

SOLIDWORKS Simulation Essentials

OVERVIEW

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

DESCRIPTION: This SOLIDWORKS Simulation Essentials class provides a first look at the basics of Finite Element Analysis (FEA).

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

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

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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:

THERMAL STRESS ANALYSIS

- 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