

SOLIDWORKS Simulation Professional

OVERVIEW

CLASSROOM LENGTH: 4 days / **INSTRUCTOR-LED ONLINE LENGTH:** 6 days

PREREQUISITES: Knowledge of SOLIDWORKS and basic mechanical engineering concepts is recommended.

DESCRIPTION: This class provides an in-depth coverage on the basics of Finite Element Analysis (FEA), covering the entire process from meshing to evaluation of results for parts and assemblies. It discusses linear stress analysis covering the entire analysis process from meshing to evaluation of results for parts and assemblies, gap/contact analysis, and best practices.

LESSON 1:

THE ANALYSIS PROCESS

- Stages in the Process
- Case Study: Stress in a Plate
- SOLIDWORKS Simulation Interface
- Preprocessing
- Meshing
- Processing
- Postprocessing
- Multiple Studies

LESSON 2:

MESH CONTROLS, STRESS CONCENTRATIONS AND BOUNDARY CONDITIONS

- Mesh Control
- Case Study: The L Bracket
- Project Description
- Case Study: Analysis of Bracket with a Fillet
- Case Study: Analysis of a Welded Bracket
- Understanding the Effect of Boundary Conditions

LESSON 3:

ASSEMBLY ANALYSIS WITH CONTACTS

- Case Study: Pliers with Global Contact
- No Penetration or Bonded Contact
- Pliers with Local Contact
- No Penetration Local Contact: Accuracy

LESSON 4:

SYMMETRICAL AND FREE SELF-EQUILIBRATED ASSEMBLIES

- Shrink Fit Parts
- Case Study: Shrink Fit
- Project Description
- Analysis with Soft Springs

LESSON 5:

ASSEMBLY ANALYSIS WITH CONNECTORS AND MESH REFINEMENT

- Connecting Components
- Connectors
- Mesh Control in an Assembly
- Case Study: Cardan Joint
- Part 1: Draft Quality Coarse Mesh Analysis
- Part 2: High Quality Mesh Analysis

LESSON 6:

COMPATIBLE / INCOMPATIBLE MESHES

- Case Study: Rotor
- Centrifugal Force
- Cyclical Symmetry

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LESSON 7:

ANALYSIS OF THIN COMPONENTS

- Case Study: Pulley
- Part 1: Mesh with Solid Elements
- Part 2: Refined Solid Mesh
- Solid vs. Shell
- Part 3: Shell Elements – Mid-plane Surface
- Creating Shell Elements
- Case Study: Joist Hanger

LESSON 8:

MIXED MESHING SHELLS & SOLIDS

- Case Study: Pressure Vessel

LESSON 9:

BEAM ELEMENTS - ANALYSIS OF A CONVEYOR FRAME

- Element Choices
- Beam Elements
- Truss Elements
- Slenderness Ratio
- Section Properties
- Connected and Disconnected Joints
- Sphere Diameter Defining Beam Joint
- Beam Joints: Locations
- Beam Joint Types
- Render Beam Profile
- Cross-Section 1st and 2nd Directions
- Bending Moment and Shear Force Diagrams

LESSON 10:

MIXED MESHING SOLIDS, BEAMS & SHELLS

- Case Study: Particle Separator
- Beam Imprint

LESSON 11:

DESIGN STUDY

- Part 1: Multiple Load Cases
- Part 2: Geometry Modification

LESSON 12:

THERMAL STRESS ANALYSIS

- Case Study: Bimetallic Strip
- Examining Results in Local Coordinate Systems (Optional)
- Saving Model in its Deformed Shape

LESSON 13:

ADAPTIVE MESHING

- Case Study: Support Bracket
- h-Adaptivity Study
- p-Adaptivity Study
- h vs. p Elements – Summary

LESSON 14:

LARGE DISPLACEMENT ANALYSIS

- Small vs. Large Displacement Analysis
- Case Study: Clamp
- Part 1: Small Displacement Linear Analysis
- Part 2: Large Displacement Nonlinear Analysis

LESSON 15:

FREQUENCY ANALYSIS OF PARTS

- Modal Analysis Basics
- Case Study: The Tuning Fork
- Frequency Analysis With Supports
- Frequency Analysis Without Supports
- Frequency Analysis with Load

LESSON 16:

FREQUENCY ANALYSIS OF ASSEMBLIES

- Case Study: The Engine Mount
- All Bonded Contact Conditions
- Bonded and Allow Penetration Contacts

LESSON 17:

BUCKLING ANALYSIS

- Linear vs. Nonlinear Buckling Analysis
- Buckling Factor of Safety (BFS)
- Buckling Analysis Considerations
- Case Study: Particle Separator

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LESSON 18:

LOAD CASES

- Case Study: Scaffolding

LESSON 19:

SUBMODELING

- Case Study: Scaffolding
- Part 1: Parent Study
- Part 2: Child Study

LESSON 20:

TOPOLOGY ANALYSIS

- Case Study: Rear Bike Shock Link
- Goals and Constraints
- Manufacturing Controls
- Mesh Effects
- Load Cases in Topology Studies
- Export Smoothed Mesh

LESSON 21:

THERMAL ANALYSIS

- Thermal Analysis Basics
- Case Study: Microchip Assembly
- Steady-State Thermal Analysis
- Transient Thermal Analysis
- Transient Analysis with Time Varying Load
- Transient Thermal Analysis Using a Thermostat

LESSON 22:

THERMAL ANALYSIS WITH RADIATION

- Case Study: Spot Light Assembly
- Steady State Analysis

LESSON 23:

ADVANCED THERMAL STRESS2D SIMPLIFICATION

- Case Study: Metal Expansion Joint
- Thermal Analysis
- Thermal Stress Analysis

LESSON 24:

FATIGUE ANALYSIS

- Fatigue
- Stress-life (S-N) Based Fatigue
- Case Study: Pressure Vessel
- Fatigue Terminology
- Fatigue Study with Dead Load

LESSON 25:

VARIABLE AMPLITUDE FATIGUE

- Case Study: Suspension Design
- Fatigue Study

LESSON 26:

DROP TEST ANALYSIS

- Case Study: Camera
- Rigid Floor Drop Test
- Elastic Floor, Elasto-Plastic Material, Elasto-Plastic Material Model

LESSON 27:

OPTIMIZATION ANALYSIS

- Case Study: Press Frame
- Static and Frequency Analyses
- Design Study

LESSON 28:

PRESSURE VESSEL ANALYSIS

- Case Study: Pressure Vessel
- Manhole Nozzle Flange and Cover