

CNC Programming & CAM Training

Using Autodesk Fusion and NC Viewer Focused on FANUC Milling and Siemens Lathe

Target Audience

This course is designed for CNC programmers, machinists, and manufacturing engineers who want to build strong foundational and advanced skills in CNC programming and CAM workflows. It is ideal for learners working with **FANUC milling** and **Siemens lathe systems**, as well as those seeking to integrate Autodesk Fusion and NC Viewer into industrial machining workflows.

Course Outcomes

By the end of this course, participants will be able to:

- Understand CNC technology, machine types, and industrial applications.
- Identify CNC machine components, axes, tooling, and workholding systems.
- Write, edit, and execute CNC programs using G-codes and M-codes.
- Apply FANUC milling programming techniques for contouring, drilling, tapping, and optimization.
- Apply Siemens lathe programming techniques for facing, threading, grooving, and parting operations.
- Configure and manage CNC tooling, offsets, and compensation strategies.
- Program multi-axis CNC machines for complex geometries.
- Use Autodesk Fusion CAM for toolpath creation, simulation, and NC code generation.
- Postprocess CNC programs for FANUC and Siemens controllers.
- Simulate machining workflows, detect collisions, and optimize cycle times.
- Analyze CNC programs using NC Viewer for verification and troubleshooting.
- Apply industrial CNC workflow best practices and safety procedures.
- Execute practical CNC projects for milling and lathe applications.

Course Objectives

- Provide a structured foundation in CNC programming and CAM workflows.
- Train learners in FANUC milling and Siemens lathe programming techniques.

- Develop proficiency in tooling, offsets, compensation, and optimization.
- Enable learners to integrate Fusion CAM and NC Viewer into CNC workflows.
- Teach simulation, verification, and troubleshooting of CNC programs.
- Reinforce learning through industrial projects and case studies.

Course Outline

The course comprises **48 hours** of theory and labs and is divided into **13 different chapters**. Each chapter will be followed by **hands-on lab exercises** to reinforce learning and gauge understanding of the topics covered.

Table of Contents:

Module 1: Introduction to CNC Technology

- What is CNC? Understanding Computer Numerical Control
- Evolution and Advantages of CNC Machining
- CNC Machine Types and Configurations
- Milling vs Lathe Machines
- Introduction to FANUC Milling and Siemens Lathe Systems
- Applications of CNC in Various Industries
- Modern Digital Manufacturing Workflow

Module 2: CNC Machine Components and Axes

- Overview of CNC Machine Components
- Understanding Linear and Rotary Axes
- Milling Machine Axis Configuration
- Lathe Machine Axis Configuration
- Workholding Devices and Tooling Systems
- CNC Machine Tools and Accessories
- Introduction to Milling and Lathe Tooling

Module 3: CNC Programming Fundamentals

- Introduction to G-Codes and M-Codes
- CNC Coordinate Systems and Part Zero Setup

- Absolute vs Incremental Programming
- Writing and Editing CNC Programs
- CNC Program Execution and Safety Considerations
- Introduction to FANUC Milling Code Structure
- Introduction to Siemens Lathe Code Structure

Module 4: CNC Tooling and Tool Management

- Types of CNC Cutting Tools
- Milling Cutters and Tool Holders
- Lathe Inserts and Turning Tools
- Tool Selection and Toolpath Strategies
- Tool Offsets and Compensation
- Tool Life Management and Tool Change Procedures
- Feeds and Speeds Optimization

Module 5: FANUC Milling Programming Techniques

- Introduction to FANUC Milling
- Linear and Circular Interpolation
- Facing Operations
- Contouring and Pocket Milling
- Drilling and Tapping Operations
- Peck Drilling Cycles
- Thread Milling and Boring Techniques
- Cutter Compensation
- FANUC Milling Program Structure
- FANUC Milling Program Optimization

Module 6: Siemens Lathe Programming Techniques

- Introduction to Siemens Lathe
- Facing Operations
- OD and ID Machining

- Grooving Operations
- Threading Operations
- Drilling Operations on Lathe
- Parting Operations
- Tool Nose Radius Compensation
- Siemens Lathe Program Structure
- Siemens Lathe Program Optimization

Module 7: CNC Programming for Multi-Axis Machines

- Introduction to Multi-Axis CNC Machines
- 4-Axis and 5-Axis Machining Concepts
- Simultaneous and Indexed Machining
- Advanced Toolpath Generation for Complex Shapes
- Multi-Axis Milling Strategies
- Introduction to Advanced Machining Workflows

Module 8: CNC Programming with CAM Software

- Introduction to Computer-Aided Manufacturing (CAM)
- Introduction to Fusion 360
- CAM Software Features and Workflow
- Importing CAD Models and Creating Toolpaths
- Manufacturing Setup and Coordinate Definition
- Milling Toolpath Creation in Fusion 360
- Lathe Toolpath Creation in Fusion 360
- Tool Library and Tool Management
- Simulation and Verification of CAM Programs

Module 9: Post Processing & CNC Code Generation

- Introduction to Post Processors
- FANUC Milling Post Processor
- Siemens Lathe Post Processor

- Generating NC Programs from Fusion 360
- Understanding Generated G-Code
- Editing and Optimizing CNC Programs
- Exporting and Managing CNC Files

Module 10: CNC Machining Simulation and Optimization

- Benefits of CNC Simulation
- Optimizing CNC Programs for Improved Efficiency
- Virtual Machining and Material Removal Simulation
- Collision Detection and Toolpath Verification
- Cycle Time Optimization
- Surface Finish Improvement Strategies
- Machining Workflow Validation

Module 11: NC Viewer and CNC Program Analysis

- Introduction to NC Viewer
- Importing and Visualizing CNC Programs
- Toolpath Playback and Verification
- CNC Program Analysis
- Error Identification and Troubleshooting
- Understanding Tool Movements and Machining Logic
- CNC Program Editing Exercises

Module 12: Industrial CNC Workflow and Best Practices

- CAD → CAM → CNC Workflow
- Machine Setup Procedures
- Workholding and Fixture Planning
- Tool Setup and Offset Management
- Dry Run and Program Verification
- CNC Machining Safety Procedures
- Industrial Production Workflow

- Manufacturing Best Practices

Module 13: Practical Projects and Industrial Applications

- FANUC Milling Practice Projects
- Siemens Lathe Practice Projects
- Pocket Milling Project
- Contour Machining Project
- Shaft Machining Project
- Threading and Grooving Project
- Integrated CNC-CAM Manufacturing Project
- Industrial Manufacturing Case Studies