ Few similarities between components
- **Mixed level of automation**
 - ▢ Several matched LOCAM manufacture family rules
 - Generate documents and cut sequence for CNC
 - ▢ From minimum interaction through manual
- **Mix manufacture methods**
 - ▢ Manual, CNC, CNC for machines without post support

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DML RAMP Evaluation Project

First level fasteners

- Mix of design methods - typical RAMP case
 - Using only standards information + CRIP & ISIS
 - To drawing and standards
- High level of automation
 - LOCAM manufacture rules
 - Generate cut sequence for EdgeCAM
 - Minimum interaction

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DML RAMP Evaluation Project

Miscellaneous items

- Design methods
 - Designed to drawing and standards
 - Few similarities between components
- Mixed level of automation
 - Several matched LOCAM manufacture family rules
 - Generate documents and cut sequence for CNC
 - From minimum interaction through manual
- Mix manufacture methods
 - Manual, CNC, CNC for machines without post support

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What does LOCAM do?

- Reads the STEP AP224 design features
- Identifies the manufacture group
 - For example bolts and screws
- Determines manufacture method
 - Uses DML knowhow
- For the INDEX turn/mill machine
 - generate correct sequence of machine commands (tool changes, setting-up datum positions)
 - Balanced turning actions
 - Use of second spindle

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The screenshot displays the LOCAM software interface. On the left, a flowchart outlines the manufacturing process with steps like 'set tool holder', 'set tool', 'set speed', 'set feed', 'set depth', and 'set chuck feature'. On the right, a table lists various parameters for the 'LOCAM (TURNMILL) Machine' such as 'VCLD=round', 'VCLD=hex', 'VCLD=thread', etc., with their corresponding values.

and LOCAM does it

- Consistently
- Always best manufacture method
- Always back to latest data source
 - No danger from copy paste mistakes
 - No danger from incorrect drawing issue
 - No mistyped dimensions
- Automatically

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The screenshot shows the LOCAM software interface with a 3D model of a cylindrical part in the center. On the left, a list of features is visible, including 'Location', 'Axis', 'Radius', 'Diameter', 'Length', 'Angle', 'Offset', 'Chamfer', and 'Thread'. On the right, a 'PARAMETER' window displays a table of values for various features, such as 'Major Diameter', 'Radius', 'Length', 'Manufacturing Status', 'Check Point', and 'Direction of Search'.

Examples of manufacturing rules

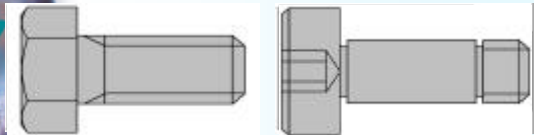
- Rules for milling text at on bolt head
 - generation font height size
 - font position of text
 - and containing box



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Examples of manufacturing rules

- Selection of thread end turning



- Decisions based on
 - thread length
 - shank length & diameter

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LOCAM Time Sheet

Part No: **APLA_1_1** (Material: **HSL8(h)**)

Description: **SCREW** (Material: **Alu**)
ENRILED (Material: **Alu**)

DATE: **15-02-2006**


Part used on: **Ramp Pilot**

Operation No.	Machine	Description	Speed	Feed	Depth
Operation No. 40	Machine: M0000	Description: Turning			
Operation No. 50	Machine: M0001	Description: Turning			
Operation No. 60	Machine: M0004	Description: Turning			

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LOCAM to EdgeCAM simulation

- LOCAM prepares information for manufacture
- Documentation
- EdgeCAM
 - For simulation, verification
 - Post-processing for machine tool



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