Training: SOLIDWORKS Simulation Premium: Nonlinear (2 days)

Prerequisites: Must have attended the basic SOLIDWORKS Simulation class, or must have an experience with SOLIDWORKS + working basic knowledge of finite elements and of basic mechanical principles

Description: This class will raise your SOLIDWORKS Simulation FEA skills to the next level! It offers hands-on experience on the use of SOLIDWORKS Simulation Premium nonlinear module. The 2-day course provides an overview on a wide range of nonlinear structural/mechanical analysis topics. You will learn how to deal with models that exhibit large displacements and/or yielding, discuss and practice the use of many material models available in SOLIDWORKS Simulation and, most importantly, how to drive a non-linear analysis to successful completion.

Introduction
- About This Course

Introduction to Nonlinear Structural Analysis
- Types of Nonlinearities
- Solving Nonlinear Problems12

Geometric Nonlinear Analysis
- Small Displacement Analysis
- Large Displacement Analysis
- Finite Strain Analysis
- Large Deflection Analysis

Material Models and Constitutive Relations
- Elastic Models
- Elasto-Plastic Models
- Super Elastic Nitinol Model
- Linear Visco-Elastic Model
- Creep Model

Numerical Procedures for Nonlinear FEA
- Incremental Control Techniques
- Iterative Methods
- Termination Criteria

Interaction Analysis
- Component Interaction/ Gap Conditions
- Local Interaction/ Gap Conditions
- Troubleshooting for Gap / Interaction Problems

Lesson 1: Large Displacement Analysis
- Case Study: Hose Clamp
- Linear Static Analysis
- Nonlinear Static Study
- Linear Static Study (Large Displacement)

Lesson 2: Incremental Control Techniques
- Incremental Control Techniques
- Case Study: Trampoline
- Linear Analysis
- Nonlinear Analysis - Force Control
- Nonlinear Analysis - Displacement Control

Lesson 3: Nonlinear Static Buckling Analysis
- Case Study: Cylindrical Shell
- Linear Buckling
- Nonlinear Symmetrical Buckling
- Nonlinear Asymmetrical Buckling

Lesson 4: Plastic Deformation
- Case Study: Paper Clip
- Linear Elastic
- Nonlinear - von Mises
- Nonlinear - Tresca's
- Stress Accuracy (Optional)

Lesson 5: Hardening Rules
- Case Study: Crank Arm
- Isotropic Hardening
- Kinematic Hardening

Lesson 6: Analysis of Elastomers
- Case Study: Rubber Pipe
- Two Constant Mooney-Rivlin (1 Material Curve)
- 2 Constant Mooney-Rivlin (2 Material Curves)
- 2 Constant Mooney-Rivlin (3 Material Curves)
- 6 Constant Mooney-Rivlin (3 Material Curves)

Lesson 7: Nonlinear Interaction Analysis
- Case Study: Rubber Tube
- Instability in Assemblies
- Releasing Prescribed Displacement
- Validity and Limitations of Static Analysis

Lesson 8: Metal Forming
- Case Study: Sheet Bending
- Plane Strain
- Large Strain Formulation Option
- Convergence Problems
- Automatic Stepping Problems
- Small Strain Vs Large Strain Formulations

Appendix A: True and Engineering Stress and Strain
- Engineering Stress and Strain
- True Stress and Strain