



Multiaxis (Curve / Drill / Circle Mill)

Course Description

The Mastercam University Multiaxis Curve / Drill / Circle Mill course provides students with a strong foundation in 5-axis CNC programming. The class starts out with an extensive overview of axis combinations, rotary points, and zero positions as they relate to Mastercam. It then builds on how to control tool axis vectors using different geometric entities. The examples explain the many ways to control how the tool approaches and machines with a controlled 5-axis toolpath. This course also covers 5-axis positioning, drilling, trimming, circle milling, and machine simulation. The 4th Axis Rotary Machining section will serve as an overview for those that have previously enrolled in the Advanced Mill Design and Toolpaths course.

Course Objectives

Upon completion, you should be able to demonstrate:

4th Axis Rotary Machining

- Axis substitution
- Unwrapping the cylinder
- Defining the cylinder for stock
- Drilling the radial holes
- Axis indexing
- Creating WCS planes from a solid
- Using the WCS offset for depth
- 4th axis machining
- Holding the part
- Creating solids for fixturing
- Creating a Multiaxis rotary 4th axis toolpath
- Radial cutting
- Defining lead / lag angle
- Roughing with an axial cut

5-Axis Toolpath

- Introduction to multiaxis machining concepts
- Overview of common 5-axis machines
- Zero position on a 5-axis machine
- Cut pattern
- Tool axis control

5-Axis Toolpath (continued)

- Geometry creation for tool axis control, including:
 - Points
 - Vectors (lines)
 - Chains
 - Planes
 - Surfaces
- Collision control, including Check Surfaces
- Machine simulation
- Mastercam Multiaxis toolpaths
 - Curve, trimming a part (face shield)
 - Drill, normal to a face, vector (lines), plane, and points
 - Circle Mill, geometry creation

Strongly Recommended Pre-requisites

- Print reading with multiple views
- CNC machining experience
- CNC set-up experience
- Intermediate to advanced Mastercam experience



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Materials

The Multiaxis Curve / Drill / Circle Mill 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. 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 4- and 5-axis 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 industrial user cost of the Mastercam University Multiaxis Curve / Drill / Circle Mill course is \$249.

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.