

Autodesk Inventor: Advanced CAD & reverse engineering

Target Audience

This advanced training program is designed for mechanical engineers, CAD designers, and Autodesk Inventor users who want to enhance their expertise in design automation, multi-body modeling, advanced surfacing, sheet metal workflows, and reverse engineering.

It is ideal for learners aiming to fully utilize Autodesk Inventor's built-in capabilities without relying on external tools, ensuring practical, industry-ready skills in product design and simulation foundations.

Course Outcomes

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

- Manage design data effectively using iProperties across parts, assemblies, and drawings
- Apply multi-body and top-down design strategies for complex assemblies
- Create and refine advanced surface models and repair imported geometry
- Automate repetitive design tasks using iLogic and parameter-driven workflows
- Build structural systems using Frame Generator and generate BOMs
- Design advanced sheet metal parts with manufacturability checks
- Integrate parameters with Excel for configurable designs
- Use iParts, iAssemblies, and Content Center for standardization
- Apply design accelerators for shafts, gears, bearings, and mechanical components
- Prepare the 3D scan and mesh cloud points to extract geometry

Course Objectives

- Provide advanced knowledge of Autodesk Inventor's design and simulation tools
- Train learners in effective data management, automation, and parameter-driven design
- Develop proficiency in multi-body modeling, surface workflows, and sheet metal design
- Enable use of built-in accelerators and Content Center for mechanical design
- Prepare participants for simulation through drawing automation and Reverse engineering environment

Course Outline

- **Duration:** 40 Hours (Theory + Hands-on)
- **Structure:** 10 Modules

Each module is followed by practical lab exercises to reinforce learning

Module 1: iProperties & Design Data Management

- Understanding iProperties tabs (Summary, Project, Custom, Physical)
- Editing properties for parts, assemblies, and drawings

- Using iProperties for mass, material, and physical data
- Linking iProperties with drawing title blocks and annotations
- Creating and managing custom iProperties
- Using iProperties in BOM and parts lists
- Maintaining consistency using templates
- Updating properties manually and semi-automatically

Module 2: Multi-Body Modeling & Top-Down Design

- Creating and managing multi-body parts
- Using combine tools (join, cut, intersect)
- Skeleton-based layout sketches
- Creating derived parts from master models
- Managing inter-part relationships
- Updating assemblies through derived geometry
- Reusing base models for similar designs

Module 3: Advanced Surface Modeling, Geometry Control & Nesting

- Creating surfaces using loft, patch, and boundary tools
- Trimming, extending, and stitching surfaces
- Converting surfaces into solids
- Repairing imported geometry (STEP/IGES)
- Using delete face, replace face, and patch tools
- Hybrid modeling (surface + solid workflows)
- Basic curvature handling

Module 4: Advanced Sheet Metal Design & Nesting

- Defining sheet metal rules (thickness, bend radius, K-factor)
- Creating flanges, contour flanges, and hems
- Applying corner treatments and reliefs
- Using punch tools and custom features
- Generating flat patterns
- Checking manufacturability basics
- Editing sheet metal parts
- Introduction to Nesting and its importance in material optimization
- Overview of Inventor Nesting Utility and interface
- Setting up a Nesting Study (material, sheet size, spacing, part selection)
- Generating, analyzing, and exporting nested layouts for manufacturing

Module 5: iParts, iAssemblies & Content Center

- Creating iParts with configurations
- Creating iAssemblies
- Using Content Center for standard components

- Placing and editing standard parts
- Creating custom Content Center entries
- Managing local libraries
- Reusing components
- Creating iLogic rules using parameters
- Linking iLogic with Excel

Module 6: Derived Parts, Parameters & Excel Integration

- Creating derived parts with associativity
- Using parameters to control dimensions
- Linking parameters with Excel
- Updating designs using external data
- Managing parameter relationships and equations
- Creating configurable design variations
- Controlling design intent

Module 7: Design Accelerators & Mechanical Tools

- Using shaft generator
- Creating gears using accelerators
- Selecting bearings
- Adding keys, splines, and standard components
- Inputting load values
- Editing generated components
- Integrating into assemblies

Module 8: Drawing Automation

- Creating drawing templates and standards
- Generating views and annotations
- Creating BOM and parts lists
- Maintaining model-drawing associativity

Module 9: Reverse Engineering – Part I (Scan Data Preparation)

- Introduction to reverse engineering in Autodesk Inventor
- Importing point cloud and mesh data
- Inspecting scan quality
- Mesh cleanup and noise reduction
- Aligning scan data with coordinate system
- Creating reference geometry from scan
- Preparing data for reconstruction

Module 10: Reverse Engineering – Part II (Surface & Solid Reconstruction)

- Planning reconstruction strategy

- Creating surfaces using extracted references
- Surface stitching and patching
- Converting surfaces into solid bodies
- Refining geometry for accuracy
- Basic deviation checking
- Preparing final model for downstream use