GLACOE Mold Machining and NC Simulation
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NC Programming and Simulation for Mold Machining

Key Points of the Demonstration

- The NC Machine Tool Builder Workbench
- Setting up and creation of a Machining Process
- Visual NC Machine Tool Instructions
- Fully engaged Motion – Trochoid Machining
- 3/5 Axis Converter
- Defining and Editing of Machine and Re-Machine regions
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What does the Machine Tool Builder define?

- Speed and Acceleration Limits
- Create Mount Point
- Travel Limits
- Tool Change/Head Change Positions
- Axis Names
- Home Position
- Mechanism Properties
- Insert and Remove Spindles and Turrets
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Setting up a Machine Process defines.

- The Part or Product document to be machined and simulated.
- The Machine to be used in the Process document.
- Machining Origin
- Mount Part or Product on the Machine.
- Tool, Macro, and Process Catalog Documents to be used with the Process document.
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What is the NC Machine Instruction generator.

The Machine Instruction operator is available if the NC Machine Tool Simulation is installed.

- Manages Machine axes motion by either locking or unlocking a machines axis in a program (i.e. An NC Machine with a “W” axis.)

- Can set a Rotary Axes Instruction (i.e. Rotate the Machine table from the Home Position to the machine position while.)

- This functionality automatically integrates with the Automatic Transition Path Generation (Advanced Machining WB)
NC Machine Instruction

In this case the creation of the Machine Instruction insures correct machine rotation. During simulation it provides visual confirmation of the table motion.
The ROTABL/ instruction is generated in the Aptcode.

```plaintext
$$ TOOLCHANGEEND
$$ End of generation of : Tool Change.1
$$ OPERATION NAME : C Axis = 90
$$ Start generation of : C Axis = 90
ROTABL/ 90.000000,CAXIS,TABLE,CCLW
$$*CATIA0
$$ MSYS/
```

The Machine Rotation is validated during NC programming due to the Machine Instruction.
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Trochoid Roughing

In the Strategy Tab of the Roughing operator the “Fully Engaged Tool Motion” Trochoid style is available.
Trochoid Roughing

Trochoid Roughing was developed to reduce roughing times and reduce tool wear.

“*A Trochoid is defined as the trace of a point on a circle that rolls along a line.*”
Trochoid Roughing

The following is an image of just one level of the path.
Advantages of fully engaged tool motion

- Longer Tool or Insert life.
- Shorter Tools may be used for rough machining.
- Reduced machining times due to larger stock removal
- Increased quality and performance.
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- **3/5 Axis Converter – removes tool holder collisions**
- Defining and Editing of Machine and Re-Machine regions
Without the 3-5 axis converter the finish cutter shows regions of holder collision.
With the 3-5 axis converter the finish cutters holder collisions.
The 3-5 axis converter is ideal for Mold Machining. Some of its advantages are:

- Enables cutting tools to be more normal to the tool surface.
- Increased quality and performance of the machining.
- Reduced programming time because 5-axis programs and simulation reside in one software package. Seamless design to manufacturing.
- Shorter tools can be used to finish in deeper draw tools. Maintaining rigidity and accuracy.
- Machining time reduction.
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- Defining and Editing of Machine and Re-Machine regions
Defining and Editing cleanup machining and re-machining regions.

- Defining machining regions increase programming speeds.

  - Re-machining patterns can be created by interrogating the geometry and the finish pathing previously machined creating regions not yet machined.
  
  - The boundary of these regions may be increased or decrease as well as combined or broken into smaller regions.
  
  - Different cutter path styles can then be applied to the different cutting regions.
Unlike part features that reside in the specification tree, Machining features do not. To verify and edit them, users must access the Manufacturing View. The Manufacturing View allows users to verify and edit:

- Machine features
- Machine patterns
- Operations and Tool Changes