SOLIDWORKS Simulation

Overview:
This course is designed to make SOLIDWORKS users productive more quickly with the SOLIDWORKS Simulation Bundle. This course will provide an in-depth coverage on the basics of Finite Element Analysis (FEA), covering the entire analysis process from meshing to evaluation of results for parts and assemblies. The class discusses linear stress analysis, gap/contact analysis, and best practices.

Duration:
InClass: 3 Days (Full Time) 8:30am- 4:30pm
Distance Learning: 7 Days (Part Time)

Pre-requisites:

- Complete the SOLIDWORKS Essentials
- Computer literacy skills
- Basic mechanical engineering concepts

Introduction

- What is SOLIDWORKS Simulation
- What is Finite Element Analysis (FEA)
- Build mathematical model
- Build FFEA model
- Solve FEA model
- Analyse results
- Errors in FEA
- Finite elements
- Degrees of freedom
- Calculations in FEA
- Interpretation of FEA results
- Units of measurement
- Limitations of SOLIDWORKS Simulation

The Analysis Process

- The analysis processes
- SOLIDWORKS Simulation options
- Pre-processing
- Meshing
- Processing
- Multiple studies
- Reports

Mesh Controls, Stress Concentrations and Boundary Conditions

- Mesh control
- Project description
- Analysis with local mesh refinement

- Results
- Results comparison
- Stress singularities
- Suppressed configuration
- Understanding the effect of boundary conditions

Assembly Analysis with Interactions

- Contact analysis
- Component interaction
- Component interaction: options
- Component interactions: default setting
- Component contact: hierarchy and conflicts
- Viewing assembly results
- Contact or Bonded interaction
- Pliers with local interaction
- Local interaction
- Local interaction types
- Self-contact
- Required force
- Contact formulation

Symmetrical and Free Self-Equilibrates Assemblies

- Shrink fit parts
- Defeaturing
- Rigid body mode
- Shrink fit contact condition
- Plot results in local coordinate system
- Cylindrical coordinate Systems
- Averaging stress
- Saving all plots
- Analysis with soft springs

Assembly Analysis with Connectors and Mesh Refinement

- Connecting components
- Connectors
- Mesh control in an assembly
- Remote load/mass
- Load location
- Reference coordinate system
- Types of load
- Connection type
- Automatic conversion of toolbox fasteners to bolts
- Distributed coupling
- Bolt strength data
- Bolt pre-load
- Bolt tight fit and diameter
- Interaction viewer

- Automatically find local interactions
- Pin connectors
- Rotation and axial stiffness
- Pin/bolt force
- Required number of solid elements in thin features
- Mesh plots
- Quality plot

Bonded Mesh Options

- Bonded mash options
- Centrifugal force
- Bonding symmetry
- Bonding options
- Bonding formulation

Analysis of Thin components

- Thin components
- Mash with solid elements
- Symmetry fixtures
- Refined solid mesh
- Solid vs. Shell
- Creating shell elements
- Shell elements

Mixed Meshing Shells & Solids

- Mixed mashing solids and shells
- Bonding shells and solids
- Mixed mesh: supported analysis types
- Analyse the assembly
- Preparing the model
- Material
- Steel identification systems
- UNS index
- Other indices
- Bulk and shear moduli
- Shell to shell bonding
- Shell to solid bonded
- Failure diagnostics
- Meshing small features
- Incremental meshing

Beam Elements – Analysis of a Conveyor Frame

- Element choices
- Beam elements
- Truss elements
- Slenderness ratio

- Section properties
- Connected and disconnected joints
- Beam joints: locations
- Beam joint types
- Render beam profile
- Beam stress components
- Cross-section 1st and 2nd directions
- Bending moment and shear force diagrams

Mixed Meshing Solids, Beams & Shells

- Mixed meshing
- Beam mesh
- Beam imprint

Design Study

- Suspension design
- Design studies
- Parameters
- Design study results
- Design study options
- Geometry modification
- Design study graph

Thermal Stress Analysis

- Thermal analysis
- Bimetallic strip
- Material Properties
- Importing temperatures
- Saving model in its deformed shape

Adaptive Meshing

- Adaptive meshing
- Geometry preparation
- H-Adaptivity study
- H-Adaptivity options
- H-Adaptivity plots
- Convergence graph
- Review h-adaptive solutions
- Strain energy error is not stress error
- P-Adaptivity study
- P-Adaptive solution methods
- H vs. P elements
- Method comparison

Meshing, Solvers, and Tis & Tricks

- Meshing strategies
- Geometry preparation
- Meshing quality
- Mesh controls
- Meshing stages
- Failure Diagnostics
- Tips for using shell elements
- Hardware considerations in meshing
- Solvers in SOLIDWORKS Simulation
- Choosing a solver