Autodesk Expert in CAM for Multi-Axis Milling

Target Audience

This course is designed for highly experienced CNC programmers, advanced manufacturing professionals, and expert-level CAM users who work with multi-axis milling using Autodesk Fusion 360. It is ideal for professionals in aerospace, defense, medical, industrial design, automotive, and energy sectors who want to demonstrate leadership in advanced manufacturing and validate expert-level toolpath control, simulation, and output optimization for complex machining operations.

Course Objective

This advanced course is designed to develop expert-level knowledge and skills in multi-axis CAM programming using Autodesk Fusion 360. Participants will learn to work with complex part geometries, optimize multi-axis toolpaths, simulate realistic machine movements, troubleshoot NC code, and perform in-process inspection within a sophisticated manufacturing environment. The course is aligned with the requirements of the Autodesk Certified Expert in CAM for Multi-Axis Milling certification, empowering learners to demonstrate mastery in advanced CAM workflows and prepare for high-level certification.

Course Outcome

• **Advanced Toolpath Planning** – Gain mastery in selecting and refining toolpath strategies for 3+1, 3+2, and simultaneous 5-axis machining.

• **Complex Fixture and Setup Management** – Learn to define workholding, WCS location, and machine configurations for multi-axis environments.

• **Simulation and Collision Validation** – Verify tool clearance, avoid shaft-holder collisions, and simulate operations prior to code generation.

• **Custom NC Code Output** – Generate, troubleshoot, and verify output code for high-precision multi-axis setups.

• **Integrated Inspection Skills** – Validate part accuracy through probing and manual inspection strategies.

Course Outline: The course comprises **56 hours** of in-depth training **theory and practical labs** and is divided into **6** comprehensive chapters. Each chapter includes advanced hands-on labs, simulation tasks, and case-based toolpath exercises.

Chapter 1. Planning and Setup for Multi-Axis Machining

Interpreting engineering drawings for multi-axis operation
Planning stock preparation for multi-axis work holding
Designing fixtures and evaluating cutting forces
Analyzing geometry for toolpath sequencing
Assessing if multi-axis machining is suitable
Performing multi-axis CAM setup in Fusion 360
Locating the Work Coordinate System (WCS) for center of rotation
Creating machine configurations for multi-axis environments

Chapter 2. Machine and Tool Setup

Digitally planning tool assemblies and holders
Selecting tools and holders for specific geometry
Digitally assembling work holding devices
Choosing work holding based on part specifications
Defining multi-axis work offsets and operation parameters
Establishing WCS strategies for multi-fixture setups

Chapter 3. Programming Multi-Axis Toolpaths

Choosing machining strategies for complex geometry
Selecting appropriate toolpaths (e.g., swarf, steep and shallow)
Defining tool orientation for 3+1, 3+2, and simultaneous 5-axis
Managing axis of rotation and tilt angles
Creating wrapped 2D toolpaths using tool axis control
Defining containment boundaries using edges, sketches, surfaces
Controlling toolpath slope limits and retraction policies
Applying collision avoidance with shaft and holder controls
Trimming toolpaths and adjusting movement strategies
Optimizing program order and toolpath smoothing

Chapter 4. Simulation and Verification

Simulating toolpaths with machine motion
Validating stock removal strategies using comparison tools
Detecting tool collisions and holder interference
Making toolpath adjustments based on simulation outcomes

Chapter 5. NC Code Output

Verifying axis setup with posted NC code
Troubleshooting NC code errors
Configuring output to match machine capabilities

Chapter 6. In-Process Part Inspection

Using probing cycles to verify features and dimensions
Manually inspecting part dimensions and feature tolerances
Updating machine parameters based on inspection results
Proving out programs on a physical machine