

# NX Design Simulation

Integrated design analysis and optimization for NX design engineers

## fact sheet

Siemens PLM Software

[www.siemens.com/plm](http://www.siemens.com/plm)

### ► Summary

NX® software delivers design-integrated structural and thermal simulation tools that help engineers compare design alternatives and optimize performance characteristics of products from the earliest stages of the design process. Complementary 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 highly iterative and predictive engineering process that delivers innovative designs, higher quality products and reduced time-to-market.

### Benefits

- Obtain earlier feedback on performance with a design integrated simulation process
- Evaluate more alternatives with faster iterations between design and analysis
- Expand CAE to more users with easy-to-use, geometry-based simulation
- Update analysis results rapidly through CAD-associative simulation models
- Improve designs with embedded optimization engine

### Features

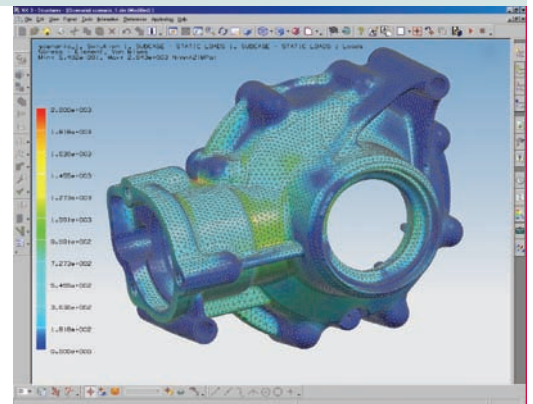
- Intuitive graphics-based Simulation Navigator for quick and easy integrated design analysis
- Seamless integration with NX fully leverages NX part and assembly modeling
- Bi-directional 3D geometry associativity
- FE models and results are extensible into the NX Advanced Simulation environment
- Parametric 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

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.



**Features continued**

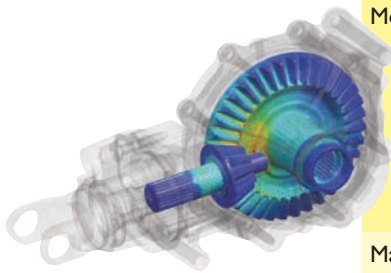
Integrated durability analysis

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

Supported solution types include linear statics, normal modes, linear buckling, 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.

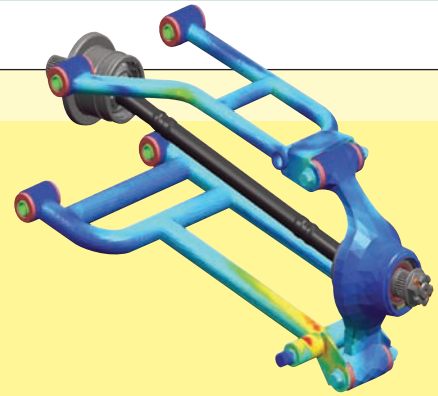
**NX Design Simulation**



Model preparation	Geometry construction – access to all NX tools Model simplification tools Model feature suppression Automated model idealization Geometric feature removal NX Open support	Access to model feature parameters Automated mesh mating conditions Non-manifold support for 2D meshing Bi-directional associativity Units manager Knowledge Fusion support
Material properties	Isotropic Orthotropic Anisotropic	Temperature dependent Fatigue Material database
Load types	Force Moment Pressure Centrifugal and gravitational Bearing Temperature Torque	Hydrostatic Fatigue 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
Meshers and element types	Tetra (free) 3D contact Edit mesh	Automatic geometry abstraction Mesh mating conditions Mesh point

### NX Design Simulation

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 Cutting planes Contour lines Iso surfaces Animation Deformed shape Result comparison Nodal displacements Element stress Nodal stress Strain energy Strain energy density Reaction forces	Results at node/element Error estimate plot Automatic report writing Multiple viewports Templates Advanced lighting Automatic min/max tags Dataset selection from navigator Results import Fly through model with results JT2Go lightweight results export Programmable CAE objects



### 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 32 and 64-bit Windows and also on 64-bit Linux systems.



### Contact

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