Autodesk Inventor CAM: Design-to-Manufacturing HSM & Multi-Axis Workflow

Target Audience

This program is designed for professionals and learners who are involved in CNC manufacturing using Autodesk Inventor CAM, including manufacturing engineers, CAM programmers, CNC machinists, toolroom engineers, and design engineers transitioning toward manufacturing roles. It is suitable for users who already work with designed parts and need to convert them into optimized, error-free machining programs using HSM strategies. The course also benefits technical instructors, production planners, and quality engineers who want to understand the complete design-to-NC workflow, including DFM preparation, 2D/3D milling, turning, and introductory multi-axis operations within Inventor CAM.

Course Objectives

- Enable participants to prepare and modify existing designs for manufacturability using Autodesk Inventor
- Develop competence in creating reliable CAM setups, tool libraries, and machining strategies in Inventor CAM
- Build practical skills in 2D/3D HSM milling and turning operations with optimized toolpaths
- Introduce 3+2 positional and 4th-axis machining workflows supported in Inventor CAM
- Teach verification, simulation, and post-processing practices to minimize machining errors
- Establish standardized and faster programming methods using templates and best practice

Course Outcomes

Upon completion of this course, learners will be able to prepare geometry for generative design, configure generative studies, apply loads and constraints, define manufacturing methods, review and select design outcomes, post-process generative designs, and reinforce generative design skills through hands-on exercises aligned with certification objectives.

Course Outline: The course comprises **40-hours** of theory and labs and is divided into **11** different chapters. Each chapter will be followed by hands-on lab exercises to reinforce learning and gauge understanding of the topics covered.

MODULE 1 – Design for Manufacturing for HSM

- Subtractive manufacturing principles for CNC
- Effect of fillets, corner radii and wall thickness on HSM load
- Feature recognition: pockets, bosses, ribs, holes
- Modifying designs for Adaptive efficiency
- Creating machining boundaries and guide sketches
- Preparing assemblies for CAM intent

MODULE 2 – Data Preparation & Custom Stock Modeling

- Editing imported STEP/IGES models
- Geometry simplification for CAM
- Patch and repair workflow
- Custom stock creation from solids & sketches
- In-process stock modeling
- Modeling fixtures: vices, parallels, clamps
- Trunnion/4th-axis assembly representation

MODULE 3 – Inventor CAM Setup Fundamentals

- Manufacture workspace overview
- Setup creation – milling & turning
- Stock definition methods
- WCS & datum strategy
- Simulation workflow
- Post processing basics

MODULE 4 – Tool Library for HSM

- Creating tools and holders
- Feeds & speeds for High-Speed Machining
- Chip load & engagement concept
- Tool naming standards
- Operation presets & templates

MODULE 5 – 2D HSM Milling

- 2D Adaptive clearing – constant engagement
- Pocket vs Adaptive decision logic
- 2D Contour & chamfer
- Heights, passes, linking
- Stock-to-leave strategy
- Helical entry & smoothing

MODULE 6 – Drilling & Hole Making

- Drill/peck cycles
- Tapping
- Thread milling
- Hole recognition & sequencing

MODULE 7 – 3D HSM Milling

- 3D Adaptive roughing
- Parallel, scallop, pencil finishing

- Rest machining workflow
- Surface quality control
- Stay-down linking & air-cut reduction

MODULE 8 – Turning in Inventor CAM

- Turning setup & CSS
- Rough & finish turning
- Grooving
- Threading
- Part-off strategy

MODULE 9 – Multi-Axis with Real Fixturing

- 3-axis vs 3+2 vs 4th axis
- Tool orientation principles
- Indexed machining on angled faces
- Rotary contour & wrap toolpath
- Programming with trunnion/rotary assembly
- Collision checking with vice & clamps

MODULE 10 – Post Processing & Verification

- Post processor selection
- Basic post editing
- NC code review
- Collision & over-travel check
- Error reduction practices

MODULE 11 – Integrated Industrial Projects

- Design modification for machining
- Custom stock + vice setup
- HSM milling part
- Turning component
- Multi-axis sample on trunnion
- Optimization & final NC