

Cutting Force Simulation in Machining Error Prediction/Correction with STEP-NC

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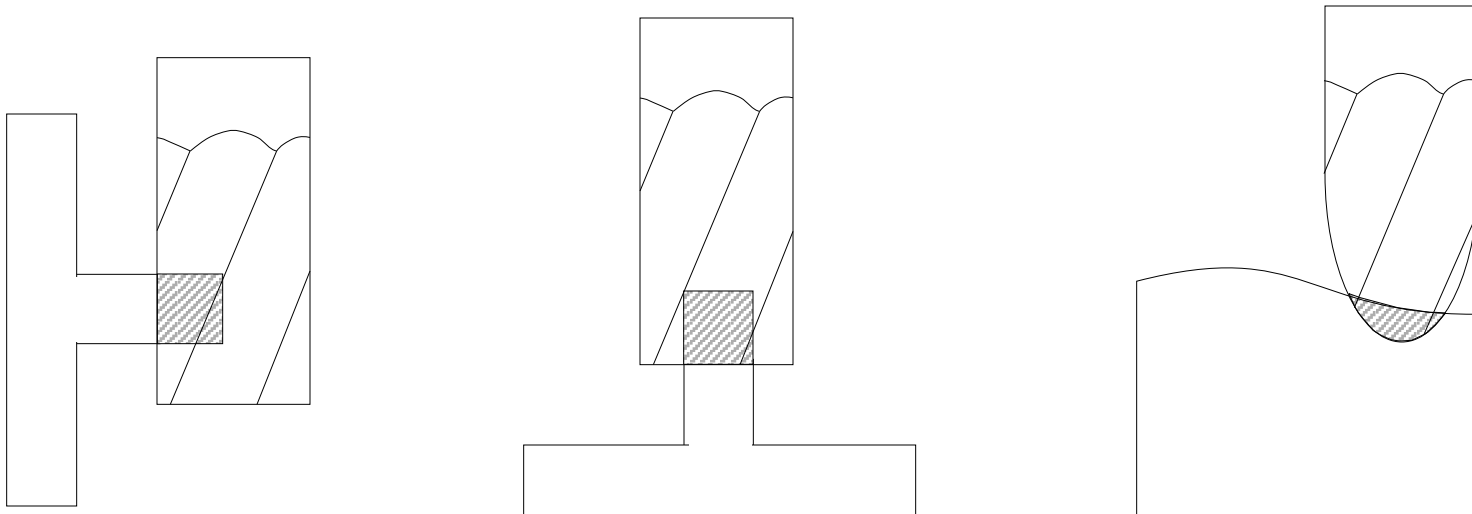
Impact of Cutting Force in Machining Accuracy

- Tool deflection.
- Machine component deformation
- Machine vibration
- Spindle thermal growth

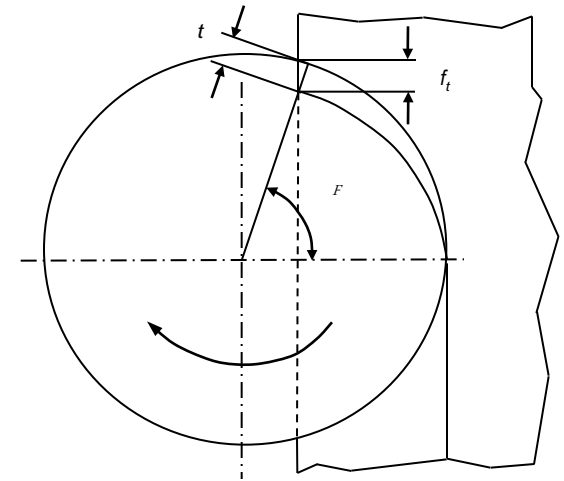
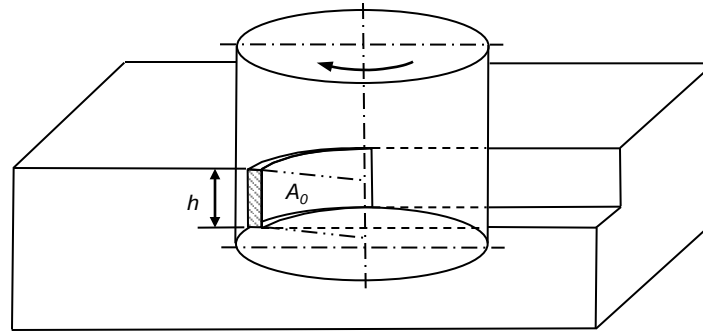
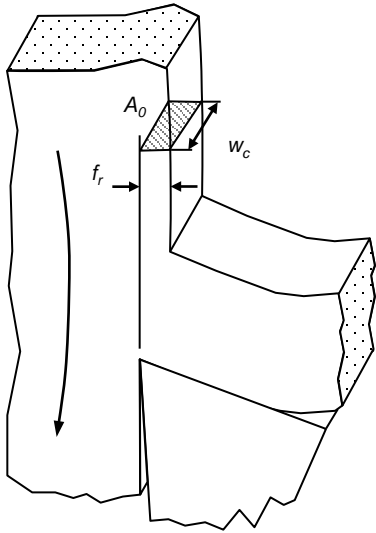
Information for Cutting Force Calculation

- Cutting tool dimensions (ISO-13399)
- Material machinability (cutting test)
- Tool/machine dynamics (modal analysis)
- Machining feed and speed (M-G or STEP-NC)
- Cross-section of cutting paths (STEP-NC)

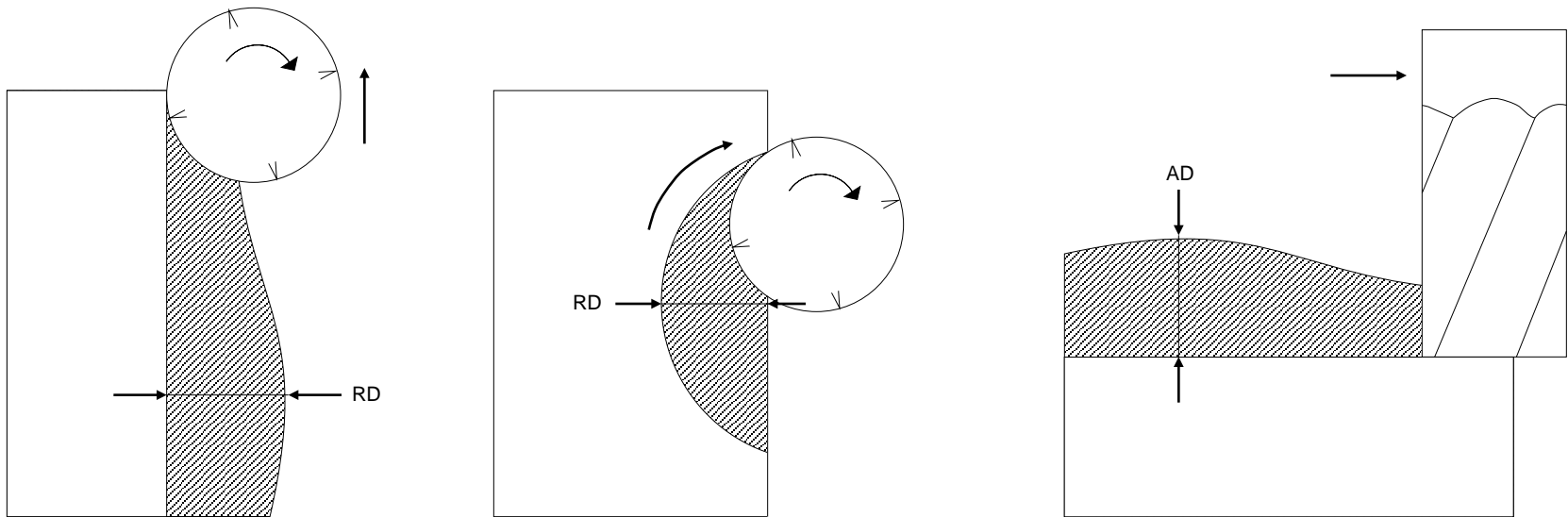
Cross-section of Cutting Path



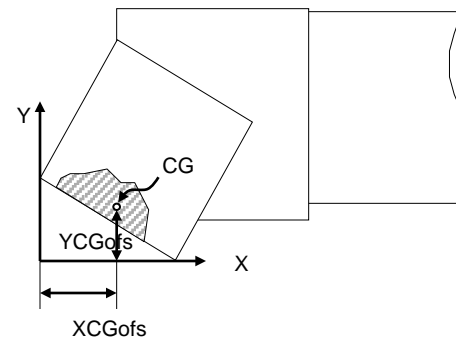
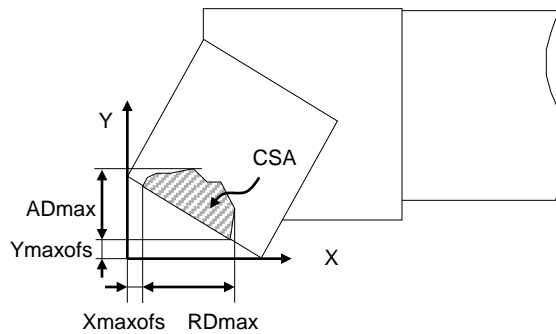
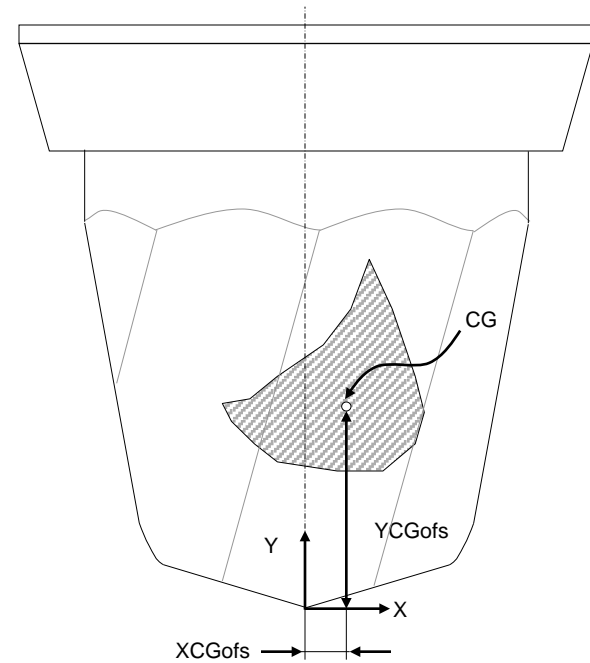
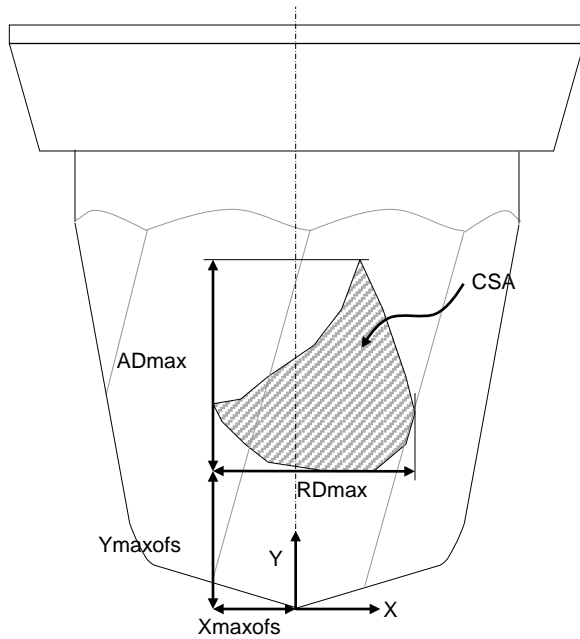
Chip Geometry Calculation in Cutting Force Simulation



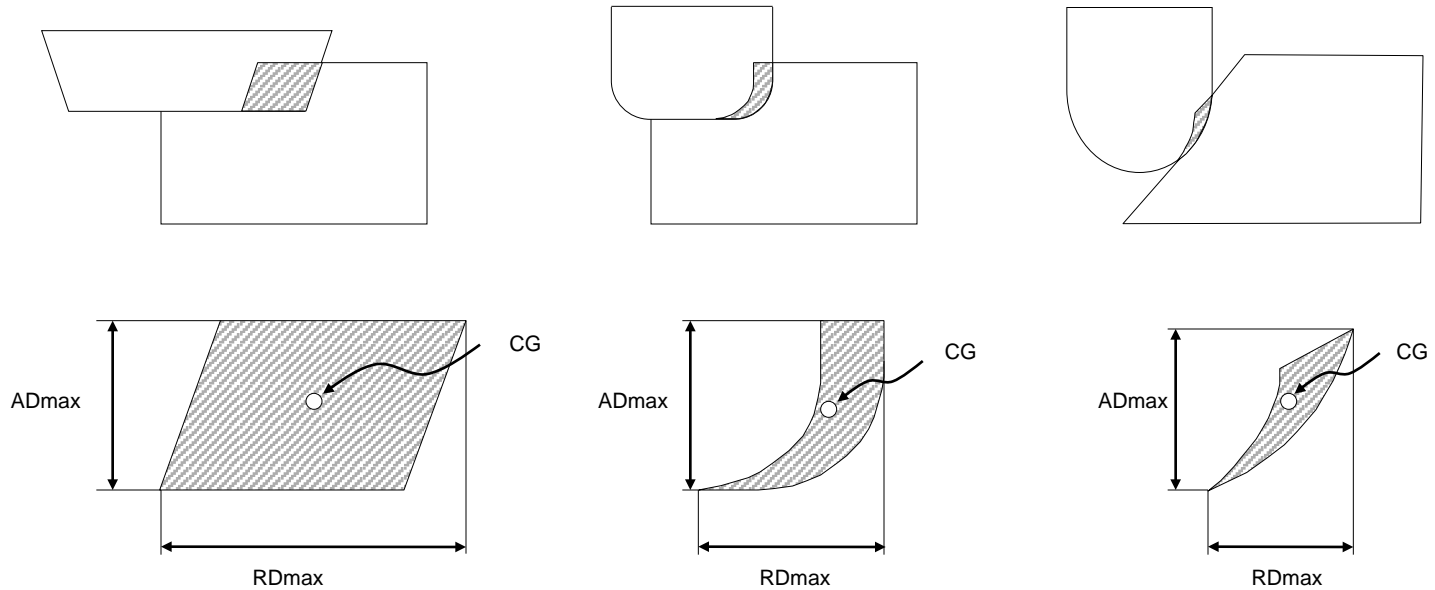
Variation of Cross-section



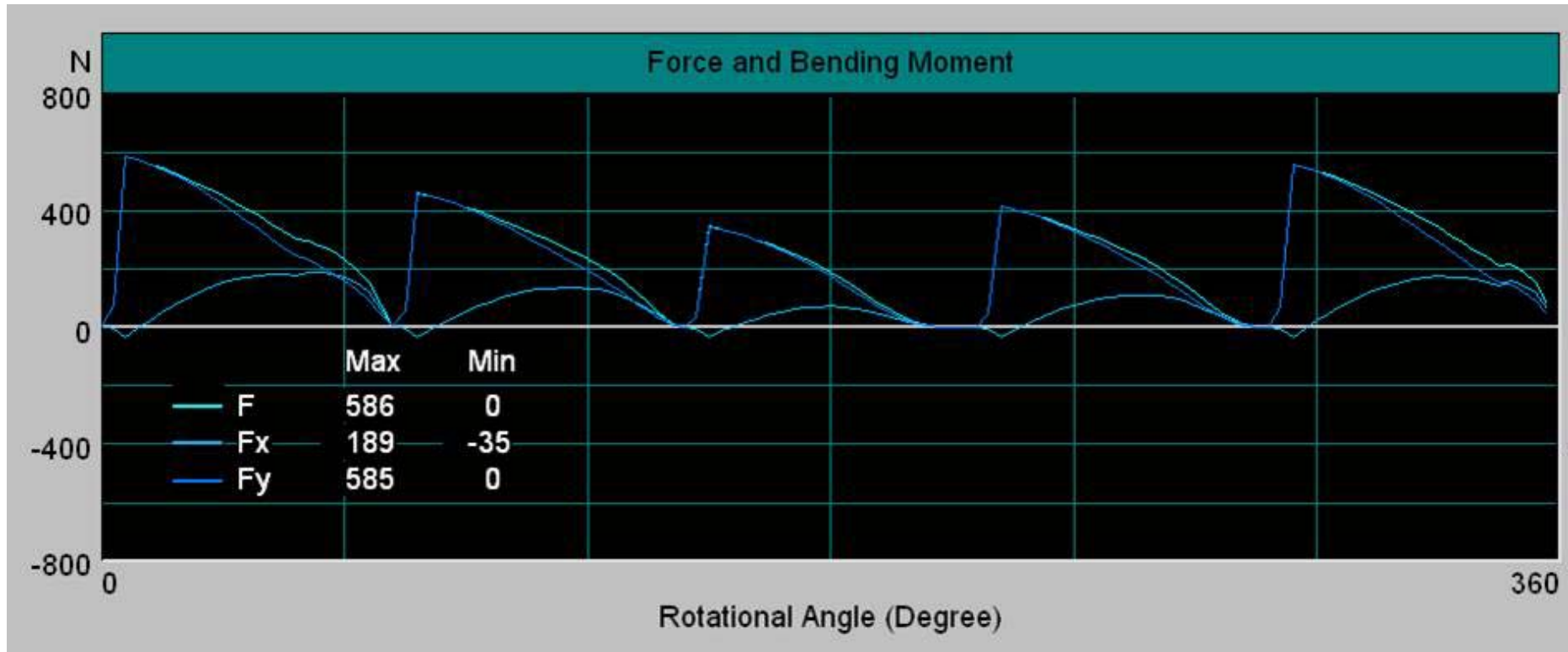
Cross-section in STEP-NC



Representation of Cross-section with STEP-NC



Cutting Force Simulation



Summary

- Cutting force has major impact to machining accuracy
- Cutting force simulation is a critical part in machining accuracy prediction/correction.
- STEP-NC plays important roles in cutting force simulation
 - Incorporates with ISO-13399
 - Provides key cross-section information
 - Transmits cutting force data