SOLIDWORKS

SIMULATION

TRAINING

COURSE OUTLINE

FORMATION
Credly
CERTIFIÉE

by **SXP**

TABLE OF CONTENT

COURSE OUTLINE / SOLIDWORKS SIMULATION

SOLIDWORKS SIMULATION STATIC – 3 DAYS (21H)

1. The Analysis Process

- The analysis process
- SOLIDWORKS Simulation options
- Preprocessing
- Meshing
- Processing
- Postprocessing
- Multiple studies
- Reports
- Summary
- References

2. Mesh Controls, Stress Concentrations, and Boundary Conditions

- Mesh Control
- Understanding the effect of Boundary Conditions

3. Assembly Analysis with Interactions

- Interaction Analysis
- Study Properties
- Contact or Bonded interaction
- Local Interaction

4. Symmetrical and Free Self- Equilibrated Assemblies

- Shrink Fit Parts
- Analysis with Soft Springs

5. Assembly Analysis with Connectors and Mesh Refinement

- Problem Statement
- Remote Load/Mass
- Connectors
- Mesh Control in an Assembly
- Mesh Plots

6. Bonded Mesh Options

- Bonded Mesh Options
- Centrifugal Force
- Cyclical Symmetry
- Bonding Options
- Bonding Formulation

7. Analysis of Thin Components

- Thin Components
- Mesh with Solid Elements
- Refined Solid Mesh
- Solid vs. Shell
- Creating Shell Elements
- Shell Elements - Mid-plane surface

8. Mixed Meshing - Shells & Solids

- Mixed meshing - Solids and Shells

9. Beam Elements- Analysis of a Conveyor Frame

- Beam and Truss elements

10. Mixed Meshing Solids, Beams & Shells

- Mixed Meshing
- Beam Imprint

11. Design Study

- Multiple load cases
- Geometry modification

Part 2 →

SOLIDWORKS SIMULATION STATIC (PART 2)

12. Thermal Stress Analysis

- Thermal stress analysis
- Saving model in a deformed shape

13. Adaptive Meshing

- Adaptive meshing
- h-Adaptivity study
- p-Adaptivity study
- h vs. p Elements – Summary

14. Large Displacement Analysis

- Small vs. Large displacement analysis
- Small displacement Linear analysis
- Large displacement Nonlinear analysis

Annex

- Meshing Strategy
- Geometry Preparation
- Meshing Quality
- Mesh Controls
- Meshing Stages
- Failure Diagnosis
- Tips for the Shell Elements Usage
- Hardware Requirements for Meshing
- Solvers in SOLIDWORKS Simulation
- Solver Selection

Course Objectives : At the end of each course, students will know the capabilities of the software and will be able to use the learned features.
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PMT2540-ENG

SOLIDWORKS MOTION – 2 DAYS (14H)

1. Introduction to Motion Simulation and Forces

- Basic motion analysis
- Forces
- Results

2. Building a Motion Model and Post Processing

- Creating local mates
- Mates
- Local mates
- Power
- Plotting kinematic results

3. Introduction to Contacts, Springs and Dampers

- Contact and friction
- Contact
- Contact groups
- Contact friction
- Translational spring
- Translational damper
- Post-processing
- Analysis with friction (optional)

4. Advanced Contact

- Latch forces
- STEP function
- Contact: Solid bodies
- Geometrical description of contacts
- Integrators
- Instability points

5. Curve to Curve Contact

- Contact forces
- Curve to curve contact
- Solid bodies vs. Curve to curve contact
- Solid bodies contact solution

6. Cam synthesis

- Cams
- Trace path
- Exporting trace path curves

7. Motion Optimization

- Motion Optimization
- Sensors
- Optimization analysis

8. Flexible Joints

- Flexible joints
- System with Flexible Joints

9. Redundancies

- Redundancies
- How to check for redundancies
- Typical redundant mechanisms

10. Export to FEA

- Exporting results
- Export of loads
- Direct solution in SOLIDWORKS Motion

11. Event Based Simulation

- Event based simulation
- Servo motors
- Sensors
- Task

12. Design Projects (Optional)

- Design Project
- Self-guided problems
- Problem solution
- Creating the force function
- Force expression

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PMT2442-ENG

SOLIDWORKS SIMULATION PROFESSIONAL – 2 DAYS (14H)

*The "SOLIDWORKS Simulation Static" Training is required for this class.

1. Frequency Analysis of Parts

- Modal analysis basics
- Frequency Analysis with Supports
- Frequency Analysis without Supports
- Frequency Analysis with Load

2. Frequency Analysis of Assemblies

- All Bonded Interaction Conditions
- Bonded and Free Interactions

3. Buckling Analysis

- Buckling Analysis
- Linear vs Nonlinear Buckling analysis

4. Load Cases

- Load Cases

5. Submodeling

- Submodeling

6. Topology Analysis

- Topology Analysis
- Goals and Constraints
- Manufacturing Controls
- Mesh Effects
- Load Cases in Topology

7. Thermal Analysis

- Thermal Analysis Basics
- Steady-State Thermal Analysis
- Transient Thermal Analysis
- Transient Analysis with time varying Load
- Transient Thermal Analysis using a Thermostat

8. Thermal Analysis with radiation

- Steady State Analysis

9. Advanced Thermal Stress 2D Simplification

- Thermal Analysis
- Thermal Stress Analysis
- 3D model

10. Fatigue Analysis

- Fatigue
- Stress-life (S-N) based fatigue
- Thermal Study
- Thermal Stress Study
- Fatigue Terminology
- Fatigue Study
- Fatigue Study with dead load

11. Variable Amplitude Fatigue

- Fatigue Study

Part 2 →

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PMT2541-ENG

SOLIDWORKS SIMULATION PROFESSIONAL (PART 2)

12. Drop Test Analysis

- Drop Test Analysis
- Rigid Floor Drop Test
- Elastic Floor/Elasto-Plastic Material
- Elasto-Plastic Material Model
- Drop Test with Contact Interaction

13. Optimization Analysis

- Optimization Analysis
- Static and Frequency Analysis

14. Pressure Vessel Analysis

- Pressure esVsel Analysis
- Manhole Nozzle Flange and Cover

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PMT2541-ENG

SOLIDWORKS SIMULATION PREMIUM – 3 DAYS (21H)

*The "SOLIDWORKS Simulation Static" Training is required for this class.
**The "SOLIDWORKS Simulation Professional" is required for this class.

NON LINEAR

1. Large Displacement Analysis

- Linear static analysis
- Nonlinear static study
- Linear static study (Large displacement)

2. Incremental Control Techniques

- Incremental control techniques
- Linear analysis
- Nonlinear analysis – Force control
- Nonlinear analysis – Displacement control

3. Nonlinear Static Buckling Analysis

- Linear buckling
- Linear static study
- Nonlinear symmetrical buckling
- Nonlinear asymmetrical buckling

4. Plastic Deformation

- Plastic deformation
- Problem statement
- Linear elastic
- Nonlinear Study with Linear Material
- Nonlinear – von Mises
- Nonlinear – Tresca's
- Stress accuracy
- Using Nonlinear Elastic Material

5. Hardening Rules

- Hardening rules
- Isotropic hardening
- Kinematic hardening

6. Analysis of Elastomers

- Two constant Mooney-Rivlin (1 material curve)
- Two constant Mooney-Rivlin (2 material curves)
- Two constant Mooney-Rivlin (3 material curves)
- Six constant Mooney-Rivlin (3 material curves)

7. Nonlinear Interaction Analysis

- Connections
- Dynamic Solutions

8. Metal Forming

- Bending

DYNAMICS

1. Vibration of a Pipe

- Static analysis
- Frequency analysis
- Dynamic analysis (slow force)
- Dynamic analysis (Fast force)

2. Transient Shock Analysis According to MILS- STD-810H

- Run Frequency
- Damping

3. Harmonic Analysis of a Bracket

- Harmonic analysis of a bracket

4. Response Spectrum Analysis

- Response Spectrum Analysis
- Response Spectrum

5. Random Vibration Analysis According to MIL-STD-810G

- Random vibration analysis according to MIL-STD-810G

6. Random Vibration Fatigue

- Material properties, S-N curve
- Random vibration fatigue options

7. Nonlinear Dynamic Analysis of an Electronic Enclosure

- Linear dynamic analysis
- Nonlinear dynamic analysis

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PMT2544-ENG

SOLIDWORKS SIMULATION PREMIUM COMPOSITE – 1 DAY (7H)

*The "SOLIDWORKS Simulation Static" training is required for this class.
**The "SOLIDWORKS Simulation Professional" training is required for this class.

- Introduction to Composites
- Objectives
- Composite Materials
- Composite Lamina
- Composite Laminate
- SOLIDWORKS Simulation Premium: Composites
- Composite Post Processing
- Case Study: Mountain Board
- Project Description
- Stages in the Process
- Lamina Properties
- Experimental Measurements
- Micromechanics

- Required Parameters
- Strength Parameters
- Composite Options
- Composite Orientation
- Offset
- Shell Alignment
- Composite Post Processing
- Stresses
- Inter Laminar Shear
- Failure Criterion
- Shear Stresses

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SOLIDWORKS FLOW SIMULATION – 2 DAYS (14H)

1. Creating a SOLIDWORKS Flow Simulation Project

- Model Preparation
- Post-Processing

2. Meshing

- Computational Mesh
- Basic Mesh
- Initial Mesh
- Geometry Resolution
- Result Resolution/Level of initial Mesh
- Control Planes

3. Thermal Analysis

- Fans
- Perforated Plates

4. External Transient Analysis

- Reynolds Number
- External Flow
- Transient Analysis
- Turbulence Intensity
- Solution adaptive Mesh refinement
- Two-dimensional Flow
- Computational Domain
- Calculation control options
- Time animation

5. Conjugate Heat Transfer

- Conjugate Heat transfer
- Real Gases

6. EFD Zooming

- EFD Zooming

7. Porous Media

- Porous media
- Design modification

8. Rotating Reference Frames

- Rotating reference frame
- Averaging
- Noise Prediction
- Sliding Mesh
- Tangential faces of rotors
- Time step
- Axial Periodicity

9. Parametric Study

- Parametric analysis
- Steady state analysis

10. Free Surface

- Free Surface

11. Cavitation

- Cavitation

12. Relative Humidity

- Relative Humidity

13. Particle Trajectory

- Particle Trajectory

14. Supersonic Flow

- Supersonic Flow

15. FEA Load Transfer

- FEA Load Transfer

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PMT2543-ENG

SOLIDWORKS FLOW SIMULATION: HVAC MODULE – 1 DAY (7H)

*The "SOLIDWORKS Flow Simulation" Training is required for this class.

1. Introduction to HVAC

- Objectives
- HVAC Module
- Case Study: Office
- Project Description
- Radiation
- Radiation Transparency
- Radiation Source
- Radiative Surface
- Discussion
- Comfort Parameters
- Conclusions

Course Objectives : At the end of each course, students will know the capabilities of the software and will be able to use the learned features.
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SOLIDWORKS FLOW SIMULATION: ELECTRONIC COOLING MODULE – 1 DAY (7H)
*The "SOLIDWORKS Flow Simulation" training is required for this class.
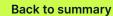
1.   Introduction to Electronics Module

- Objectives
- Electronic Module
- Case Study: Computer Box
- Conclusions

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SOLIDWORKS PLASTICS – 1.5 DAY (10H), 2 DAY (14H) OR 3 DAY (21H)

1. Basic Fill Analysis

- Basic Fill Analysis
- Injection Process
- Element Types
- Units
- User Interface
- Injection Units
- Material
- Boundary Conditions
- Injection Location
- Create Mesh
- Simulation Type
- Running a Fill Analysis
- Fill Results

2. Detecting a Short Shot

- Detecting Short Shots
- Fill Properties
- Flow Front Central Temperature
- Configurations

3. Automation Tools

- Automation Tools
- Duplicate Study
- Plastics File Management
- Batch Manager

4. Injection Locations and Sink Marks

- Injection Locations and Sink Marks
- Injection Location Rules
- Visibility Commands
- Sink Marks

5. Materials

- Materials Properties
- User-Defined Database
- Resin Properties
- Temperature Properties
- Polymer types
- Thermal Properties
- Rheological Properties
- PVT Data
- Thermo-Mechanical Properties

6. Mesh Manipulation

- Mesh Manipulation
- Local Mesh Refinement
- Edit/Review
- Element Issues
- Leader Lines
- Edit Study
- Solid Mesh
- Solid Mesh Size

7. Detecting Air Traps

- Detecting Air Traps
- Air Traps
- Venting
- Solver settings

8. Gate Blush

- Gate Blush
- Runner Elements

9. Packing and Cooling Times

- Pack and Cooling
- Flow/Pack Switch
- Pack Stage
- Pack Analysis
- Pack Results
- X-Y Plot
- Clipping Plane Mode
- Isosurface Mode
- Cooling Times

Part 2 →

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PMT2539-ENG

SOLIDWORKS PLASTICS (PART 2)

10. Multiple Cavity Molds

- Multiple Cavity Molds
- Mold Layouts
- Runner System
- Runner Channel Design
- Clamping Force
- Family Mold Layout
- Using Runner-Balancing

11. Symmetry Analysis

- Symmetry Analysis
- Symmetry
- Cyclic Symmetry

12. Valve Gates and Hot Runners

- Hot Runners
- Valve Gates

13. Reaction Injection Molding

- Reaction Injection Molding

14. Using Inserts

- Using Inserts
- Inserts
- Metal Material Database

16. Co-Injection Molding

- Co-Injection Molding
- Thick Parts

17. Bi-Injection Molding

- Bi-Injection Molding
- Copy and Paste
- Bi-Injection
- Injection Start Value

18. Cooling Analysis

- Cooling Analysis
- Cooling
- Cooling Channels and Mold Bodies
- Baffle
- Bubbler
- Cooling Simulations
- Coolant
- Mold
- Cool Parameters
- Cool Analysis
- Cool Results

19. Warpage Analysis

- Warpage Analysis
- Shrinkage
- Warpage
- Warp Parameters
- Warp Results
- Reducing and Fixing Warped Parts

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