

Autodesk Professional in CAM for 3 Axis Milling

Target Audience

This course is designed for advanced CNC programmers, machinists, and manufacturing engineers who want to deepen their skills in computer-aided manufacturing (CAM) for 3-axis milling using Autodesk Fusion 360. It is ideal for professionals working in aerospace, automotive, defense, industrial, medical, and general manufacturing sectors who are looking to validate their expertise in CAM workflows, toolpath optimization, and advanced machining strategies.

Course Objective

This course provides advanced knowledge and practical skills in planning, programming, simulating, and verifying complex 3-axis milling operations using Autodesk Fusion 360. Participants will learn to optimize toolpaths, manage tooling, perform collision checks, generate NC programs, and apply inspection strategies to ensure high-precision manufacturing outcomes. The course is structured to align with the competencies required for the Autodesk Certified Professional in CAM for 3 Axis Milling certification, preparing learners to demonstrate proficiency in professional-level CAM workflows and achieve industry-recognized certification.

Course Outcome

- **Advanced Process Planning Skills** – Gain expertise in analyzing part geometry, defining setups, and planning operations for efficient machining.
- **Tooling and Toolpath Proficiency** – Learn to select and manage tools, define optimized toolpaths, and apply CAM expressions for advanced control.
- **Simulation and Verification Mastery** – Master validating toolpaths, checking collisions, and making adjustments to ensure error-free operations.
- **Code Generation and Documentation** – Develop skills to generate NC code, create setup sheets, and interpret program warnings or errors.
- **Inspection and Quality Control** – Understand and apply probing and first-article inspection techniques to verify part accuracy.

Course Outline: The course comprises **40 hours** of advanced **theory and practical labs** and is divided into **6 comprehensive chapters**. Each chapter will be followed by hands-on lab exercises to reinforce learning and assess understanding of the topics covered.

Chapter 1. Work Planning and Setup

Analyzing Part Drawings and Models

- Using inspection tools (Measure, Minimum Radius Analysis, Accessibility Analysis)
- Selecting tools based on geometry and surface finish
- Determining setups and order of operations

Stock and Workholding Planning

- Reviewing models to determine stock shape and size
- Designing fixturing methods (collision avoidance, cutting force evaluation)
- Defining stock position and selecting workholding devices (soft jaws, vises, fixtures)

CAM Setup in Fusion 360

- Defining stock, model, and fixture
- Setting WCS offsets
- Defining machine configurations

Chapter 2. Machine Setup and Tool Management

Tool and Tool Holder Planning

- Identifying appropriate tools for each operation and geometry
- Defining tool holder parameters and selection criteria

Tool Assembly and Digital Library Management

- Defining and managing tool parameters in a tool library

Chapter 3. Toolpath Programming and Optimization

Defining Toolpath Inputs

- Containing toolpaths to areas, slopes, or surfaces
- Applying model overrides and height settings

Optimizing Toolpaths

- Using CAM expressions, derive/duplicate/templates
- Adjusting 3D toolpath inputs (stepover, stepdown, load, containment)

Applying Toolpaths

- Applying toolpath inputs for contact control and geometry-based adjustments

Chapter 4. Simulation and Verification

Stock and Material Removal Verification

- Using stock comparison and tolerance simulations
- Verifying toolpath motions (cutting, linking, rapid)

Collision Analysis and Adjustments

- Reviewing collisions and making toolpath adjustments based on simulation results

Chapter 5. NC Code Generation and Setup Documentation

Program Configuration and Output

- Creating and configuring NC programs
- Selecting program settings and post configurations
- Evaluating NC file warnings and errors

Setup Sheet Creation

- Identifying and reviewing critical setup sheet components

Chapter 6. Part Inspection and Quality Control

WCS Probing and Validation

- Creating probe operations for WCS location

First Article Inspection

- Using precision tools (calipers, micrometers, Bluetooth calipers) for validation

Program Prove-Out

- Evaluating results and confirming program readiness