MERCURY

SOLIDWORKS Essentials: 3D CAD Modeling and Engineering Drawings Training Course

4 – 8 October 2027
Madrid (Spain)



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Ref: 24_1081995 **Date:** 4 – 8 October 2027 **Location:** Madrid (Spain) **Fees:** 6200 Euro

The SOLIDWORKS Essentials: 3D CAD Modeling and Engineering Drawings Training Course is a one-week practitioner course for mechanical designers, drafting technicians, and production engineers establishing parametric digital product definitions. Working through sketch constraints, multi-part assembly mates, and production drawing automation, you develop a standardized Parametric Engineering Design and Drawing Package. This professional course is delivered by Mercury Training Center to build disciplined design workflows.

About This Course

Design teams frequently struggle with broken sketch references, unconstrained assembly mates, and non-compliant production drawings that cause downstream manufacturing delays. To benefit from this course, you must already understand basic mechanical engineering principles and standard orthographic projection views. Through structured modeling exercises, you practice constructing stable parametric features, coordinating multi-body assemblies, and applying standard drawing annotations.

Who It Is For

- Professionals responsible for drafting mechanical components, machinery parts, and industrial equipment housings
- Professionals responsible for validating multi-body assemblies, motion clearances, and bill of materials accuracy
- Professionals responsible for generating production-ready manufacturing blueprints, fabrication cuts, and drawing annotations
- Professionals responsible for standardizing parametric CAD part templates, drawing borders, and revision tracking systems

This course is not for complete computing novices who require foundational introductions to technical drawing principles, nor is it for experienced stress analysts seeking advanced finite element simulation workflows.

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Competencies You Will Build

- Parametric Solid Modeling: Creating robust sketch relations, dimension networks, and base features to generate fully defined solid components.
- Multi-Body Assembly Design: Positioning sub-assemblies with standard and mechanical mates while diagnosing component interferences and clearance limits.
- Standardized Drawing Generation: Producing multi-view technical drawings, section cuts, and detail views in accordance with ISO 128-1:2020 and ISO 128-2:2020 rules.
- Geometric Dimensioning Integration: Applying datums, tolerances, and feature control frames to production drawings aligned with ASME Y14.5 practices.
- Industrial Sheet Metal Modeling: Developing sheet metal enclosures, base flanges, edge flanges, and accurate flat pattern export data for fabrication.
- Structural Weldment Detailing: Configuring structural member profiles, corner treatments, and automated cut lists for welded structural frames.

What You Will Be Able to Do

By the end of the course you will be able to:

- From preliminary concept sketches, model parametric mechanical components using extrusions, revolves, swept features, and shell operations.
- Given multi-part industrial equipment requirements, build top-down and bottom-up assemblies with resolved mates and collision-free mechanical travel.
- Using ASME Y14.5 guidelines, apply datum reference frames and geometric tolerances to complex machined part drawings.
- From completed 3D assembly models, generate automated associative drawing sheets, balloon callouts, and indented bills of materials.
- Given structural framing specifications, generate weldment layouts with structural profiles, trim orders, and associative weldment cut lists.
- Using SimulationXpress analysis tools, run preliminary static stress screenings on modeled parts to identify critical displacement regions before detailing.

Course Content

Day 1: Parametric Sketching and Solid Feature Foundations

- FeatureManager Design Tree Navigation and Coordinate System Orientation in Part Environments
- Parametric Sketch Relations, Dimensional Constraints, and Fully Defined Geometry Rules
- Boss Extrude, Cut Extrude, Thin Feature Creation, and Contour Selection Methods
- Revolved Bodies, Swept Geometry, Lofts, and Reference Geometry Plane Construction
- Fillet Typology, Chamfer Rules, Shelling Parameters, and Feature Reorder Diagnostics

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Day 2: Advanced Part Features, Patterns, and Configurations

- Linear, Circular, Curve-Driven, and Table-Driven Feature Pattern Architectures
- Design Table Integration, Global Variables, and Mathematical Equations Management
- Part Configurations Setup for Component Sizing and Standard Hardware Variations
- Direct Editing Tools, Feature Suppression Logic, and Parent-Child Dependency Tracking
- Material Property Assignment, Mass Properties Calculation, and Design Evaluation Tools

Day 3: Assembly Modeling, Motion Mates, and Interference Auditing

- Bottom-Up Assembly Techniques and Component Mating Hierarchy Management
- Standard, Advanced, and Mechanical Mates for Cam, Gear, and Slot Mechanisms
- Sub-Assembly Structuring, Flexible Sub-Assemblies, and Top-Down In-Context Modeling
- Interference Detection, Dynamic Clearance Verification, and Physical Collision Audits
- Exploded View Generation, Explode Line Sketches, and Assembly Motion Studies

Day 4: Technical Drawing Automation and Downstream Fabrication

- Model View Projection, Section Cuts, Auxiliary Views, and Broken-Out Sections
- Standard Dimensioning Practices, Centerlines, and Datum Placement Under ASME Y14.5
- ISO 128-1:2020 and ISO 128-2:2020 Line Conventions and Title Block Metadata Setup
- Automated Bill of Materials Formatting, Item Numbering, and Detail Callout Balloons
- Sheet Metal Flange Generation, Bend Allowance Tables, and Unfolded Flat Pattern Views

Day 5: Structural Weldments, Design Validation, and Delivery

- Exercise on Structural Member Profile Placement, Corner Miters, and Gusset Detailing
- Exercise on Weldment Cut List Generation, Sorting Logic, and Fabrication Tables
- Exercise on SimulationXpress Stress Checks, Factor of Safety Audits, and Design Iteration
- Exercise on Multi-Sheet Drawing Package Assembly and Revision Table Tracking
- Finalization of the Parametric Engineering Design and Drawing Package

Case Studies and Exercises

These suggested activities provide practical application of CAD modeling and drawing preparation principles across operational environments:

- Case study: A centrifugal pumping unit in the industrial manufacturing sector requiring modular impeller designs where you configure parametric design tables and evaluate flow passage clearances.
- Case study: A structural skid frame in the energy equipment sector where you model standard steel sections, establish weldment cut lists, and audit joint clearances.
- Exercise: An automated sorting conveyor station where you assemble drive shafts, pulleys, and structural brackets to detect mechanical interferences and resolve motion travel.
- Exercise: A precision machined valve manifold where you prepare production drawings containing geometric tolerancing datums and automated bill of materials callouts.

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What You Take Back

The Parametric Engineering Design and Drawing Package equips you to construct reliable part geometry, maintain assembly integrity, and issue consistent production drawings during your first month back at work. You will use it to standardize modeling practices, eliminate drafting errors, and accelerate design sign-offs across your engineering department.

- Configured parametric part and assembly templates embedded with standard physical properties
- Automated technical drawing sheet formats aligned with ISO and corporate drafting standards
- Parametric structural weldment and sheet metal design libraries with pre-set cut list formatting
- Engineering quality checklist for interference detection, mate stability, and geometric tolerance validation

Quick Answers FAQ

What background is required before attending the SOLIDWORKS Essentials: 3D CAD Modeling and Engineering Drawings Training Course?

You need working knowledge of technical drafting principles, including orthographic projections, standard section views, and mechanical dimensions. Prior exposure to basic computer-aided drafting software helps you grasp 3D parametric workflows and coordinate systems quickly.

How does this course differ from general CAD drafting training?

General CAD drafting training focuses on static 2D vector geometry and manual line drawing. This course teaches parametric 3D solid modeling, associative assembly relationships, motion checks, and automated drawing generation linked directly to underlying 3D geometry.

What industry drafting standards apply to models created in SOLIDWORKS?

Technical drawing outputs apply ASME Y14.5 rules for geometric dimensioning and tolerancing, while line hierarchies, view layouts, and projection conventions align with ISO 128-1:2020 and ISO 128-2:2020 specifications for technical product documentation.

What work product do you take back from the course?

You take back the Parametric Engineering Design and Drawing Package. It includes standardized modeling templates, drawing sheet formats, weldment cut list configurations, and assembly verification checklists for immediate operational use.

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For Your Manager

Your team member will gain practical proficiency in building parametric models, managing complex assemblies, and producing error-free manufacturing blueprints. They complete the course with the Parametric Engineering Design and Drawing Package, which includes standardized drafting templates and verification checklists. The department will use this immediately on upcoming product designs to eliminate drawing errors, avoid mechanical interferences, and reduce fabrication cycle times.