SolidWorks Routing and Flow Simulation

Target Audience:

This course is designed for mechanical engineers, piping designers, CAD professionals, and engineering students who wish to enhance their expertise in SolidWorks for routed systems and flow simulation.

Course Objective:

The objective of this course is to equip learners with the skills to design and manage complex piping, tubing, HVAC, and electrical routes, and to simulate real-world fluid and thermal systems using SolidWorks Flow Simulation.

Course Outcome:

Upon completion, participants will be able to create advanced routing assemblies, customize components, and conduct flow and thermal analyses for various engineering applications, enabling more efficient and optimized design workflows.

Course Outline:

The course comprises **56-hours** of theory and labs and is divided into **16** different chapters. Each chapter will be followed by **hands-on lab exercises** to reinforce learning and gauge understanding of the topics covered.

SolidWorks Pipe & Routing

Lesson 1: Fundamentals of Routing

- What is Routing?
- Types of Routes
- Routing Feature Manager
- External vs. Virtual Files
- Routing Setup and Add-ins

Lesson 2: Piping Routes

- Creating a Piping Route
- Route Sketching and Properties
- Auto Route
- Route Specification Templates

Lesson 3: Advanced Piping Routes

- Adding Alternate Elbows
- Editing Routes
- Using Piping Hangers
- Routing Along Existing Geometry

Lesson 4: Piping Fittings

- Drag and Drop Fittings
- Planes in Routes
- Tees and Inline Components
- Creating Custom Fittings

Lesson 5: Tubing Routes

- Orthogonal & Flexible Tubing
- Tubing Components
- Route Segment Properties
- Tubing Drawings

Lesson 6: Route Editing and Drawings

- Piping & Tubing Changes
- Pipe Spools & Gaskets
- Editing Route Geometry
- Piping Drawings

Lesson 7: Creating Routing Components

- Routing Library Parts
- Copying and Editing Components
- Pipe vs. Tube Components
- Routing Geometry & Design Tables

Lesson 8: Electrical, Cable Tray, and HVAC Routing

- Electrical Ducting
- Cable Tray Routing
- HVAC Components
- Ducting Drawings

Lesson 9: Using SOLIDWORKS Content

- Content Files and Libraries
- Virtual Clips
- Using Routing Content

SolidWorks Flow Simulation

Lesson 1: Introduction to Flow Simulation

- Setting Up Projects
- Meshing & Boundary Conditions
- Goals & Results Visualization

Lesson 2: Basic Flow Problems

- Flat Plate Boundary Layer
- Flow Past Sphere and Cylinder
- Airfoil Flow Simulation

Lesson 3: Intermediate Flow Applications

- Rayleigh-Bénard Convection
- Taylor-Couette Flow
- Pipe Flow (Laminar & Turbulent)

Lesson 4: Complex Assemblies and Systems

- Tube Bank Flow
- Heat Exchanger Analysis
- Ball Valve Simulation

Lesson 5: Flow Devices & Measurement

- Orifice Plate & Flow Nozzle
- Thermal Boundary Layers
- Free Convection Scenarios

Lesson 6: Advanced Simulation Scenarios

- Swirling Flow in Cylindrical Container
- Flow Around a Model Rocket
- Draining of a Cylindrical Tank

Lesson 7: Aerodynamics & Rotating Systems

- Ahmed Body Analysis
- Savonius Wind Turbine
- Spinning Propeller Simulation
- Supersonic Flow Over a Cone