



## **Advance Lathe Mill Multiaxis Design & Toolpaths using Mastercam**

**Course Curriculum (Duration: 100 Hrs.)**

### **Chapter 1: Before you start using Mastercam**

- a. Coordinate Systemes
- b. Conversions, Measurements, and Tools
- c. Machining Processes
- d. Lathe, Drilling, Reaming, Tapping and Milling
- e. Cutting Tools and Tool Holders
- f. Cutting Speeds, Feeds, and Revolutions per Minute (RPM)
- g. Chip Formation, Load, and Material Removal Rates
- h. Work Holding and Setup
- i. Introduction to CNC Part Programming

### **Chapter 2: Basics of CAD/CAM & Introduction to Mastercam**

- a. Introduction to CAD/CAM
- b. Advantages of CAD/CAM over conventional methods
- c. Mastercam Software Installation
- d. Mastercam Modules
- e. GUI
- f. Getting Help
- g. File Management
- h. File Conversions

### **Chapter 3: Lathe Design**

- a. Set the plane to diameter
- b. Create lines on diameter
- c. Create a groove
- d. Create a revolved solid
- e. Create dimensions
- f. Use radius blends
- g. Create chamfers
- h. Assignments

### **Chapter 4: Lathe Setup**

- a. Select a Lathe machine definition
- b. Set the Lathe machine group properties (tools, materials, stock, chuck, jaws, etc.)
- c. Set up a Lathe toolbar configuration
- d. Explore the Lathe toolbar icons
- e. Face, rough, finish, groove, and thread a part
- f. Cut the part off
- g. Verify all toolpaths
- h. Post process the operations to create the NC program (G-code)
- i. Assignments

### **Chapter 5: Lathe Toolpaths**

- a. Review Mastercam chaining as used for lathe machining
- b. Set up stock and chuck jaws
- c. Create geometry as necessary to program operations on a solid model
- d. Create a custom tool, tool holder, and tool library Flip stock
- e. Create and use a template and merge part geometry with a template
- f. Apply both standard and quick lathe toolpath operations
- g. Assignments
- h. Lathe Applications

## **Chapter 6: Milling Design**

- a. Set the plane to diameter
- b. Create lines on diameter
- c. Create a groove
- d. Create a revolved solid
- e. Create dimensions
- f. Use radius blends
- g. Create chamfers
- h. 3D Modeling of various Parts & Assemblies
- i. Assignments

## **Chapter 7: Mill Toolpaths**

- a. Chaining Overview
- b. Toolpaths Overview
- c. Alt Mount
- d. Power Mount
- e. Tool Manager
- f. Autowinder
- g. Dash
- h. 30 Degree Clamp
- i. Receiver
- j. Assignments

## **Chapter 8: Mill Applications**

- a. Programming the brake for a limited production run.
- b. Programming the brake for a big production run with dedicated fixturing.
- c. Assignments

## **Chapter 9: Multiaxis (Curve Drill and Circle Mill)**

### **a. 4th Axis Rotary Machining:**

#### **Axis substitution**

- Creating geometry based on a cylinder
- Marking at 90, 30, and 45 degree positions
- Drill point on angle
- Adding the 4th axis mill
- Backplot and verify the toolpath

#### **Axis Positioning**

- Loading a Parasolid model
- Part Fixture
- Drill rotary
- Multiple offsets
- Positioning

## **Chapter 10: Rotary Surface Machining**

- a. Axial machining
- b. Radial machining
- c. Axis substitution
- d. Axis Positioning
- e. Shifter
- f. Horizontal Overview

## **Chapter 11: 5 Axis Toolpath**

- a. Overview
- b. Toolpath vector from a Point
- c. Toolpath vector from a Line
- d. Toolpath vector from a Chain
- e. Toolpath vector from a Plane
- f. Toolpath vector from a Surface
- g. Toolpath vector from Curves and Lines
- h. Trimming a shield
- i. Drilling and Circle Mill
- j. Final Project