

## Pro/ENGINEER® Advanced Mechanics

THE OPTIMAL TOOL FOR SIMULATING REAL-WORLD PERFORMANCE

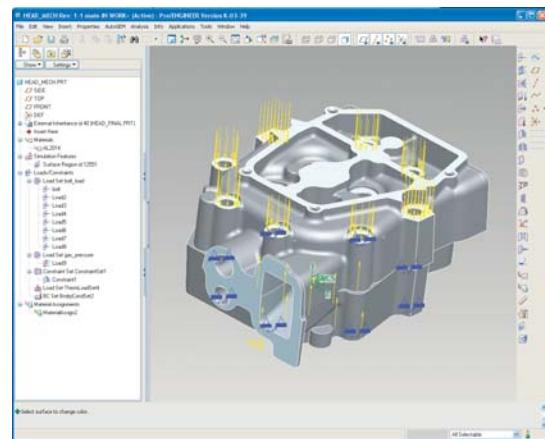
Few companies today – if any – can afford the time and cost of building a new physical prototype with every new design iteration. Instead, today's top development teams are relying on Pro/ENGINEER Advanced Mechanics to perform comprehensive structural and thermal simulation – on the desktop – long before committing significant time and money to physical prototypes. There's simply no better tool on the market for early insight into product performance.

Facing the pressure to deliver higher quality products on ever-tightening schedules, companies are adopting computer-aided engineering (CAE) tools as an intrinsic part of their design processes.

By expanding on the base functionality of Pro/ENGINEER Mechanics, Pro/ENGINEER Advanced Mechanics delivers additional capabilities that are ideal for sophisticated users who either work with complex models, employ advanced design processes and want the most expansive range of simulation functionality offered by PTC.

Pro/ENGINEER Advanced Mechanics provides an even broader set of analysis capabilities such as nonlinear deformation, transient thermal, vibration and failure analysis. By leveraging these advanced capabilities, you'll have even greater confidence that your design will satisfy performance requirements. You'll also have more options to model advanced, real-world conditions such as rigid or weighted links, orthotropic and transversely orthotropic materials, advanced springs and preloaded bolt fasteners.

By giving engineers early insight into design performance, Pro/ENGINEER Advanced Mechanics enables product development organizations to easily meet exacting requirements. With this knowledge, engineers have the freedom to explore new ideas and design variants, while optimizing their designs. Better yet, it saves time by reducing the number of changes during physical prototyping. It saves even more time by offering greater options to simplify the model in preparation for analysis. For example, in Pro/ENGINEER Advanced Mechanics, users can idealize components in an assembly down to point masses whose properties are associative back to the original components.



Pro/ENGINEER Advanced Mechanics simulates more accurate real-world conditions for stress analysis by defining bolt preload conditions and internal combustion loads.

For any simulation tool to be adopted as an integral component of the product design process, it must be fast and easy to use, plus it must provide accurate results while satisfying functional needs. As a Pro/ENGINEER simulation add-on, Pro/ENGINEER Advanced Mechanics delivers all these capabilities because it employs the same user interface, workflow and productivity tools that are prevalent throughout Pro/ENGINEER. Thus, designers can leverage their familiarity with the proven power of Pro/ENGINEER for model creation and collaboration. Also, since the model files store simulation-modeling data, engineers can streamline data management issues.

### Key Benefits

- Greater confidence in your design's ability to satisfy performance requirements
- Understand a product's ability to satisfy structural and thermal performance requirements by testing the design as it develops
- Mitigate the risk of failure and drive first-time build success by leveraging the integrated design and analysis environment, and by starting analysis earlier in the design cycle
- Reduce product cost and design time by identifying and addressing design flaws before committing to costly physical prototypes
- Produce the highest quality designs by modeling complex real-life conditions and using advanced capabilities such as failure analysis
- Save time by having even more advanced tools, along with the flexibility to simplify the model

# Pro/ENGINEER Advanced Mechanica

## Features and Specifications

Pro/ENGINEER Advanced Mechanica Has All the Capabilities of Pro/ENGINEER Mechanica, Plus the Following Advanced Simulation Capabilities:

### Simulate a broader range of analysis types

- Large non-linear deformation analysis
- Pre-stress static analysis, including stress-stiffening effects
- Pre-stress modal analysis, including spin-softening effects
- Transient thermal analysis
- Dynamic analyses for:
  - Time response
  - Frequency response
  - Random response
  - Shock

### Support for Advanced Connection Definitions

- Use Rigid Links to bond geometry together as a rigid body
- Use Weighted Links to couple a point to the average of the displacements of a set of referenced geometry

### Laminate Modeling Capabilities

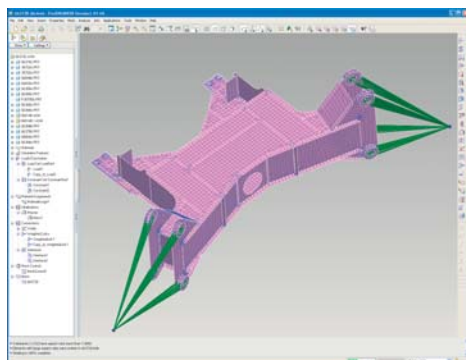
- Support for orthotropic and transversely orthotropic materials
- Tsai-Wu, Maximum Strain, and Maximum Stress failure criteria
- Define shell properties with a laminate ply editor
- Flexible options to view results by ply or relative to material orientation

### Access to More Sophisticated Idealization Types

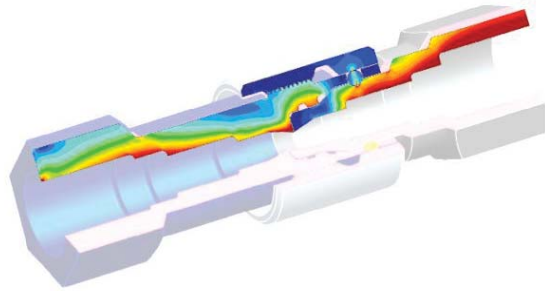
- Mass idealizations defined by component or the full inertia tensor
- Spring idealizations defined by the stiffness matrix including off diagonal terms
- Define advanced conditions for bolt fasteners such as pre-load, stiffness properties and coupling control
- Shell idealizations support for material orientations and non-isotropic material definitions

### 2D Model Support

- Plane Strain
- Plane Stress
- 2D axis-symmetric



Take advantage of rigid and weighted links to more realistically simulate product behavior.



2D axisymmetry allows you to simplify complex problems, greatly reducing solution time.

### Advanced FEM Mode Support

- Hierarchical meshing: assemble meshed models from lower-level components into higher-level assemblies
- Rigid- and weighted-link support
- Laminate support to NASTRAN with PCOMP and PSHELL export options

### Language Support

- English, German, French and Japanese

### Platform Requirements

- Microsoft Windows (XP, 2000)
- UNIX platforms (Solaris, HP-UX)

For specific operating system levels, visit:

[www.ptc.com/partners/hardware/current/support.htm](http://www.ptc.com/partners/hardware/current/support.htm)

### The Pro/ENGINEER Advantage

With every Pro/ENGINEER add-on module, you gain an advantage over any other CAD/CAM/CAE product, due to the power of associativity. Because all Pro/ENGINEER modules share the same architecture, you don't have to worry about translating model information between applications, which wastes time and often introduces errors in your design. Once you modify your model in the design environment, you can instantly rerun the analysis in Pro/ENGINEER Advanced Mechanica. You don't waste a minute setting up the simulation again and again with each design change. Also, with the Materials Library, you have central access to material properties, including structural and thermal properties, throughout all Pro/ENGINEER modules. By giving you full associativity across CAD, CAM, and CAE functions, Pro/ENGINEER offers a level of speed and ease that's second to none.