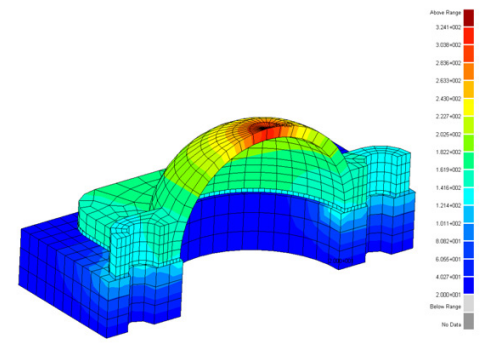# SimXpert Structures
Integrated Structural Analysis Solution for the Enterprise

Overview

SimXpert is a unified computer aided engineering environment for product simulation that enables manufacturers to accelerate the speed and accuracy of simulation, increase design productivity, and bring better products to market faster. SimXpert accomplishes this by integrating multidiscipline analysis capabilities, the best simulation methodologies, and a high degree of customization all into one engineering environment. Given SimXpert's unified engineering environment, analysts and designs can reduce the number of tools in their engineering workflow and better share critical information with each other.

SimXpert provides multiple workspaces for structural, thermal, explicit dynamics, systems and controls, and multibody dynamics that allow analysts to easily move from one discipline to another while sharing data models and results. This enables all the CAE teams to share the information more effectively, without data loss.

Structures Workspace

SimXpert Structures, a module of SimXpert, offers a wide breadth of simulation capabilities ranging from simple linear statics to large deformation nonlinear analysis in a common user environment. SimXpert Structures provides users with a variety of geometry and meshing tools, element, material models and analysis types, enabling them to create complex models required for accurate simulations. With the full power of MSC Nastran's comprehensive, advanced nonlinear capabilities, users can simulate highly nonlinear materials, and complex interaction within structural assemblies with ease.

With the integrated environment to address the multidisciplinary problems faced by organizations, engineers can perform end-to-end, detailed studies of assemblies, subjected to a broad range of loading scenarios. Engineers can also perform more accurate structural analyses by obtaining accurate loads from the Motion workspace, which can be imported into Structures workspace in an easy manner. Similarly, chained thermal stress analysis can be performed easily by distinct groups by taking advantage of the unified multidisciplinary environment.

With the help of easy to use template builder, users have flexibility to customize any aspect of the pre- and post-processing improving simulation efficiency. The report generator also saves considerable time and resources through automatic report creation.

Capabilities

- Perform multidisciplinary analyses with industry's best solution capabilities with MSC Nastran™
- Increase productivity in advanced structural analysis with integrated Pre-, Post-and Solver processing
- Automate repetitive tasks with custom built templates for improved efficiency
- Capture and deploy best practice CAE methods by integrating with MSC's SimManager™
- Smoothly exchange key data between multiple disciplines for higher accuracy

Benefits

- Increase productivity by handling all requirements of the analysis process within one intuitive environment
- Shorten design cycles by enabling maximum collaboration across the extended enterprise
- Maximize business efficiencies by capturing and deploying CAE best practices and deploying throughout the enterprise using SimManager
- Improve accuracy and product quality by unifying the multi-discipline simulation process into a single, integrated environment, leveraging the common data model across the disciplines
- Drive innovation by delivering simulation process improvements at every point of the enterprise, and thereby releasing the experts to focus on making better designs

MSC Software
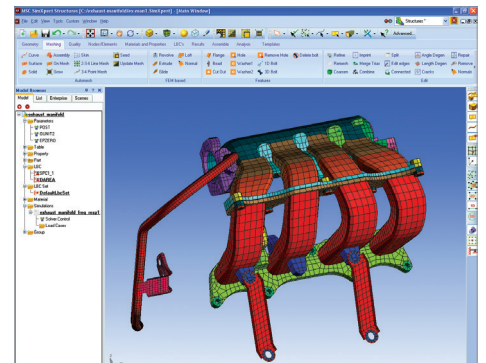
Enabling Capabilities

- Intuitive object-based user interface with contextual actions
- Advanced browser capability to view, manipulate, and organize model
- Import IGES, Parasolid, CATIA V4, CATIA V5, Pro/ENGINEER, Creo, UG, SolidWorks, ACIS, STEP and STL data for FE modeling
- Interactive CAD cleaning and healing with auto curve, shell, and solid meshing
- Contact creation and setup through easy and intuitive contact tables
- Visualization and manipulation all CAE entities
- User configurable toolsets and menus to streamline the modeling process

Modeling Capabilities

- Surface Meshing algorithms: paver, mapped, minimal, quad-dominant
- Mesh seeding: uniform/bias
- Assembly meshing
- Virtual geometry / topological simplification
- Composite modeling and verification
- Connections: Adhesive, bolt, seam weld
- Contact: Glued, Linear and Nonlinear
- Check and correct contact penetrations
- Import and export of solver input files

Multi-disciplinary Solutions

- Statics, buckling, modal, harmonics, random vibration, transient response
- Advanced nonlinear with geometric, material and contact nonlinearities
- Coupled Motion-Structures-Controls Integration to carry out a diverse set of virtual tests
- Coupled Structures and Motion analysis to perform flexible body analyses
- Coupled Thermal and Structures analysis to seamlessly apply thermal loading to structural analysis
- Coupled linear and non-linear structural analysis to get high accuracy and faster solutions

Post-processing

- Multiple window view support to visualize model, state plots and x-y charts and graphs simultaneously
- Animation of output quantities, including displacements, stresses, strains and vectors
- Time and frequency domain result plots
- Multi-file attachment
- Report generation

Process Capture and Automation

- Capture and record of specific processing tasks as action macros
- Direct integration of macros to create highly complex SimTemplate™ CAE processes
- SimTemplate CAE processes based on macros and scripting to standardize and automate complete end-to-end analyses.
- Batch processing of SimTemplates
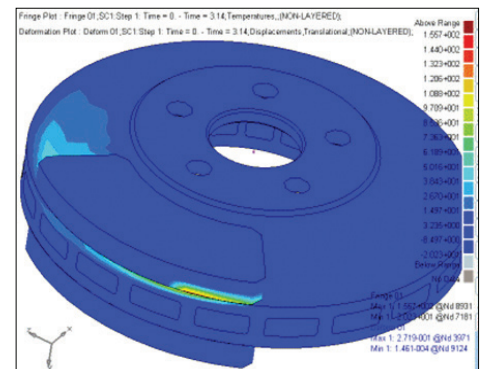
Supported Platforms

- Microsoft Windows 7 x64 (Enterprise, Professional and Ultimate)
- Red Hat Enterprise Linux 5 (x64)
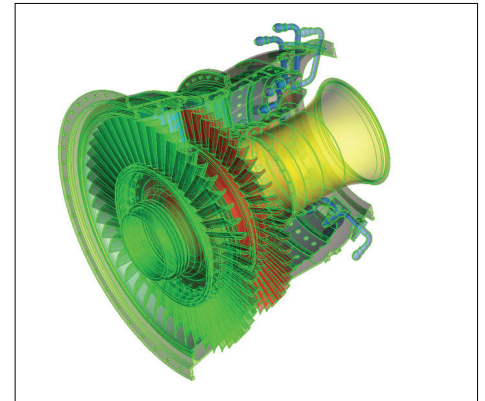
CAD import
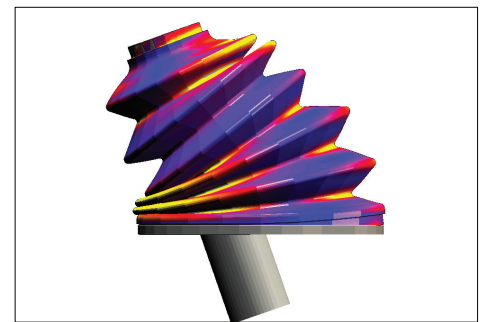
Nonlinear analysis of a rubber boot

Coupled thermal mechanical brake analysis

MSC Software