Pro/ENGINEER® Structural and Thermal Simulation

Gain Insight into Product Performance Early in the Design Phase

Pro/ENGINEER Structural and Thermal Simulation gives you the power to understand product performance on the desktop—before resorting to physical prototyping. By gaining insight into product behavior early in the design phase, you can improve product quality while saving time, effort, and money.

Market competition is forcing design teams to "get it right the first time." But to achieve that goal, designers must understand product performance early in the development cycle. The problem: costly, time-consuming prototyping processes hinder design teams, while compromising schedules and budgets. And though some CAE tools offer a solution, often they are disconnected from the CAD platform and require a specialized skill set.

With Pro/ENGINEER Structural and Thermal Simulation, design engineers can better understand product performance, and revise the digital design accordingly—all without needing a specialist's background or building a prototype.

An integral solution within Pro/ENGINEER, Structural and Thermal Simulation requires no data translation and features the same user interface, workflow, and productivity tools that are prevalent throughout Pro/ENGINEER. Thus, product designers can now leverage the industry-leading power, performance, and associativity of Pro/ENGINEER for their analysis needs. The result: engineers can evaluate product performance digitally and deliver higher quality products at lower cost.

Key Benefits

- **Intuitive GUI**, suited to designers and engineers, enables early discovery of design flaws, for first-time build success

- Powerful adaptive technology and automatic convergence delivers **accurate results** in the shortest amount of time

- **Obtain real-world performance** data by directly applying conditions to design geometry without requiring data translation

- **Increase innovation** by simultaneously designing and simulating results of design variations

- **Reduce development costs** through reduction/elimination of physical prototyping
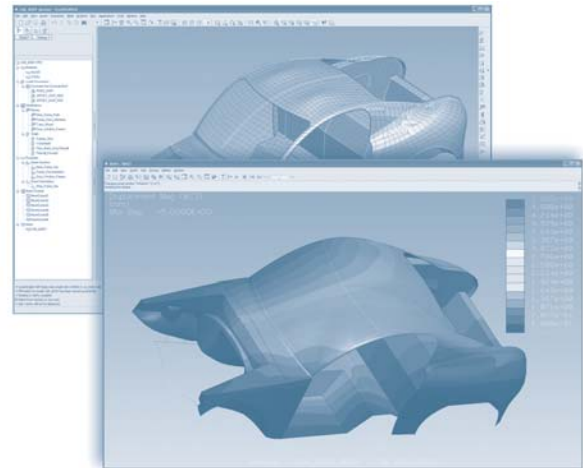
Evaluate product performance early without extensive specialist knowledge.

Features and Specifications

Advanced adaptive solution ensures results accuracy
- Powerful simulation technology that drives solution accuracy

- Automatic convergence provides product designers with confidence in results—without the need for user intervention

- Capture actual model geometry as designed, not an approximation as in traditional analysis packages

Broad Range of Analysis Capabilities to Address Design Needs
- Static stress and displacement

- Find natural frequencies

- Ability to solve for buckling failure

- Steady state thermal analysis for temperatures and fluxes

Sophisticated Analysis Capabilities for Advanced Requirements
- Transient thermal*

- Large deformation and contact nonlinearity*

- Static and modal pre-stress*

- Dynamic time, frequency, shock and random vibration*

- Anisotropic and orthotropic materials*

- Temperature-dependent materials

Thermal Analysis Capabilities

- Apply heat loads, prescribed temperatures, and convection coefficients for thermal models

- Apply imported thermal boundary conditions from CFD analyses

- Use thermal results to structural models and solve for thermal stresses

Scalability to Address your Needs

- Option to output, solve, and post process your model online in either NASTRAN or ANSYS

- Hierarchical modeling to build FEM models of complex structures

Tools for Querying, Interpreting, Communicating Results

- Interactively query results values on the model

- Fringe, iso-plot, vector plot, or graph results

- Output MPEG, VRML, JPEG, EXCEL, TIFF, and HTML reports

- Insert capping/cutting surfaces to view inside the model

- Templates automate results creation

- Ability to overlay deformed and un-deformed model representations

- Compare model iterations side by side

- Overlay model boundary conditions in results

Robust Set of Tools for Modeling Assemblies

- Model spot, end, and perimeter welds

- Model contact between components as free, bonded, or nonlinear

- Rigid and weighted connections

- Bolt fasteners including preload*

- Simplify components to point masses*

- Automated assembly modeling: automates analysis of midsurfaced models

Meshing Tools to Tackle Tough Jobs

- Mixed meshing (solids, shells, and beams)

- Options for meshing to be fully automated or with user control

- Meshing controls for refinement

- Automated geometry cleanup and diagnostics

Modeling Tools to Accurately Simulate Complex Designs

- Springs, Masses, Beams, and Shells

- Composite laminate modeling tools

- Beam releases free specified rotations and translations

- Advanced springs and masses*

- A library of standard & sketched beam sections

Design Improvement and Optimization Tools

- Measures can be defined to track results of specific quantities at locations

- Optimization and feasibility studies to improve initial design

- Sensitivity studies that answer "what if" scenarios common to design

- Ability to parametrically vary properties in your simulation model

Leverage all Pro/ENGINEER Capabilities

- No separate data files—all the simulation data is stored in the part and assembly files

- Integration with Behavioral Modeling to apply more advanced design exploration tools such as design of experiments

- Loads from Mechanisms Dynamics may be automatically applied to a structural analysis

- Automated midsurface extraction (sheetmetal and thin solid parts)

Structural Boundary Conditions

- Enforced displacement, mirror, and cyclic symmetry constraints

- Force and moment, bearing, and pressure loads

- Gravity, angular acceleration/velocity body loads

- Temperature loads

- Total loads applied at point

- Loads varying as a function of coordinates or table data

Language Support

- English, German, French, Japanese

Platforms

- Microsoft Windows (XP, 2000)

- UNIX (Solaris, HP-UX, IRIX)

For specific operating system levels, visit:

www.ptc.com/partners/hardware/current/support.htm

*These capabilities are available in the Pro/ENGINEER Advanced Structural and Thermal Simulation Option

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