

SolidWorks Simulation 2012 *Course outline*

The following is a general outline for the standard SolidWorks Simulation training courses offered by CADimensions. All courses consist of lectures and case studies demonstrated by the instructor. Students are then given lab exercises that reinforce the topics covered. Training manuals will be supplied to each student. Computers are provided by CADimensions unless other arrangements have been made, such as on-site training.

SolidWorks Simulation

	Morning
<u>Introduction</u>	Introduction to Finite Element Analysis (FEA), Definitions, Building Mathematical Models, Finite Elements, Degrees of Freedom, Calculations
<u>Lesson 1</u>	The Analysis Process, Stages in the Process, Simulation Settings, Preprocessing, Meshing, Post processing, Creating Multiple Studies, Reports
<u>Lesson 2</u>	Mesh Controls, Stress Concentrations, Boundary Conditions, Local Mesh Refinement, Stress Singularities
<u>Lesson 3</u>	Assembly Analysis with Contacts, Global and Local Contacts, Component Contact, Contact Stresses
	Afternoon
<u>Lesson 4</u>	Symmetrical and Free Self-Equilibrating Assemblies, Shrink Fit, Rigid Body Mode, Soft Springs, Inertial Relief
<u>Lesson 5</u>	Assembly Analysis with Connectors, Connecting Components, Connector Types and Options
<u>Lesson 6</u>	Compatible and Incompatible Meshes, Automatic Switch, Improved Accuracy for Contacting Surfaces

Day 2

Morning

Lesson 7 Assembly Analysis Mesh Refinement, Mesh Controls in Assemblies, Remote Loads, Bolt Pre-Loads, Local Contact Sets, Rotational and Axial Stiffness, High Quality Mesh Analysis, Aspect Ratio Plot, Jacobian Check

Lesson 8 Analysis of Thin Components, Solid vs. Shell Meshing, Creating Shell Elements, Symmetry Fixtures, Shell Element Alignment

Afternoon

Lesson 9 Mixed Meshing Shells and Solids, Bonding Shells and Solids, Shell Face/Edge Bonding, Bulk and Shear Modules, Failure Diagnostics

Lesson 10 Mixed Meshing Solids, Beams, and Shells, Beam Elements, Beam Mesh, Beam Joint Types, Section Properties, Connected and Disconnected Joints, Bending Moment and Shear Force Diagrams

Day 3

Morning

Lesson 11 Design Studies, Multiple Load Cases, Design Scenarios, Geometry Modification, Design Study Graph

Lesson 12 Thermal Stress Analysis, Material Properties, Importing Temperatures, Averaging Stress, Examining Results

Afternoon

Lesson 13 Adaptive Meshing Types (h-Adaptive and p-Adaptive), h-Adaptive Options and Plots, Convergence Graph, p-Adaptive Solution Method, h vs. p Elements, Method Comparison

Lesson 14 Large Displacement Analysis, Small vs. Large Displacement Comparison, Contact Solutions, Permanent Deformation, When to use Non-Linear Analysis

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SolidWorks Simulation Professional

Morning

- Lesson 1 Frequency Analysis of Parts, Modal Analysis Basics, Frequency Analysis with and without Supports, and with Loads
- Lesson 2 Frequency Analyses of Assemblies, Bonded and Free Contact Conditions, Analysis with and without Loads
- Lesson 3 Buckling Analysis, Linear vs. Non-Linear Buckling, Buckling Load Factors (BLF), Analysis Considerations

Afternoon

- Lesson 4 Thermal Analysis Basics, Mechanisms of Heat Transfer - Conduction, Convection, and Radiation, Steady-State Analysis, Transient Analysis, Time and Temperature Curves
- Lesson 5 Thermal Analysis with Radiation, Steady State Analysis, Heat Flux Singularities

Day 2

Morning

- Lesson 6 Advanced Thermal Stress Analysis, Temperature Conditions, Meshing Considerations, Importing from SolidWorks Flow Simulation, Thermal Boundary Conditions, 2D Simplification
- Lesson 7 Fatigue Analysis, High vs. Low Cycle, S-N Curves, Static Pressure Study, Constant Amplitude, Salt Computation, Mean Stress, Damage Factor Plot
- Lesson 8 Advanced Fatigue Analysis, Variable Amplitude, Variable Loading Curve, Fatigue Strength Reduction Factor

Afternoon

- Lesson 9 Drop Test Analysis, Rigid and Elastic Floor, Drop Test With Contact
- Lesson 10 Optimization Analysis, Goals, Constraints, Local Trend Graphs
- Lesson 11 Pressure Vessel Analysis, Stress Intensity, Stress Linearization, Basic Stress Intensity Limits

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SolidWorks Flow Simulation

<u>Lesson 1</u>	Morning Creating a Flow Simulation Project, Internal and External Flow, Creating Lids, Internal Fluid Volume, Adiabatic Wall, Roughness, Computational Domains, Goals
<u>Lesson 2</u>	Meshing – Computational, Basic, and Initial Mesh, Thin Wall Resolution, Control Planes
<u>Lesson 3</u>	Thermal Analysis, Fans, Orthotropic Thermal Conductivity
<u>Lesson 4</u>	External Transient Analysis, Reynolds Number, External Flow, Transient Analysis, Turbulence Intensity, Two Dimensional Flow
	Afternoon
<u>Lesson 5</u>	Conjugate Heat Transfer, Real Gases
<u>Lesson 6</u>	EFD Zooming – Computational Domain
<u>Lesson 7</u>	Porous Media, Permeability, Resistance

Day 2

<u>Lesson 8</u>	Morning Rotating Reference Frames, Stages in the Process
<u>Lesson 9</u>	Parametric Analysis, Steady State Analysis
<u>Lesson 10</u>	Cavitation
<u>Lesson 11</u>	Relative Humidity
	Afternoon
<u>Lesson 12</u>	Particle Trajectory, Boundary Conditions Tab
<u>Lesson 13</u>	Supersonic Flow, Drag Coefficients, Shock Waves
<u>Lesson 14</u>	FEA Load Transfer

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SolidWorks Simulation Premium: Nonlinear

<u>Lesson 1</u>	Morning Introduction to Nonlinear FEA, Large Displacement Analysis, Linear and Nonlinear Static Studies, Time Curves, Large Displacement
<u>Lesson 2</u>	Incremental Control Techniques, Force Control, Displacement Control, Initial Instabilities, and Restart Function
	Afternoon
<u>Lesson 3</u>	Nonlinear Static Buckling Analysis, Symmetrical and Asymmetrical Buckling
<u>Lesson 4</u>	Plastic Deformations, Linear Elastic, and Nonlinear Elastic Material

Day 2

	Morning
<u>Lesson 5</u>	Rotating Reference Frames, Stages in the Process
<u>Lesson 6</u>	Parametric Analysis, Steady State Analysis
	Afternoon
<u>Lesson 7</u>	Particle Trajectory, Boundary Conditions Tab
<u>Lesson 8</u>	Supersonic Flow, Drag Coefficients, Shock Waves

SolidWorks Simulation Premium: Dynamics

	Morning
<u>Lesson 1</u>	Introduction to Dynamics, Vibration, Frequency Analysis, Dynamic Analysis (Slow and Fast Force)
<u>Lesson 2</u>	Transient Shock Analysis, Mass Participation Factor, Damping, Remote Mass
	Afternoon
<u>Lesson 2</u>	Lesson 2 Continued
<u>Lesson 3</u>	Harmonic Analysis, Single DOF Oscillator, Harmonic Properties

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Day 2

Morning

Lesson 4 Response Spectrum Analysis, Mode Combination Method

Lesson 5 Random Vibration Analysis, Power Spectral Density Function, Decibels, RMS and PSD Results

Afternoon

Lesson 5 Lesson 5 Continued

Lesson 6 Nonlinear Dynamic Analysis, Linear vs. Non-linear, Rayleigh Damping, Time Integration Methods, Iterative Methods

There is also a Training Course for SolidWorks Motion. Please contact your CADimensions sales rep for further assistance in attending one of these training classes.

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