Pro/ENGINEER® Mechanism Dynamics Option

ANALYZE DYNAMIC FORCES WITH A POWERFUL VIRTUAL PROTOTYPING SOLUTION

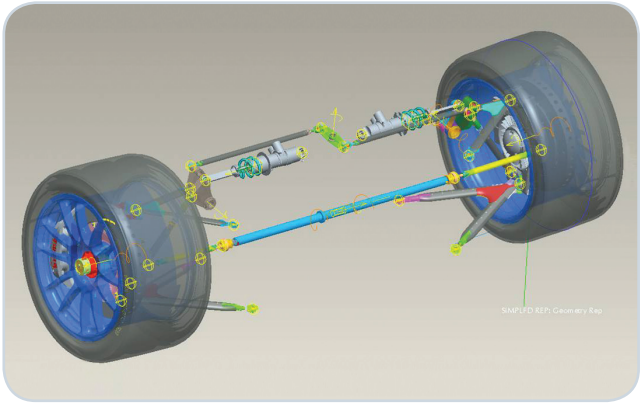
Pro/ENGINEER Mechanism Dynamics Option (MDO) allows you to virtually simulate real-world forces and analyze how your product will react to them, without building costly physical prototypes. Gaining insight into product behavior early in the design phase allows you to build better products, while saving you time and money.

Simulate Real-World Forces

With Pro/ENGINEER MDO, you can determine–on the desktop–how your design will react to dynamic forces, such as gravity and friction. Since you can conduct this analysis without having to build a physical prototype, you can perform your tests very early in the design phase, when correcting problems is much less costly. And when you do build a physical prototype, it's likely to be of much higher quality, as you've already completed a series of vigorous tests, virtually. By building fewer physical prototypes, you not only cut costs, but you also reduce time-to-market because you're building a better quality product that is 'right the first time'.

Design and Analyze Concurrently

Pro/ENGINEER MDO takes advantage of the integrated toolset of Pro/ENGINEER. This means there are no errors in data translation from one application to another. Additionally, engineers working with Pro/ENGINEER MDO are already familiar with the graphical user interface, as it is the same one used to design the product in Pro/ENGINEER. Furthermore, since Pro/ENGINEER MDO already leverages the same model data as Pro/ENGINEER, you won't waste time translating data for analysis. After implementing engineering changes, you simply rerun the analysis, generating a higher quality model faster.



Above: Engineers at Maserati and Dallara use Pro/ENGINEER MDO to simulate real-world forces on this Maserati MC12 race car suspension, reducing the number of physical prototypes and shortening the design cycle.

Key Benefits

- Eliminate time, effort, and money spent on data translation and associated errors by using fully integrated design and analysis tools
- Reduce development costs by creating virtual prototypes for desktop testing
- Incorporate changes into the products faster and earlier, and get immediate results from desktop testing
- Deliver higher quality products to market first, by reducing development time
- Reduce warranty costs by generating a better estimate of your product's life
- Eliminate costly manufacturing errors with specific, animated production instructions for assembly
- Create more innovative products by using the time-savings gained from virtual testing to evaluate more design ideas
- Work within an easy-to-learn, highly intuitive user interface

Pro/ENGINEER Mechanism Dynamics Option

Capabilities and Specifications

Explore Real-World Behavior

- Simulate gravity, springs, dampers, belts, gears, contact and friction without creating a physical prototype
- Perform kinematic analysis (position, velocity, and acceleration analysis) as well as dynamic motion analysis (friction, gravity, and forces)
- Detect problems with clearances and interferences early in the design cycle
- Import behavioral data from applications such as PTC's Mathcad® or Microsoft Excel, and apply to existing models to determine their performance under this behavior

Easily Share Results Via Intuitive Graphs

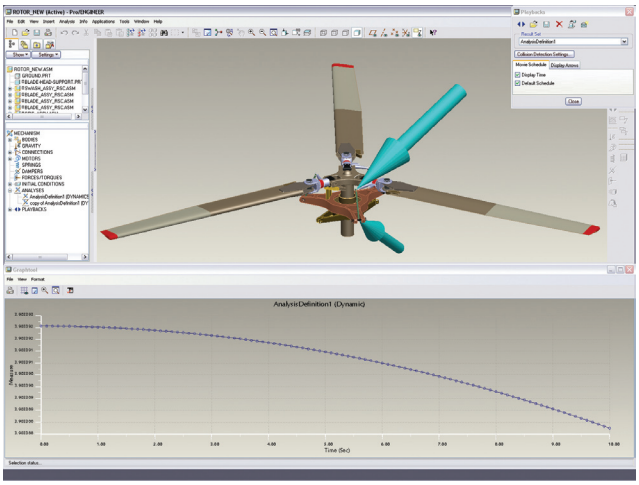
- Measure and graph custom specifications, such as velocity, at a specific joint
- Graph critical reactionary forces, such as loads and torques, to better communicate how the product will respond in a specific environment
- Share results with others, using graphs and animations; output your tabular data to spreadsheets for additional analysis
- Compare real-time motion with the graphical results

Increase Flexibility to Explore Complex, Real-World Situations, with Advanced Motion Analysis

- Use static analysis to determine loading at a static point
- Analyze belt connections, slot motors, dynamic gears and generic gears for all motion relationships
- Determine forces necessary to put a mechanism into motion, with inverse static loading (force balance)
- Easily create complex motion envelope parts of select components in your mechanism for use either in space claim studies or as place-holders in any assembly
- Use PTC's Pro/TOOLKIT™ to program a variety of complex behaviors, such as force-based gear systems, belts driven by flexible pulleys, linear beam and truss elements, and tire models
- Create user-defined forces and motor profiles as custom functions of measured force, torque, time, acceleration, velocity or position
- Model intelligent, proportional-integral-derivative (PID) controllers, as well as non-linear springs and dampers

Integrate Design and Simulation

- Transfer reaction, gravity, and inertial loads directly to Pro/ENGINEER Mechanica
- Set design feasibility and optimization study goals for kinematic and dynamic performance
- Leverage integration with other Pro/ENGINEER solutions, such as Pro/ENGINEER Mechanica and Pro/ENGINEER Behavioral Modeling, both for optimization and complete virtual product analysis
- Leverage design information from other calculation applications, such as Mathcad–PTC's engineering calculation software, or Microsoft Excel
- Use parametric motion features to re-use and create variants of motion models
- Ensure that changes are propagated to all other downstream deliverables of the product design via Pro/ENGINEER associativity



Above: Dynamic forces are applied to the rotor head assembly using Pro/ENGINEER MDO to optimize quality.

For more information on language and platform support, visit:
www.ptc.com/partners/hardware/current/support.htm

The Pro/ENGINEER Advantage

Pro/ENGINEER is simple to learn and use, and is available in a variety of packages designed to meet your company's specific needs. Whether you need a cost-effective 3D CAD system that contains the essential basic design capabilities, or a comprehensive Product Development System that seamlessly connects your extended supply chain, you'll find exactly what you need in a single, fully scalable solution. Choose the package that fits your needs today. And as your needs change and grow, you can easily upgrade to the package that is right for you tomorrow, while you leverage the same powerful platform. The result: no data translation and a consistent user experience.

With Pro/ENGINEER Mechanism Dynamics, you can perform motion analysis without wasting time preparing the model for analysis; Pro/ENGINEER already understands the joints and connections. Moreover, you don't have to worry about working with outdated information, or recreating data to be used for motion analysis. Pro/ENGINEER applications are seamlessly integrated, so you can focus on design and analysis of your product–and not waste time and energy recreating the model to be used for different applications. The integration of all Pro/ENGINEER applications eliminates errors that result from translating or recreating models for another program.

4327-MDO-DS-EN-0209