COSMOSWorks Designer

COMBINE POWERFUL ENGINEERING ANALYSIS TO IMPROVE PRODUCT QUALITY

COSMOSWorks Professional offers a wide spectrum of powerful tools to help engineers who are familiar with design validation concepts to perform virtual testing and analysis of parts and assemblies. Take your designs to the next level. In addition to the design validation functionality contained in COSMOSWorks Designer, COSMOSWorks Professional offers expanded analysis capabilities including: Structural Simulation, Thermal, Frequency, Buckling, Optimization, Fatigue, and Electro-Dispersion.

Understand the effects of temperature changes. Temperature variations encountered by mechanical parts and structures can greatly influence product performance.  
- Study conduction, convection, and radiation heat transfer.
- Support isostatic, orthotropic, and temperature-dependent material properties.

Evaluate natural frequency or critical buckling loads and their corresponding mode shapes. Often overlooked, vibrational hazards involve structural components or mechanical supports can cause structural failure. 
- Study natural modes and orthotropic material behavior.
- Bending, shear, and membrane effects.
- Loads for buckling and eigenvalues including forces, pressure, gravity, and centrifugal forces.

Optimization-based design on your defined criteria. Design optimization automatically determines the most optimal design based on your given criteria. 
- Study natural and orthotropic material behavior.
- Use dynamic criteria on orthotropic, elastic, or volume.

COSMOSWorks Professional is the first validation software created for nonspecialists, enabling any designer to quickly and easily test the performance of their designs. COSMOSWorks for stress analysis.

COSMOSWorks Advanced Professional

ONE OF THE MOST COMPREHENSIVE SOFTWARE PACKAGE OFFERED TO THE DESIGN COMMUNITY

One of the most comprehensive and sophisticated packages available, COSMOSWorks Advanced Professional offers analysts a tremendous range of analysis capabilities at a fraction of the cost of most high-end FEA programs. The complete design validation software for advanced product engineers. In addition to the design validation functionality contained in COSMOSWorks Designer, COSMOSWorks Advanced Professional offers analysts an expanded selection of analysis capabilities including: Stress, Frequency, Nonlinear, Dynamic, and Composite.

Study nonlinear large displacement behavior of your designs. Quickly solve nonlinear problems due to large deformation and changes in boundary conditions. 
- Study complex materials such as anisotropic, composites, hyperelastic, and viscoelastic.

Analyze designs made of nonlinear materials. Nonlinear materials such as rubber, silicon, or metals under high loads behave differently from standard engineering materials.
- Study nonlinear behavior of rubber, silicone, metals, and composites.
- Conduct material model analysis to study stress of nonlinear materials as well as post-yield analysis in your design.

Study dynamic forced vibration and nonlinear behaviors with temperature.
- Analyze nonlinear composite materials.
- Include creep effects and material changes with temperature.
- Conduct elastoplastic analysis to study onset of yield for nonlinear materials.

Perform dynamic analysis of parts and assemblies. Study dynamic nonlinear analysis due to time history loading, response spectra input, steady-state harmonic input, and random vibration input.
- Study stress, displacement, velocity, acceleration, and strain response of assemblies.

Analyze assemblies and composite materials. Composite materials are used in an increasing number of products ranging from simple consumer goods to very expensive industrial components.
- Study quasi- and real multilayer shell elements with membranes and bending capabilities. Each layer can have non-isotropic or orthotropic material properties, thickness, and temperature-dependent material behavior.
- Utilize sandwich and graphite or carbon fiber composites (such as honeycomb, cellular foams, carbon fiber).

Conduction, convection, and radiation heat transfer.
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Compare alternative designs easily and quickly. Go beyond simple hand calculations and study history-driven configuration changes with a powerful visualization tool to help you easily visualize the effects of design changes on your products.
- Study stress, strain, and displacement in parts and assemblies.
- Define analysis inputs such as material, loads, and geometric dimensions using parameters.
- Drag and drop to create and clone analysis studies.

Study the interaction between different assembly components.
- COSMOSWorks Designer provides powerful tools to study and optimize assemblies of all sizes.
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POWERFUL DESIGN VALIDATION SOFTWARE FOR PRODUCT DESIGNERS AND ENGINEERS

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COSMOSWorks Professional

- Advanced validation software offering power and sophistication
- Meets the needs of advanced designers and analysts
- Provides a wide spectrum of powerful tools to help engineers who are familiar with design

COSMOSWorks Advanced Professional

- Complete design validation software for advanced product engineers
- In addition to the design validation functionality contained in COSMOSWorks Professional, COSMOSWorks Advanced Professional offers analysts an expanded selection of analysis capabilities including; Motion Simulation, Thermal, Frequency, Buckling, Optimization, Fatigue, and Drop Test Simulation.

Use COSMOSWorks Designer to improve product quality by identifying areas that are prone to weakness and failure. You can also lower costs by trimming excess material and minimizing the need for tooling and prototypes.

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\[ \text{strain} \approx \frac{\text{stress}}{\text{strain}} \]
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### Feature Designer Professional Advanced

#### GEOMETRY TYPES

<table>
<thead>
<tr>
<th>Feature</th>
<th>Designer</th>
<th>Professional</th>
<th>Advanced Professional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assembly analysis</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Shell, thin parts, sheet metals</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Beam, Trusses</td>
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</tbody>
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#### ANALYSIS TOOLS

- Static & Dynamic
- Contact analysis in assemblies with friction
- Transient dynamic analysis
- Heat Transfer - steady state & transient
- Temperature dependent materials
- Drop Test
- Fatigue
- Vibration

#### SIMULATION FEATURES

- Beams, Trusses
- Thin parts, sheet metal parts, shells
- Nonlinear Analysis

#### GEOMETRY

- Multiple models, "what-if" scenarios
- Parametric & Solid Model Components
- Parametric Material Library

#### ENVIRONMENTAL LOADS & BOUNDARIES

- Uniform pressure & force on faces
- Fixed restraints on faces
- Directional & non-uniform pressure & force
- Force on edges and vertices
- Body loads: gravity & centrifugal
- Special loads: torque, remote, bearing
- Fixed restraints on edges & vertices
- Directional and prescribed restraints
- Temperature, convection, radiation, heat power

#### ASSEMBLY CONNECTORS

- Springs, Elastic Foundation
- Pin, Bolt, Rigid, Spot Weld
- Thermal Contact Resistance

#### VISUALIZATION

- Stress plot, Displacement plot
- Factor of safety calculation and plot
- Principal stress, directional stress, strain plots
- Result probing, listings
- Dynamic section, iso plots
- Scaled plots, superimposed plots, customizations
- Resonant frequencies, mode shape plots
- Temperature, heat flux plots

#### ENGINEERING COLLABORATION

- HTML report
- Publish eDrawings of analysis results
- Animation and save as AVI
- Detailed HTML report customizations
- Save as bitmap, JPEG, VRML, XGL
- Export to other FEA systems

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**Design Validation Made Simple**

**www.cosmosworks.com**