

NX I-deas Mechanism Simulation

Advanced mechanical system motion simulation

fact sheet

Siemens PLM Software

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► Summary

NX® I-deas® Mechanism Simulation software, offered in the NX I-deas digital simulation suite, is a sophisticated add-on or superset module for the standard Mechanism Design within the NX I-deas digital product design suite. Augmenting the capabilities of the MasterFEM package, Mechanism Simulation mimics the complex motion of articulated mechanisms. Using assemblies created in other modules of NX I-deas, Mechanism Design enables you to create joint constraints, contact locations, and connectivity information in order to apply motion and load inputs. Mechanism Simulation helps you understand, from the earliest stages of conceptual design, the dynamics and tolerances of a mechanism, enabling you to explore more “what if” alternatives. The result is a better, more refined product design.

Benefits

- Perform advanced motion simulation of articulated mechanisms quickly and easily
- Perform virtual tests on a variety of design variations before a physical prototype exists, including performance, interference and load history
- Import and export simulation results using standard Adams formats

Features

- Simulate the behavior of mechanisms whose motion is affected by a wide range of forces
- Observe the effects on mechanisms when specific physical characteristics are subjected to various forces, torques, loads, displacements, velocities and accelerations
- Recover and apply as loads to finite element models such characteristics as rigid body forces, torques, velocities and accelerations
- Evaluate XY plots and configurations concurrently, using integrated Adams/post-processing animation, for easy interpretation and documentation of results

A wide range of tools for mechanical design simulation

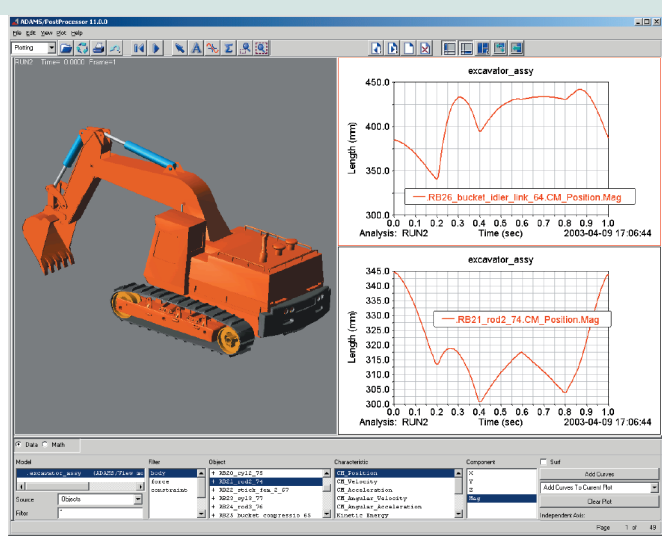
NX I-deas Mechanism Simulation, available with the NX I-deas digital simulation suite, offers the same range of capabilities as the Mechanism Design module within the NX I-deas digital product design suite, plus advanced tools and enhancements that make it ideal for in-depth motion simulation and load analysis of articulated mechanisms.

In addition to kinematic and dynamic solves, Mechanism Simulation enables you to:

- Define loads as forces and torques
- Define bushings and field matrix spring dampers
- Recover and plot forces and torques
- Interrogate results directly from other NX I-deas software using Adams/post-processor (delivered with Mechanism Simulation)
- Transfer joint and body loads directly to MasterFEM
- Create an .mnf (modal neutral file) from Model Solution (requires only a Model Solution license)

Rigid body dynamics

Mechanism Simulation imitates the behavior of under-constrained mechanical systems whose motion is affected by forces (actuators, impacts, gravity loads, etc.) Rigid body forces, torques, velocities and accelerations can be recovered and applied as loads in a finite element analysis. For the physical characteristics of a mechanical system that can be simulated, see the table on the reverse side.



NX I-deas Mechanism Simulation offers advanced mechanical system simulation capabilities.

System requirements

Mechanism Simulation shares the NX I-deas system requirements.

Recommended system configuration

For information on particular operating systems or graphics cards, please visit <http://support.ugs.com/>

Simulating physical characteristics

<i>Characteristic</i>	<i>Simulation effect</i>
Force-driven, motion-transient behavior	Drive product concept through work cycle by applying forces and/or torques to a system at rest. Observe transition to equilibrium speed.
Force-driven, motion-force balance	Define springs and/or external loads. Observe motion simulation to achieve force balance.
Contact/impact modeling (sphere-sphere, sphere-plane, curve-curve)	Model collisions between related parts or between a part in freefall and the ground (as in a drop test). Observe part collision effects.
Gravity effects	Apply gravity loads. Observe behavior as a mechanism moves from initial position to static equilibrium.
Bushing connector effects*	Vary bushing stiffness in various directions to mimic certain joint types. Connect two parts with several bushings. Get accurate distribution of loads. Mechanism aligns itself to reach force balance.

*Mechanism Simulation enhances the capabilities of Mechanism Design, which only simulates rigid connectors and spring dampers, by adding bushings.

Load transfer

Once a Mechanism Simulation solve is completed, the resulting forces, torques, gravity, velocities and accelerations can be automatically transferred to MasterFEM. A user simply picks a rigid body in the mechanism, then selects a time step. Nodes are created at marker locations and joint loads are transformed into finite element loads applied at the nodes. Gravity, velocities, and accelerations are transferred to the finite element load set. Optionally, the joint loads can be saved in a time history ADF (associated data file) for use in Durability or Response Analysis within NX I-deas.

Performance tuning

Based on Mechanism Simulation results, Response Analysis and use of Adams requests provide post-solution methods for calculating relative position, velocity, forces and acceleration between any two arbitrary rigid bodies. Mechanism Simulation results and geometry are automatically transferred to Adams/post-processor. Simultaneous display of assembly configurations and function plots are possible using the Adams/post-processor tool.

The Adams/post-processor is delivered with Mechanism Simulation, allowing you to investigate model results in greater depth. Manufacturers who use this technology not only reduce the time and cost of new product development, they accelerate innovation and improve the quality of mechanical designs.

Adams technology: reducing dependence on physical testing

With Adams capabilities, an engineering team can quickly perform virtual tests on a variety of design variations before a physical prototype exists. What used to take weeks or months to physically model and test can now be done in just hours with Adams technology in NX I-deas. Benefits of physical testing – including performance determination, interference checking, and load history determination – are available to Mechanism Simulation and MasterFEM users.

**Contact**

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