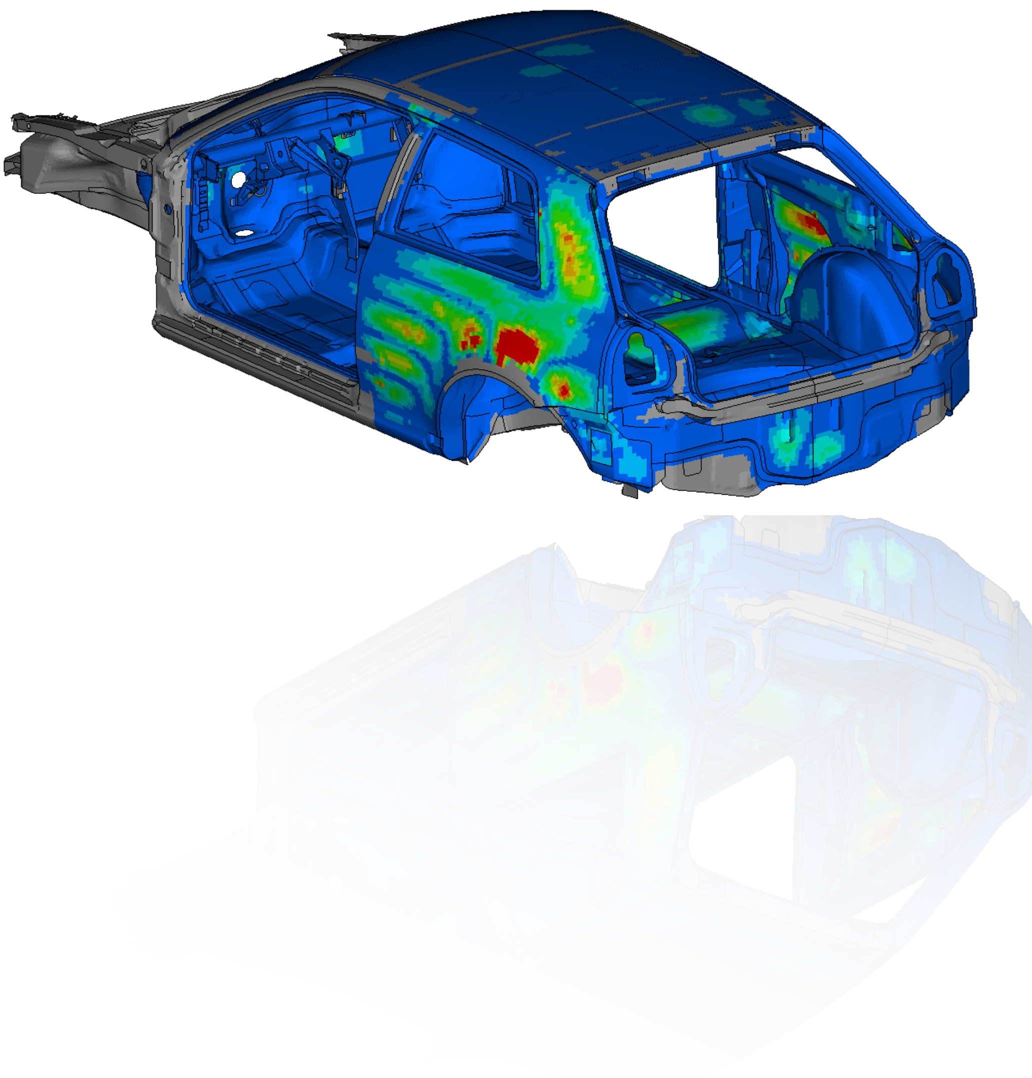
MSC Nastran™ 2017



MSC Software

Welcome to MSC Nastran 2017!

MSC Software is pleased to introduce you to the latest release of MSC Nastran with enhancements to fatigue, acoustic, rotordynamics, optimization and nonlinear analyses, in addition to dynamic analysis performance, which are all designed to improve user productivity. Major areas of focus in this release include the following:

Embedded Random Vibration Fatigue

Traditionally fatigue analysis is performed with data from time domain analysis. MSC Nastran Embedded Fatigue (NEF) capabilities are now extended to perform fatigue analysis in the frequency domain. It is now possible to calculate fatigue life/damage from a random vibration analysis using frequency response solutions SOL 108 and SOL 111. This provides more realistic life estimates for the product development teams in automotive, aerospace, energy, and machinery industries. This computationally efficient procedure provides life estimates orders of magnitude faster, with only a small fraction of system resources.

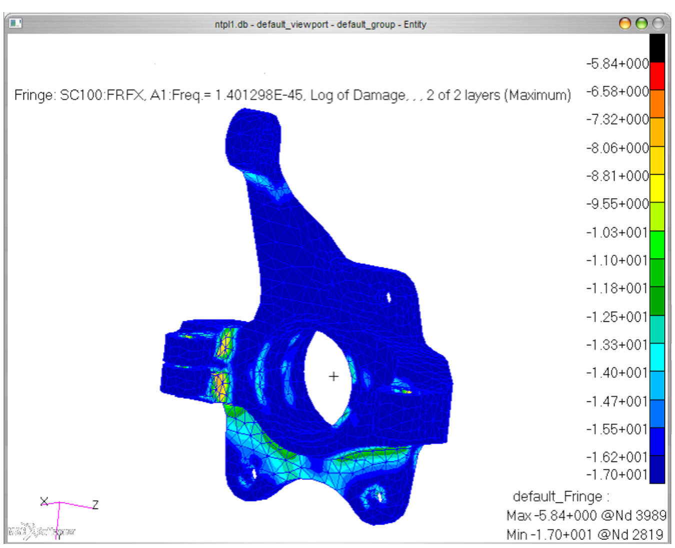
Loading conditions supported in this release include:

- Single-input random load with or without static stress offset
- Multi-load random input including cross-correlation with or without static stress offset

Following deterministic loading conditions can also be applied independently or on top of a random single-input loading with or without static stress offset.

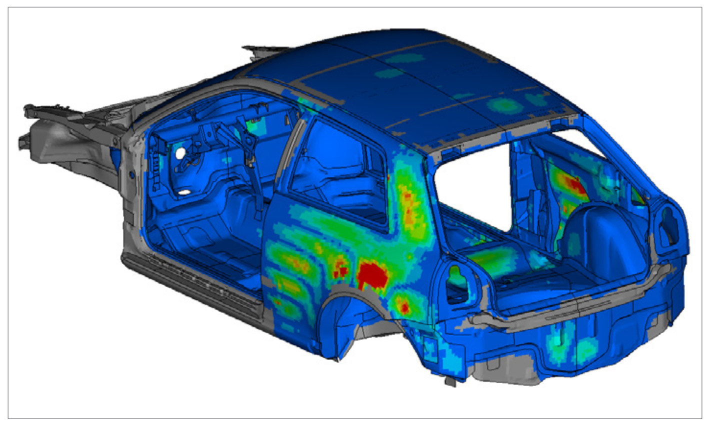
- Deterministic loading (single sine waves and narrow bands)
- Harmonic loading (multiple simultaneously applied sine waves)
- Sine and narrow band sweeps

Additionally, the time domain loading can be automatically converted into equivalent power spectral density loads for the random vibration fatigue analysis, saving time and effort for the user.



Acoustics

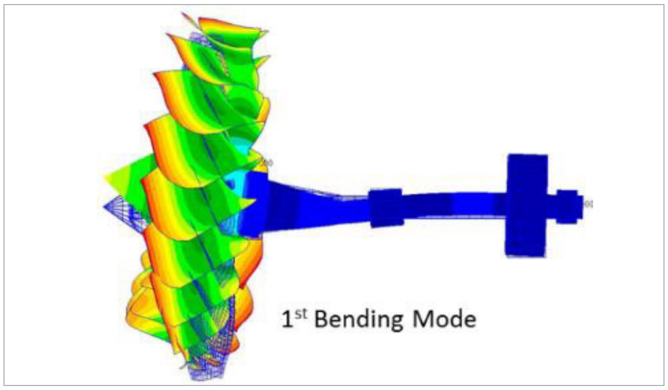
- Mid-frequency acoustics capability is supported by the Monte-Carlo simulation in SOL 111, with the highly scalable non-parametric varaibility method (NPVM). This allows NVH engineers to study the influence of model uncertainties. The results can also be used to perform statistical operations such as mean response, response confidence interval and envelope.
- Acoustic participation factor calculation has also been simplified with the introduction of the capability to find peaks in frequency response and automatically perform participation factor calculations at those peaks. This elminates the manual effort in frequency response identification and reduces the number of MSC Nastran frequency response runs, speeding up the acoustic studies.

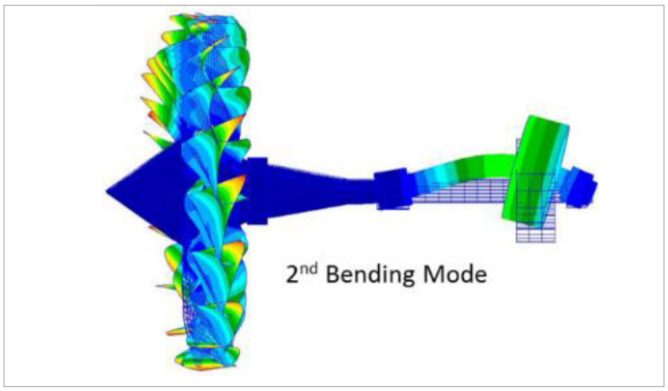


Rotordynamics

Rotordynamics has been enhanced to provide flexibible input options and improved performance for large models.

- The new features provide users with additional options to control the whirl damping and structural damping for rotors, especially for the analysis of models with multiple rotors. Structural damping for rotors can also be defined as complex stiffness matrix for complex eigen analysis.
- It is also possible to include mass and speed correction terms for transient analysis with unbalanced loads, to account for the inertia and gyroscopic effects associated with the unbalanced mass.
- Users can perform modal complex eigenvalue analysis (SOL 110) and complex frequency response analysis (SOL 111) for rotors modeled with axisymmetric harmonic elements and solid/shell elements. The modal approach has the advantage of providing quick solutions using real eigenvalue modes model reduction.

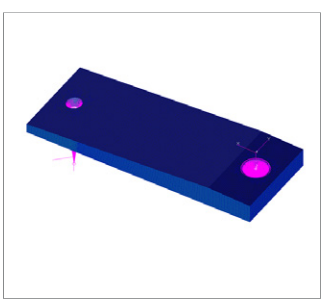


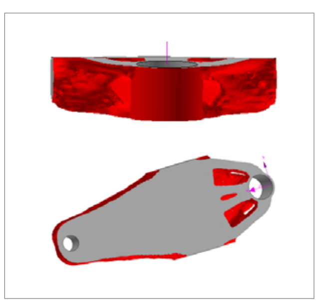


Optimization

Topology optimization capability now supports stress constraints, which leads to more efficient mass minimization while meeting the allowable stress levels. Design of components like brackets and engine mounts is made more efficient with this capability.

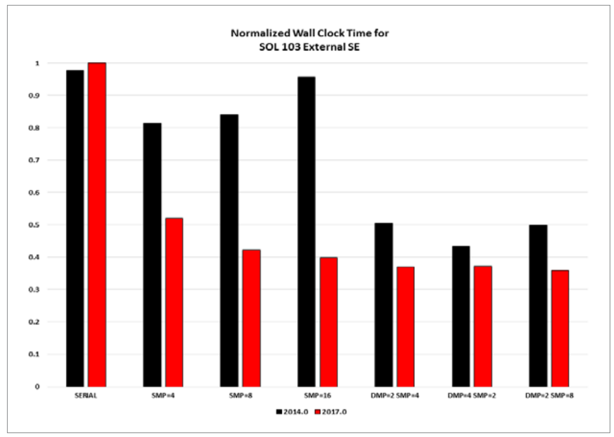
Constraint on the minimum allowable member thickness, which helps eliminate designs with thin, disjoint members, has been a long time feature of topology optimization in MSC Nastran. This version introduces ability to constrain maximum thickness as well. This avoids thick member designs that could inhibit product quality in some types of manufacturing processes, and leads to more reliable designs.





High Performance Computing

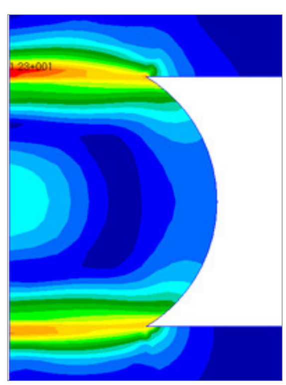
- ACMS is enhanced to support creation of external superlemements and provides better SMP parallelization performance and reduce wall clock time for large models. This enables users to perform a full frequency response analysis of vehicles or large assemblies with components that can be repeatedly used in multiple analyses at a much reduced cost.
- Memory requirement for ACMS has been reduced, resulting in users' ability to solve more and larger models in parallel.
- Parallel analysis support has been added to fluid eigensolution problem using DMP approach, which improves productivity of NVH engineers solving vibro-acoustic systems in automotive and aerospace industry.

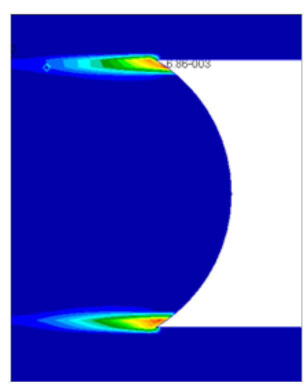


ACMS performance with SOL 103 using External Superelement

Advanced Nonlinear

- Anand creep model introduced to help simulate the time dependent deformation of solder materials in electronic products. It is particularly useful to model the creep of solder which is widely used to connect different chips or lines, and has significant influence on the IC performance and durability.
- Cohesive contact is introduced to help introduce structure flexibility in glued contact used in assembly modeling and achieve improved accuracy. This extension to contact retains the advantages of glued contact of avoiding the need to model the detailed connectors, but simpler modeling, while overcoming the limitation of the traditional glued contact approach with its ability to account for stiffness of the connectors more accurately.



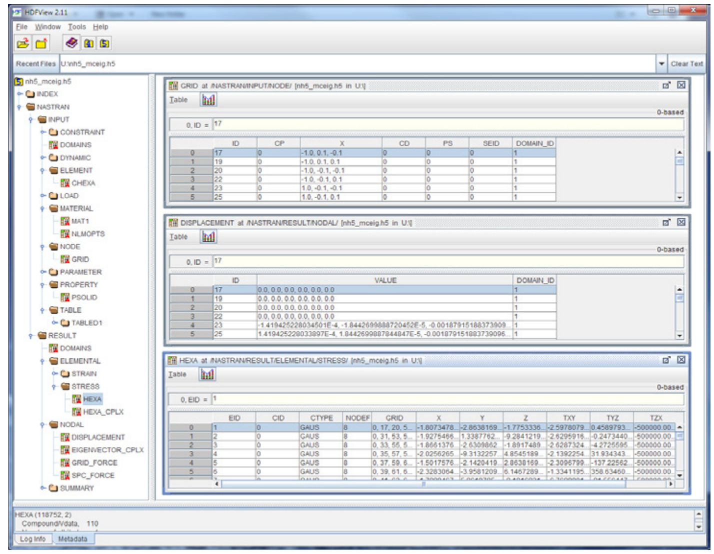


Results

A new MSC Nastran database in Hierarchical Data Format (HDF5) was introduced in the 2016 release. This database organizes MSC Nastran input and output data in a hierarchical structure, which can be accessed through HDF5 APIs or third party packages in multiple languages. This open format supports high precision, compression, and unlimiated amount of data, making it ideal for FEA applications.

The 2016 release of HDF5 Results Database (NH5RDB) supported multiple MSC Nastran solution sequences, major input and output datablocks and Python module and utility functions for data manipulation.

The 2017 release of NH5RDB includes support for additional data types and features, including complex eigen value summary, composite element output in linear solution sequence, bi/multiaxial fatigue data, coordinate system transformation matrix, and acoustic pressure and velocity data. Intermediate NH5RDB files can also be created at requested steps during a MSC Nastran analysis, which can be used for additional post-processing. Three DMAP modules have been added to write special data blocks data and intermediate HDF5 format database into NH5RDB.



Corporate
MSC Software Corporation
4675 MacArthur Court
Suite 900
Newport Beach, CA 92660
Telephone 714.540.8900
www.mscsoftware.com

Europe, Middle East, Africa
MSC Software GmbH
Am Moosfeld 13
81829 Munich, Germany
Telephone 49.89.21093224
Ext. 4950

Japan
MSC Software LTD.
Shinjuku First West 8F
23-7 Nishi Shinjuku
1-Chome, Shinjuku-Ku
Tokyo, Japan 160-0023
Telephone 81.3.6911.1200

Asia-Pacific
MSC Software (S) Pte. Ltd.
100 Beach Road
#16-05 Shaw Towers
Singapore 189702
Telephone 65.6272.0082