MSC Working Knowledge — Collaborative Mechanical Simulation™

MSC/Working Model® Family

Making functional design, simulation and virtual prototyping a fundamental part of the design process.

MSC Working Knowledge offers an exciting product family that at its core emphasizes the concept of functional design. The Working Model product family delivers a unique combination of simulation, visualization and collaboration features providing pathway to significant improvements in product quality and reductions in cost and time-to-market.

Your Design Looks Good But Does It Work?

Tools such as those offered by MSC Working Knowledge focus on the question: "does the design function as intended?" or simply, "does it work?" More and more, small and large companies alike are finding that building a virtual software prototype enables designers and engineers to identify design flaws that would previously only have been identified after building costly and time consuming physical prototypes.

Working Model products provide an environment for breaking down the barriers between functional groups. By enabling design concepts to be simulated and visualized as they would function in the real world, a virtual prototype, or "working model," not only provides a vehicle for simulating and validating designs, but facilitates communication and collaboration both inside and outside an organization. The end result is better designs to market faster.

Today, a growing number of Working Model customers are finding that a virtual prototype not only improves the in-house design process, but also enhances their ability to generate new business by communicating ideas more clearly — not just with pretty pictures — but functioning models based on real physics.

A single source for a complete family of proven mechanical simulation tools.

For the first time, complete simulation capabilities and sophisticated viewing, visualization and collaboration tools are available in a single product family from a single vendor.

MacNeal-Schwendler (MSC) has been offering industry leading simulation technology and solutions for over 35 years.

Leveraging MSC/NASTRAN™ and other technologies in use today at leading manufacturing companies across a wide variety of industries, MSC is revolutionizing desktop design and simulation.

The Working Model product family brings powerful simulation to the Windows desktop. This unique product family and technology is not only powerful and comprehensive enough to solve the most rigorous engineering analysis problems, it's easy-to-use Windows® interface makes it accessible to all designers and engineers.

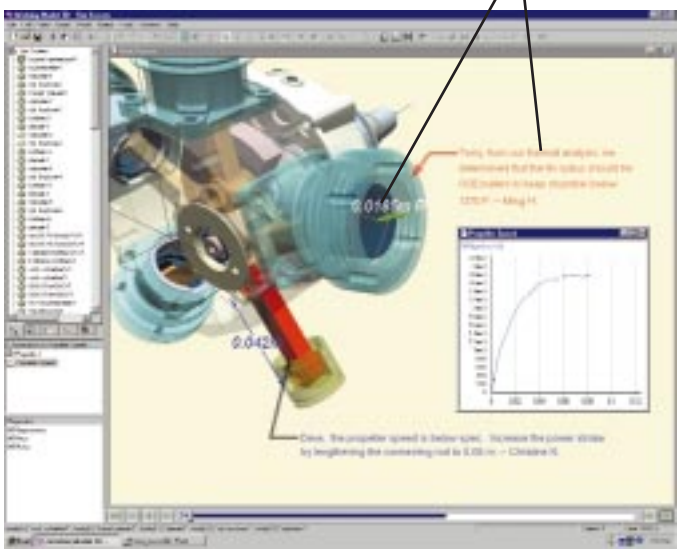
Why settle for anything less than the proven-industry standard for functional design and simulation?

www.workingmodel.com

MSC Working Knowledge

Powerful, yet easy-to-use functional design and simulation technology coupled with visualization and collaboration tools for both small and large companies.

Annotation such as notes and dimensions facilitate design collaboration between workgroups, vendors, suppliers and customers.



Working Model View

Working Model View provides a rich collection of design visualization and collaboration tools for the workgroup and enterprise including viewing, annotation and measurement of parts and assemblies from popular CAD systems. By also supporting playback of photorealistic animations and physics-based simulations, Working Model View becomes a platform for communicating design concepts throughout the organization.

Benefits

- Low-cost, widely available "portal" for 3D data from multiple sources
- Easy-to-use and learn native Windows interface saves time and money on training and decreases learning curve
- Facilitates communication and collaboration throughout the product life cycle with suppliers and vendors in addition to internal groups and departments
- Improves ROI for 3D data by increasing its usage inside and outside the organization

Features

- View, annotate and redline 3D and 2D files
- Popular 3D formats include files from Mechanical Desktop®, Pro/ENGINEER®, Solid Edge™, SolidWorks® and neutral formats such as STL, SAT (ACIS), and IGES
- Support for a variety of popular 2D file formats including DXF and DWG
- Measurement and dimensioning
- View images and play back animations and physics-based simulations from other products in the Working Model family

Control key simulation parameters with interactive input sliders to perform "what if?" analyses.

Working Model Studio

Working Model Studio combines the engineering foundation of the Working Model family with sophisticated visualization features to enable authoring of photorealistic renderings and interactive hybrid keyframed and simulated, physics-based animations of functioning virtual prototypes.

Benefits

- Authoring/Creation tool for 3D design and simulation data provides an easy-to-use environment for design collaboration and digital mockup
- Common look and feel from viewing through engineering simulation maximizes investment in learning and simplifies support
- Facilitates communication and collaboration with suppliers in addition to internal groups and departments throughout the product life cycle
- Improves ROI for 3D data by increasing its usage inside and outside the organization

Features

All functionality of Working Model View, plus:

- Photorealistic rendering and texture mapping
- Multiple cameras and light sources
- Keyframed animation: bodies, cameras, lights, properties, notes, dimensions
- Integration of true physics-based simulations with traditional keyframed animations
- Auto-explode for quick animated exploded views of assemblies

Working Model Motion (formerly Working Model 3D)

The solution of choice for demanding engineering and design applications requiring simulation of moving parts, Working Model Motion provides a complete suite of tools for the development and communication of physics-based virtual prototypes.

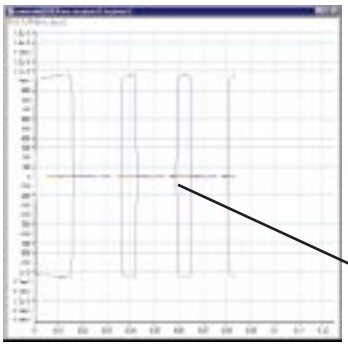
Benefits

- Easy-to-learn and use native Windows interface
- Provides accurate solutions to complex engineering motion simulation problems
- Save time and money: avoid expensive prototyping and product failures
- Common look and feel from viewing through engineering simulation maximizes investment in learning and simplifies support

Features

All functionality of Working Model View and Studio, plus:

- Powerful physics-based motion simulation and analysis (kinematics, dynamics, etc.)
- CAD Associativity via Automatic Constraint Mapping™ (ACM)
- Automatic collision detection
- Measurable parameters (velocity, acceleration, etc.)
- Connect with FEA via Automated Load Transfer™ (ALT)



Create meters to accurately measure and plot important simulation inputs and outputs.

Working Model Concept

Working Model Concept puts sophisticated optimization technology at the fingertips of every designer and engineer. Automatically generate alternative designs earlier in the design cycle based on user-defined optimization criteria.

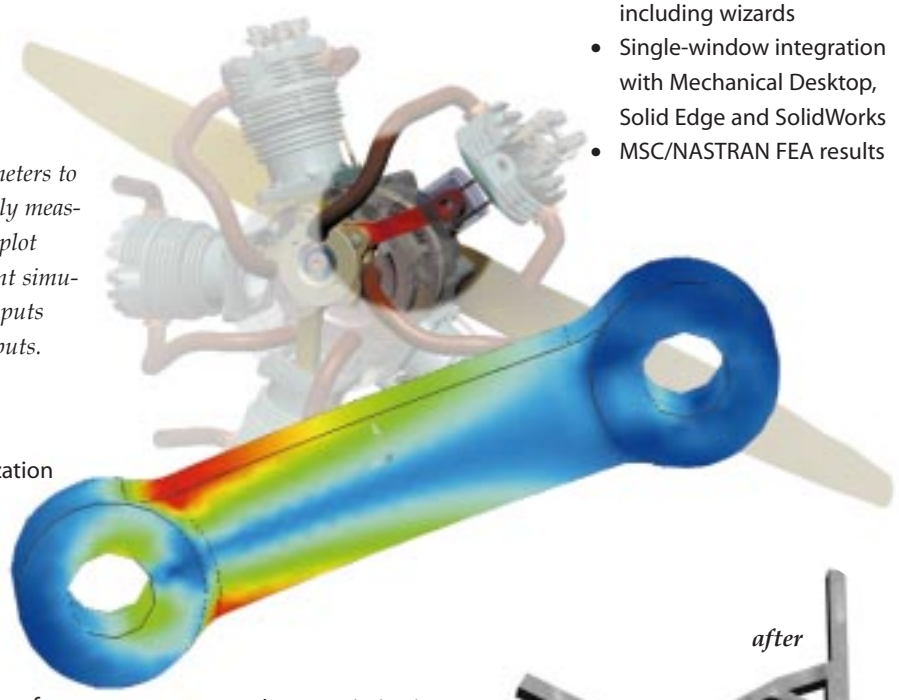
Benefits

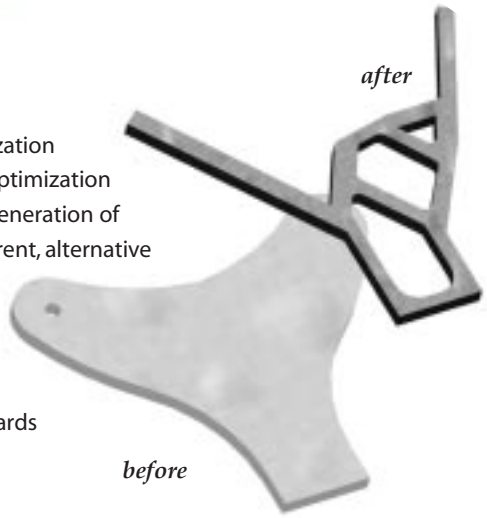
- Easy-to-use, CAD-integrated interface decreases the learning curve and training costs
- Quickly optimize your products by investigating alternative designs
- Improve design quality and decrease time-to-market

Features

All functionality of Working Model FEA, plus:

- Conceptual design based on the optimization of simulation results
- Automatic generation of completely new designs based on user-defined functional requirements
- Automatic, geometry-based shape optimization
- Topological optimization enables the generation of radically different, alternative designs
- Standard Windows interface, including wizards





Working Model FEA (formerly MSC/InCheck)

Working Model FEA delivers a complete suite of Finite Element Analysis solutions for the designer, including stress and deflection, heat transfer, vibration, and buckling; all integrated within a common easy-to-learn and use Windows interface, and all based upon proven MSC/NASTRAN technology.

Benefits

- Easy-to-use, CAD-integrated interface decreases the learning curve and training costs
- Quickly investigate alternative designs
- Improve the quality of your designs and reduce development time
- Reliability, accuracy and performance of the MSC/NASTRAN FEA solver gives you confidence that your designs will work

Features

- Assembly-based
- Linear-static stress and deflection
- Steady-state heat transfer with conduction and convection
- Linear buckling
- Vibration: normal mode frequencies
- Loads, restraints and mesh associatively linked with CAD geometry
- Extensive post-processing tools such as contour plots, graphs, etc.
- Standard Windows interface, including wizards
- Single-window integration with Mechanical Desktop, Solid Edge and SolidWorks
- MSC/NASTRAN FEA results

Working Model Family Overview

	Integrated and Associative, Assembly-based Interface				Neutral File Interface				
Working Model	**Mechanical Desktop**	**SolidWorks**	**Solid Edge**	**Pro/ENGINEER**	**SDRC**	**Unigraphics**	**Think3**	**CoCreate**	**IronCAD**
Concept	•	•	•						
Motion	•	•	•	•	•	•	•	•	•
FEA	•	•	•						
Studio	•	•	•	•	•	•	•	•	•
View	•	•	•	•	•	•	•	•	•

Feature	View	Studio	Motion
Integration with Mechanical Desktop, SolidWorks, Solid Edge and Pro/ENGINEER	•	•	•
Viewing and plotting of common 2D and 3D file formats	•	•	•
Annotation (notes and markup)	•	•	•
Dimensioning	•	•	•
Animation and simulation playback	•	•	•
Photorealistic rendering		•	•
Lights, cameras and keyframed Animation		•	•
Automatic assembly explode		•	•
Engineering motion simulation			•
Meters and table-driven simulation			•
Conveyor belts and bushings			•
Customizable collision/contact model			•
Automated Load Transfer from Motion			•
NURBS-based "smooth" collision detection			•

Feature	FEA	Concept
Integration with Mechanical Desktop, SolidWorks and Solid Edge	•	•
Automatic mesh generation with local control	•	•
Assembly-based	•	•
Flexible boundary condition control	•	•
Full suite of result displays, including graphs, plots, etc.	•	•
MSC/NASTRAN technology	•	•
Linear Static Stress	•	•
Heat Transfer	•	•
Vibration	•	•
Buckling	•	•
Geometry-based "shape" optimization		•
Topological optimization		•

System Requirements

- Windows NT® 4.0 or later; Windows 95 or later
- Pentium-based PC
- Video card and monitor capable of 16-bit color
- CD-ROM drive (installation only)

Memory Requirements

Working Model View
- 64MB minimum

Other Working Model Products
- Consult your CAD vendor for RAM and disk space requirements

Voyager Member

Autodesk. Mechanical Application Initiative

Pro/ENGINEER®

MSC Working Knowledge
USA/Latin America
66 Bovet Road, Suite 200
San Mateo, CA 94402
800-766-6615, 650-574-7777
650-574-7541 (fax)
info@workingmodel.com

MSC Working Knowledge
Europe
Prudence Place, Proctor Way
Luton, Beds. LU2 9PE UK
+44 1582-613103
+44 1582-612992 (fax)

MSC Japan Limited
Entsuji-Gadelius Building
2-39, Akasaka 5-chome
Minato-ku
Tokyo 107-0052, Japan
+81 (3) 3505 0266
+81 (3) 3505 0914 (fax)

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www.workingmodel.com