MSC Nastran
Industry-leading, linear and nonlinear finite element analysis solver.

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
- New 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
- New, highly-tuned, state-of-the-art iterative and in-core sparse solvers

Benefits
- Increase the capabilities of your Simulation processes and Accelerate Innovation
- Partition Large, Complex Structural Models into Multiple Components Automatically
- Deliver Products that Meet Certification and Safety Requirements
- Reduce Risk by using Simulation to Save Time and Cost

Overview
Leading manufacturers around the globe have relied on MSC’s core Nastran technology to bring new products to market for over four decades. The MSC Nastran™ product family is modular, enabling you to analyze products ranging from simple components to complex structures and systems. This also 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 the structural response (displacement, strain, stress, vibration, and temperature) due to various working loads and boundary conditions that are applied to it during operation.

MSC Nastran 2007 r1 release provides new features and enhancements 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:
- Two new sparse solvers; TAUCS (statics) and UMFPACK (unsymmetric)
- Enhanced Lanczos solver to take advantage of available memory.
- Automatic optimal reordering selection for solid models
- Relaxed restrictions to CASI iterative solver for statics of large solid models as with automotive engine block, powertrain and aircraft engine
- Automated Component Modal Synthesis (ACMS) extended to External Superelements for reductions in compute time, I/O and scratch space with NVH solutions
- Support of Microsoft Compute Cluster and Compute kernels for x86_64 platforms optimized for Intel and AMD systems.
Implicit Nonlinear:
- Heat transfer and automated procedures for thermal stress analysis
- Thermal analysis of composites may include thermal gradient through the thickness
- Modeling Enhancements including large deformation formulations of CFAST, CWELD and CBUSH
- Calculation of stress intensity factors using either the VCCT or Lorenzi method and delamination prediction.
- Several performance improvements.

Assembly Modeling:
- New 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
- A new connector type RBE2GS to optionally search and connect independent grids of the two closest RBE2 elements with a specified search radius.

Design Optimization:
- Combined topology, sizing and shape optimization simultaneously to find possible better designs
- Topology optimization with different mass targets on multiple design parts of the structure
- Automatic External Superelement Optimization (AESO) that automatically partitions the model into a designed and non-designed part (external Superelement) for efficient optimization

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

Aeroelasticity:
- Monitoring points can now be updated and summed
- New type of monitoring point (MONCNM) for monitoring stripwise aerodynamic results
- Various splining techniques for aerodynamic structural applications.

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:
- Aerelasticity 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
- Implicit Nonlinear Shape Memory metals
- Implicit Nonlinear Hemi Cube View Factors

MSC Nastran Basic Package is a prerequisite.

Complementary 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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