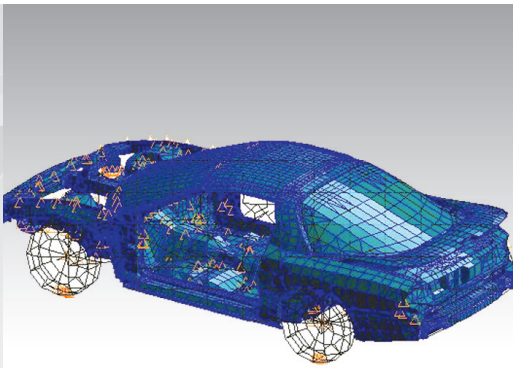
MSC Nastran

Industry-leading, Linear and Nonlinear Finite Element Analysis Solver



Overview

Leading manufacturers around the globe have relied on MSC's Nastran technology to bring new products to market for over four decades. The MSC Nastran™ product is modular and scalable, enabling you to analyze products ranging from simple components to complex structures and systems. This enables you to start simply and to grow your analysis capabilities as your Virtual Product Development (VPD) needs expand. As part of your VPD process, you can use MSC Nastran to assess many functional aspects of your products, such as static and dynamic response, frequency response, and thermal behavior due to various working loads and boundary conditions that are applied to it during operation.

MSC Nastran continues to provide productivity enhancing functionality with each new release in the areas of numerical and high performance computing (HPC) for solving large systems, dynamics and NVH simulations, implicit nonlinear analysis, assembly modeling, design optimization, rotor dynamics and aeroelasticity. These include:

Numerical and HPC:

- Enhanced CASI and matrix-based unsymmetric iterative solver
- Enhanced Lanczos solver
- Automatic optimal reordering selection for solid models
- Automated Component Modal Synthesis (ACMS) extended to External Superelements for reductions in compute time, I/O and scratch space with NVH solutions

Implicit Nonlinear:

- Large sliding, easy to define contact
- General purpose nonlinear analysis that includes material, geometric and boundary conditions nonlinearities
- Heat transfer and automated procedures for thermal stress analysis
- Thermal analysis of composites may include thermal gradient through the thickness
- Large deformation formulations of CFAST, CWELD and CBUSH
- Material failure models
- VCCT and cohesive zone modeling for composite failure
- Calculation of stress intensity factors using either the VCCT or Lorenzi method and delamination prediction.

Assembly Modeling:

- Seamweld (CSEAM) connector element for assembly modeling
- Spot weld elements (CWELD, CFAST) end point displacement output to view relationship between the spot weld and the connecting shells
- RBE2GS to optionally search and connect independent grids of the two closest RBE2 elements with a specified search radius.

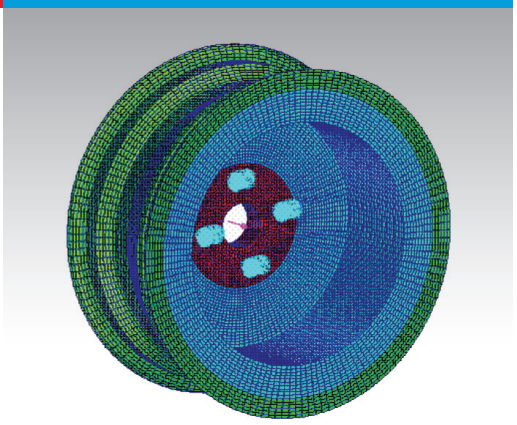
Capabilities

- Optimized for large scale systems, assemblies, dynamics and NVH simulations
- Strength, durability and vibration assessment of structures
- Structural dynamic response simulation of loads that vary with time or frequency
- Automated Component Modal Synthesis (ACMS) for large modal based analyses and NVH solutions
- Simulation of interior acoustics for sound pressure inside a bounded domain
- Static and transient analysis of structures involving nonlinearities
- Heat transfer analysis with contact including conduction, convection and radiation
- Failure models based on Virtual Crack Closure Technique and Cohesive elements
- Structures with rotating components
- Effects of aeroelasticity on structures
- Combined topology, sizing and shape optimization with manufacturing constraints
- Optimize large model designed sections through Automatic External Superelements
- Enhanced iterative and in-core sparse solvers

Benefits

- Increase the capabilities of your simulation processes and accelerate innovation
- Design optimization to achieve reduced material costs
- Deliver products that meet certification and safety requirements
- Reduce risk by using simulation to save time and cost

MSC Software



Design Optimization:

- Sizing, shape, topology, topography and topometry optimization simultaneously to find possible better designs
- Ability to run multiple optimization methods simultaneously
- Optimization to meet special constraints that include symmetry, cyclic symmetry and manufacturing constraints
- Automatic External Superelement Optimization (AESO) that automatically partitions the model into a designed and non-designed part (external Superelement) for efficient optimization

Rotor Dynamics:

- Unbalance loading for frequency response with the rotor dynamics option
- Multiple RGYRO subcases
- Simplification of damping specification that allows for new damping formulations such as hybrid damping.

MSC Nastran Basic Package Includes:

- Linear Statics
- Normal Modes
- Buckling
- Connectors
- Dynamics
- Heat Transfer
- Adams integration
- Unlimited Model Size
- Direct Matrix Abstraction Programming (DMAP)

MSC Nastran Advanced Package Adds:

- Aeroelasticity I
- Dynamic Design Analysis Method (DDAM)
- Shared Memory Parallel (SMP)

MSC Nastran Basic Package is a prerequisite.

MSC Nastran Nonlinear Complete Adds:

- Nonlinear
- Marc Translator
- Implicit Nonlinear (SOL600)
- Implicit Nonlinear Shape Memory metals
- Implicit Nonlinear Hemi Cube View Factors

MSC Nastran Basic Package is a prerequisite.

Optional MSC Nastran Modules:

- Distributed Memory Parallel (DMP)
- Automated Component Modal Synthesis (ACMS)
- Acoustics (Interior)
- Aeroelasticity II
- Design Optimization
- Krylov Solver
- Rotor Dynamics
- Superelements
- Topology Optimization
- User Modifiable Nastran
- Implicit Nonlinear Multi-Processor

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