NX Design Simulation

Integrated design analysis and optimization for NX design engineers

fact sheet

Siemens PLM Software   www.siemens.com/plm

▶ **Summary**

NX® software delivers design-integrated structural simulation tools that help engineers compare design alternatives and optimize performance characteristics of products from the earliest stages of the design process. Complementing and scalable to the NX Advanced Simulation applications suite, these tools are tightly linked with NX 3D design geometry to accelerate simulation modeling, analysis and results evaluation, so that functional performance simulation results can directly influence design. The result is a a highly iterative and predictive engineering process that delivers innovative designs, higher quality products and reduced time-to-market.

Benefits

Higher quality products that meet customer specifications

Reduced warranty costs

Reduced requirement for prototypes; overall cost reduction

Faster time-to-market

Features

Intuitive graphics-based Simulation Navigator for quick and easy integrated design analysis

Seamless integration with NX fully leverages NX part and assembly modeling

Bi-directional 3D geometry associativity

FE models and results are extensible into the NX Advanced Simulation environment

Parametric shape optimization

Fault tolerant adaptive meshing

Powerful model management tools support NX Manager and Teamcenter for all created FE data sets

Built-in knowledge wizards for vibration and stress analyses

Integrated durability analysis

Integration with Simulation Process Studio for execution of CAE "best practices" wizards

NX Design Simulation enables design engineers to understand, evaluate and optimize the structural, thermal and vibration behavior of parts and assemblies. NX Design Simulation includes the integrated NX Nastran finite element solver for quick-turnaround linear structural and thermal evaluations as well as sizing and parametric shape optimization.

Engineers can quickly perform multiple "what-if" simulations of a product's structural and thermal performance to choose the most promising and innovative conceptual design alternatives. Geometry-based parametric modeling and automated optimization tools lead to a detailed understanding of a product's performance characteristics and definition of an "optimal" digital design prototype earlier in the product development process.

NX Design Simulation has been specifically developed to allow users to quickly predict and optimize the simulated engineering responses of various design alternatives. A complete set of geometry based analysis tools is provided.
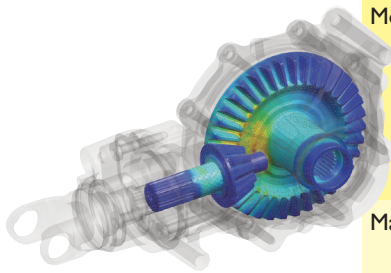
Also integrated into NX Design Simulation are automated sizing and parametric shape optimization and fault tolerant adaptive meshing technologies. Using the embedded optimization engine, NX Design Simulation is able to automatically predict the best geometric and mechanical parameters for a component or assembly based on engineering performance simulation results. Optimization goals, engineering constraints and model variables are defined by the user through a simple process guided by NX. Direct optimization and sensitivity studies then provide the maximum amount of guidance for the engineer while fault-tolerant meshing provides a quantitative degree of confidence. Key ease-of-use features in NX Design Simulation include a simulation navigator that guides new users and increases the efficiency of the more experienced by providing a visual reference to the analysis objects created in the model. Intelligent meshing algorithms incorporate industry best practices and apply knowledge based approaches to successfully mesh complex geometry, reducing element count while increasing element quality. Built-in 'wizards' enable vibration and/or stress analyses.

NX SIEMENS
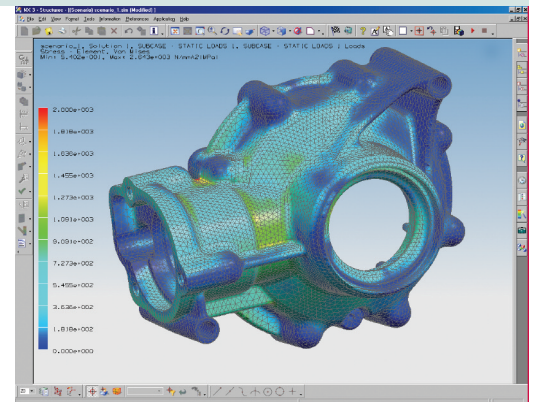
Supported solution types include linear statics, normal modes, linear bucking, linear contact, steady-state heat transfer and combined thermo-structural; temperature dependent materials are also supported. In many cases, engineers are not just focused on if a product will fail. Integrated durability analysis enables design engineers to predict when it will fail. Results of a durability analysis are displayed as contour plots that show the duration of cyclic loading (number of fatigue duty cycles) the structure can undergo before crack initiation begins. A library containing standard fatigue material properties is provided. Simple and easy to use!

Validation requires full and complete documentation, a natural process with NX Design Simulation. Report content is controlled and maintained through fully customizable templates ensuring consistency and quality. While much report content can be created automatically, much more can be added "on the fly," providing the vital flexibility needed to ensure that reports add value to your business supporting collaboration, archival and regulation requirements.

NX Design Simulation

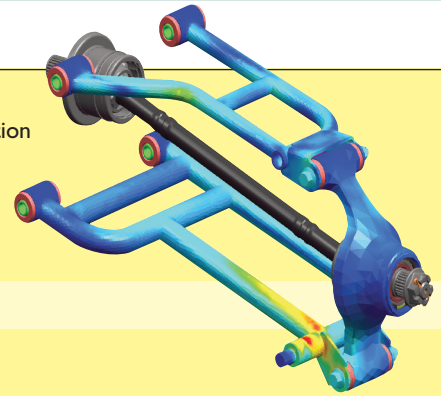|		
Model preparation	Geometry construction – access to all NX tools Model simplification tools Model feature suppression Automated model idealization Geometric feature removal	Access to model feature parameters Automated mesh mating conditions Bi-directional associativity Units manager Knowledge Fusion support NX Open support
Material properties	Isotropic Orthotropic Anisotropic	Temperature dependent Fatigue Material database
Load types	Force Moment Pressure Centrifugal and gravitational Bearing Temperature Torque Hydrostatic Fatique load variations Surface to surface contact definition	Heat flux Heat generation Radiation
Boundary conditions	Rotations and translations Enforced displacements Simply supported Pinned Cylindrical Slider Roller Symmetric and Anti-symmetric	Thermal constraint Convection

NX Design Simulation

Meshers and element types	Tetra (free)	
	Automatic geometry abstraction	
	3D contact	
	Mesh mating conditions	
	Edit mesh	
	Mesh point	
Integrated solver	NX Nastran	
Supported solution types	Linear static	
	Normal modes	
	Durability	
	Linear buckling	
	Steady-state heat transfer	
	Assembly with linear contact	
	Sensitivity studies	
	Sizing and shape optimization	
	Adaptive meshing and analysis	
Viewing results	Fringe plots	Results at node/element
	Cutting planes	Error estimate plot
	Contour lines	Automatic report writing
	Iso surfaces	Multiple viewports
	Animation	Templates
	Deformed shape	Advanced lighting
	Result comparison	Automatic min/max tags
	Nodal displacements	Dataset selection from navigator
	Element stress	Results import
	Nodal stress	Fly through model with results
	Strain energy	JT2Go lightweight results export
	Strain energy density	Programmable CAE objects
	Reaction forces	

Product availability

NX Design Simulation is an add-on module in the suite of NX Digital Simulation applications available within the NX integrated digital product development portfolio. It requires a core seat of either NX Gateway or NX Design as a prerequisite.

NX Design Simulation is available on most major hardware platforms and operating systems including Unix, Windows and Linux.

▶ **Contact**
Siemens PLM Software

Americas   800 498 5351
Europe   +44 (0) 1276 702000
Asia-Pacific 852 2230 3333

www.siemens.com/plm

SIEMENS