



## Advanced Mill Design and Toolpaths

### Course Description

The Mastercam University Mill Design & Toolpaths course provides training that exceeds the minimum requirements for the first level of Mastercam Certification (Mill-CPgmM) as defined by the Mastercam Certification Advisory Committee. The course outline and competencies were developed by the Mastercam Certification Advisory Committee. This course is the baseline Mastercam training at both major manufacturing companies and colleges throughout the United States and is the equivalent of a 3-credit course at a college or university.

### Course Objectives

Upon completion, you should be able to demonstrate skill in the following areas:

#### Advanced Wireframe Creation

- Creating Tangent Vectors relative to a surface edge or point on a surface
- 2D and 3D spline creation and manipulation
- Multiple construction planes
- User-defined construction planes
- 2D and 3D construction methods

#### Surface/Solid Modeling

- Surface Normal
- Surface geometry creation
- Application of all Mastercam surface creation functions
- Projecting geometry onto surfaces
- Advanced Solids

#### Application of Mastercam Solid Creation

- Fillet/Chamfer
- Boolean operations
- Loft Solid
- Swept Solid
- Shell Solid
- Thin Wall Solids
- Trim a Solid with a Surface

### Toolpath Overview

- Overview High Speed Toolpaths
- Core Roughing Toolpath
- Setup for the core
- Horizontal Flat Boundary Toolpath
- Rest Roughing Toolpath
- Raster Toolpath
- Scallop Toolpath
- Waterline Toolpath
- Spiral Toolpath
- Radial Toolpath
- Pencil Toolpath
- Translate a Raster boundary Toolpath
- Blend Toolpath
- Rough Cavity Toolpath
- Waterline Toolpath

### Toolpaths

- Efficient toolpath creation
- Scale the model for shrink
- Creating core geometry, Boolean remove
- Set WCS, stock size, tool list
- Area Rough, Rest Rough
- Backplot, Quick Verify
- STL file creation and STL compare
- Stock setup
- Spiral finishing
- Selecting distance 2D vs 3D

### Toolpaths (continued)

- Waterline
- Pocket contain boundary
- Z depth/ height control
- Toolpath transformation
- Ghosting Operations
- Select core levels
- Determine stock boundary
- Core vs Cavity machining strategies
- Selecting geometry by color
- Scallop toolpath
- Flowline toolpath
- Blend toolpath

### 4<sup>th</sup> Axis/Rotary

- Axis substitution
- Unwrapping the cylinder
- Defining the cylinder for stock
- Drilling the radial holes
- Axis Indexing
- Creating WCS planes form a solid
- Using the WCS offset for depth
- 4th axis machining
- Holding the part
- Creating solids for fixturing
- Multi-axis rotary 4th axis toolpath
- Radial cut
- Lead lag angle
- Roughing with an axial cut



## Advanced Mill Design and Toolpaths

### Materials

The Advanced Mill Design & Toolpaths course requires:

- High speed internet connection
- Computer that meets the [Mastercam System Requirements](#)
- Mastercam Demo/Home Learning Version, which you can download at Mastercam U.

### Course Schedule

Because this course is available online, it can be taken at any time and at your own pace. At an educational institution, this course would typically require approximately sixty hours (for example, three nights a week for six weeks). This includes lab time to complete all examples. To get the most out of this class, plan to spend three hours per session and allow two and a half hours to take the final practical test.

### Multiple Choice Test Overview

There are pre- and post- multiple choice tests for both the design and toolpath sections of the course. You will receive a Certificate of Completion (PDF format) upon completion of the post-test, which will display the post-test grade. Students should have at least 30-45 minutes to complete the multiple choice question tests. These are supplied to review.

### Cost

The cost of the Mastercam University Mill Design & Toolpaths course is \$249.00.

### Course Policies

- This course is designed for one student, but allows the lectures to be viewed by others.
- The Certificate of Completion will be stored at Mastercam University under your unique student ID number. It remains available for you to use as proof of work completed and grades received.
- You must also register at a regional college to receive college credit for the successful completion of this course.