VALIDATE

Effectively evaluate the performance of your product design, improves quality, boosts product innovation by setting up virtual real-world environment to simulate product designs before manufacturing.

ATE
meeting engineering challenges

SOLIDWORKS

SOLIDWORKS SIMULATION

OBJECTIVE

SOLIDWORKS Simulation is a comprehensive structural analysis solution fully embedded within SOLIDWORKS that can be used by designers and analysts alike to enable companies to get their products to market faster and with less cost without sacrificing quality or performance.

OVERVIEW

SOLIDWORKS® Simulation is a portfolio of structural analysis solutions using the Finite Element Analysis (FEA) method to predict a product's real world physical behavior by virtually testing CAD models. The portfolio delivers linear, non-linear static and dynamic analysis solutions divided into three products: Simulation Standard, Simulation Professional, and Simulation Premium, each of which adds easy-to-use capabilities to solve ever more challenging problems.

BENEFITS

- Evaluates the performance of multiple variables at a rapid pace.
- Reduces time-to-market by quickly determining optimal design solutions.
- Predicts product performance, Factor of Safety (FOS), and fatigue capabilities early-on in the process.
- Reduces materials cost. SOLIDWORKS Simulation enables design teams to safely remove unnecessary material.
- By virtually testing and refining your designs first, the costly testing and certification process is streamlined reducing your time-to-market.

CAPABILITIES

SOLIDWORKS Simulation Standard

SOLIDWORKS Simulation Standard gives product designers an intuitive virtual testing environment for linear static, timebased motion, and high-cycle fatigue simulation. Designers and engineers can tackle common structural engineering challenges with the Static Study which assumes a linear elastic static formulation of elastic and linear materials, and that all loads and fixtures are static (no variation in time). With these parameters, users can calculate component stresses, strains, FOS, and displacements.

The fatigue study estimates the high cycle fatigue life of components subjected to multiple varying loads where the peak stress is below the material yield stress. Cumulative damage theory is used to predict locations and cycles to failure. The Trend Tracker and Design Insight Plot enable designers to highlight optimal design changes while they work. Time-based motion analysis is a rigid body kinematic and dynamic motion tool used to calculate the velocities, accelerations, and movements of an assembly under operational loads. In addition, designers and engineers can determine assembly power requirements together with spring and damper effects.
With the motion analysis complete, the component body and connection loads can be included in a linear analysis for a complete structural investigation.

SOLIDWORKS Simulation Standard delivers a concurrent engineering approach helping engineers know if their product will perform properly and how long it will last.

SOLIDWORKS Simulation Professional

SOLIDWORKS Simulation Professional delivers easy-to-use, powerful capabilities to carry out sequential multi-physics. Temperature distributions from a static or transient thermal analysis can included into a linear static analysis allowing for the effects of material thermal expansion in the stress calculations. For products that experience vibration in their working environment, a frequency analysis will determine the product's natural modes of vibration to limit the possibility of resonance which can dramatically shorten component life.

Carrying out 'what if' analyses is easy in SOLIDWORKS Simulation Professional with the parametric optimization design study. Users can vary the parameters of their model, material, loadings, and restraints to determine the optimal or most robust design. Products that are slender with in-plane loading can suffer from structural instability, well below the materials' yield stress, which is predicted by the buckling study. The safe design of pressure vessels requires the reporting of linearized stresses due to pressures and pipe loads calculated in the pressure vessel study. The topology study enables designers and engineers to discover new minimal material design alternatives, under linear elastic static loading, while still meeting the components' stiffness requirements. SOLIDWORKS Simulation Professional enables designers and engineers to produce robust, innovative designs while ensuring product strength, reliability, and endurance.

SOLIDWORKS Simulation Premium

SOLIDWORKS Simulation Premium includes three advanced studies: Non-Linear Static, Non-Linear Dynamic, and Linear Dynamic. The linear dynamic study builds upon the frequency study to calculate the stresses due to forcing vibrations. This enables engineers to calculate the effects of dynamic loads, impact or shock loading, even earthquake simulations for linear elastic materials.

Non-linear analysis allows designers and engineers to analyze complex material behavior, such as that of metals, rubbers, and plastics. This analysis also helps account for large deflections and sliding contact in the components. Non-linear static studies assume static loads, and although the loads can be sequenced, the dynamic effects of varying loads are not taken into account. The complex material models in non-linear analysis allow for the calculation of permanent deformation and residual stresses due to excessive loads, as well as the prediction of springs and clip fasteners.

In non-linear dynamic studies, the effect of real-time varying loads are included in the calculation and results. In addition to solving non-linear static problems, non-linear dynamic studies can also solve impact issues. SOLIDWORKS Simulation Premium enables engineers to solve problems without simplification to determine complex real-world behaviors. Not all capabilities are available in every package or for all studies.

SOLIDWORK Design Support

- Fully embedded in SOLIDWORKS 3D CAD
- Support SOLIDWORKS configurations and materials
- Help, documentation, and knowledge base
- Macro recording and Application Programming Interfaces (APIs)

Results and Post Processing

- Overlay Simulation results onto SOLIDWORKS graphics
- Calculation of stress, strain, displacement, and FOS
- Calculation of reaction forces and moments
- Contour, Iso-Surface, Surface, Section Result Plot
- Animation of results
- Probe tool
- Compare test data
- Hot spot detection (stress singularity)
- Equation-driven results
- Customizable simulation report
- eDrawings® of SOLIDWORKS Simulation results

General Finite Element Analysis

- Single and multi-body part analysis
- Assembly analysis
- Solid, Shell, and Beam modeling
- 3D & 2D analysis
- h and p adaptive element type
- Mesh control capabilities
- Sub-Modeling
- Offload solve

Analysis Types

- Linear Static Analysis
- Fatigue Analysis
- Frequency Analysis
- Linear Buckling Analysis
- Linear Thermal Analysis
- Design Optimization (parametric)
- Topology Studies
- Drop Test Analysis
- Pressure Vessel Design Simulation
- Time-based Motion Analysis
- Event-based Motion Analysis
- Linear Dynamic Analysis
- Non-Linear Static Analysis
- Non-Linear Dynamic Analysis

Contact Conditions

- Bonded, sliding, and shrink-fit contact conditions
- Self-contact condition
- Thermal contact resistance condition
- Insulated condition

Connectors

- Bolt, spring, pin, elastic support, and bearing
- Connectors Safety Check
- Edge and spot weld connector

Loads & Boundary Conditions

- Support for Cartesian, Cylindrical, and Spherical coordinate systems
- Fixtures to prescribe zero or non-zero displacements
- Structural loads
- Temperature loading
- Import Flow/Thermal Effects
- Load Case Manager
- Load curves