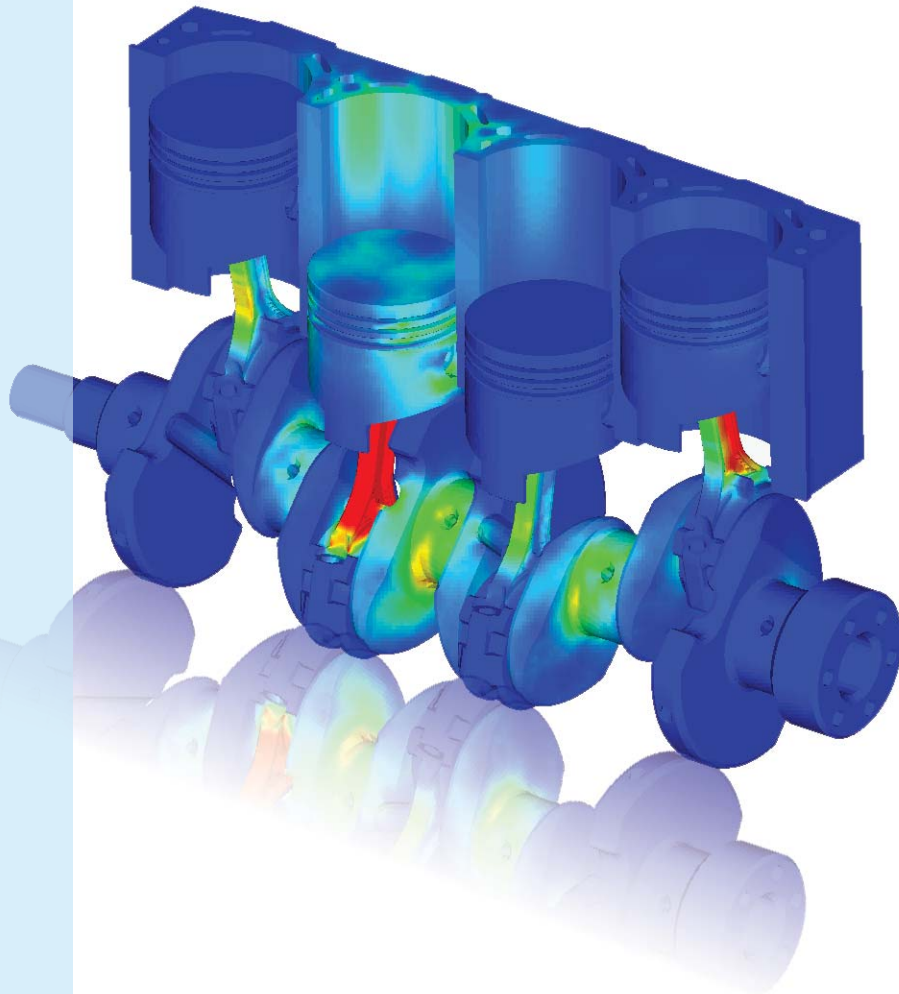


Announcing NEi Nastran V9.2

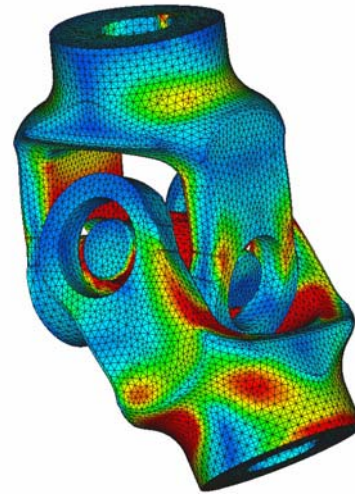
Announcing



# NEi Nastran Version 9.2

NEi Software announces the release of NEi Nastran Version 9.2, its latest upgrade with extensive enhancements in performance and capability.

**NEi Nastran V9.2** is a major upgrade with over 85 customer driven enhancements. Major features include nonlinear composite progressive ply failure analysis, concrete material model, direct enforced motion, bolt preload, improved overall performance in all solutions, as well as enhanced rigid element features. The NEi Nastran Editor now has a new look and feel, and many enhancements have been included such as visualization support for various entities, automatic dynamic plots during nonlinear analysis, and transparent max/min labels.



## Performance Enhancements

- Improved nonlinear surface contact performance especially for models where previously a reduced SFACT was required to obtain convergence.
- Improved nonlinear analysis performance for models with large displacement effects enabled and linear materials.
- Added PCGLSS solver support for direct linear and nonlinear transient response analysis.
- Improved overall performance in all solutions.

## Linear Analysis Enhancements

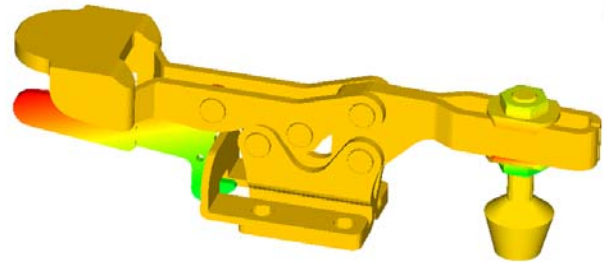
- Increased the tolerance for surface weld detection in Automated Surface Contact Generation (ASCG).
- Increased the allowable gap size for Automated Surface Contact Generation (ASCG) when a weld or offset weld type is specified.
- Improved linear contact analysis accuracy and robustness.
- Added PARAM, ADAPTLNCONTACT which controls the adaptive stiffness update method used in linear contact. When set to ON, each contact segment will adjust stiffness on each iteration to maintain a fixed penetration of 1 percent of the contact segment reference length dimension. When set to OFF, stiffness is not adjusted individually. The AUTO setting will use ON for contact segments with initial gap openings that are 10 percent of the contact segment reference length dimension.
- Added SPCD support for static load combination via the LOAD Bulk Data entry.

- Enhanced linear buckling analysis for models with quad elements.

## Nonlinear Analysis Enhancements

- Added nonlinear database restart via PARAM, NLINDATABASE from a nonlinear static to a nonlinear transient response analysis. The nonlinear database establishes the initial conditions including stress and strain state for the nonlinear transient response solution.
- Added PARAM, NLINDATALOADSF for specifying the initial load scale factor to be used when performing a nonlinear database restart (PARAM, NLINDATABASE, FETCH).
- Added PARAM, SLINEFACENORMTOL for specifying contact face normal tolerance and PARAM, SLINEEDGENORMTOL for specifying contact edge normal tolerance in Automated Surface Contact Generation (ASCG).
- Added PARAM, HPNLMATREDORD which controls the use of reduced order integration in hyperelastic material nonlinear analysis. When set to ON, the volumetric hyperelastic terms will use a one point integration.
- Added PARAM, NITERSUPDATE for specifying the number of iterations to freeze slide line and surface contact status when two successive solution divergences occur.

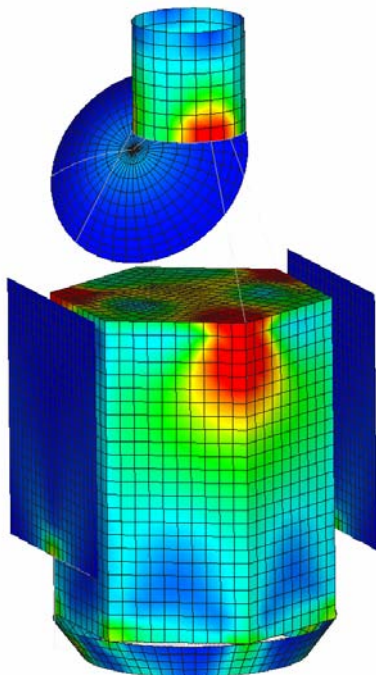
- Added PARAM, SLINEOPENKSFAC for specifying the slide line and surface contact open gap stiffness scale factor.
- Added PARAM, SLINESTABOPTION for specifying the type of solution stabilization to be used when a model contains slide line or surface contact and the solution diverges. All options are active for PARAM, NITRERSUPDATE iterations only. When SLINESTABOPTION is set to 1, the contact status will be frozen. When set to 2, the open gap stiffness scale factor, PARAM, SLINEOPENKSFAC will be multiplied by 1.0E+07. When set to 3, the contact unload tolerance is multiplied by 1.0E+07.
- Changed the definition of PARAM, SLINEPROTOL. Previously this model parameter was designed to move a protruding contact surface onto the contact plane. This typically resulted in poor convergence and singularity errors so a zero value was recommended. Now, instead of moving the contact plane down, the datum is simply reset to zero. Doing this should minimize hot spots on curved contact surfaces.
- Changed the default for PARAM, SPARSEITERMETHOD for nonlinear analysis. Previously, the DIRECT method was forced for nonlinear analysis when no enforced displacements were specified. Now, the PCGLSS will select the either ITERATIVE or DIRECT based on model characteristics.
- Added the UPDATE option to the NLINDATABASE model parameter, which performs both a nonlinear database FETCH and STORE.
- Added support for nonlinear composite Progressive Ply Failure Analysis (PPFA) via the NLCOMPLYFAIL model parameter. When set to ON, composite plies that fail the user specified failure theory will be reduced in material stiffness based on reduction scale factors specified on MAT1 and MAT8 Bulk Data entries. Support is provided for PPFA in nonlinear static and transient solution sequences.
- Added support for concrete materials in nonlinear solutions via the CONCRETE Bulk Data entry.
- Changed how PARAM, LGDISP is set in Automated Impact Analysis (AIA). The new behavior is that if PARAM, LGDISP is set to OFF or 0, it will be set to 1. All other settings will be retained.
- Enhanced surface contact grid point repositioning phase to now check if a repositioned grid will result in a singular element.
- Added subcase selectable contact via the CONTACTSET Case Control command. With this feature users can specify different contact regions and types for each subcase.
- Changed default for PARAM, SLINEOFFSETTOL to the MAXAD value specified on the CONTACTGEN Case Control command, if specified.
- Added an AUTO setting for PARAM, SLINEOFFSETTOL which is normalized to the model reference dimension. AUTO is not used when the CONTACTGEN Case Control command is specified in the model.
- Enhanced checking of MATS1 Bulk Data entry table data. A new check has been added when the TYPE field is set to NLELAST to check that the referenced table contains the origin.



### Dynamic Analysis Enhancements

- Added PARAM, EIGENFLEXFREQ which specifies the threshold for defining the first flexible mode. Eigenvalues with a frequency greater than this value will be considered flexible modes.
- Added PCGLSS solver support for direct linear and nonlinear transient response analysis.
- Removed the license requirement for a DDAM Phase 2 analysis. When LICENSECODE is set to 01, a DDAM Phase 2 analysis can be performed without a license (dongle or network).
- Added direct enforced motion using the SPCD Bulk Data entry to all linear dynamic response solutions.
- Added an AUTO option to PARAM, RESVEC to enable residual vector generation for modal response solutions with direct enforced motion via the SPCD Bulk Data entry.
- Improved DDAM analysis performance for models where printed element results data was requested (PRINT specified on STRESS, STRAIN, GPSTRESS, or GPSTRAIN Case Control command).

- Added scaled mode shape output for DDAM analysis via the TRSLDDAMDATA directive.
- Added support for models in metric units for DDAM analysis via PARAM, UNITS.
- Changed the TRSLLOADDATA directive when inertial relief is enabled to now translate load data after accelerations are applied.
- Enhanced DDAM tabular output by removing data for last mode in Modal Effective Weight and Peak Modal Response tables when the modal weight was less than 1%. Previously the data for this mode was included to show that modes including and past this mode had modal effective masses less than 1% and were excluded.



- Enhanced 3-Phase DDAM analysis by no longer requiring a DDAMDAT Bulk Data entry in the Model Input File when running the third phase.
- Added a new METHOD field to the DDAMDAT Bulk Data entry which allows either DDS-072 or NRL-1396 response spectra generation methods to be specified. Also, changed the default minimum G value to 1.0 for DDS-072.
- Added PARAM, ADDPSDAFREQ which when set to ON will add frequencies from TABRND1 entries referenced in the Case Control of a random response solution.

## Composite Analysis Enhancements

- Added an individual composite laminate ply interlaminar shear allowable in the SB field of MAT8 and MAT12 Bulk Data entries. The new SB field allows the specification of different bond material shear allowables from one ply to the next. This is especially useful for sandwich materials.

## Thermal Analysis Enhancements

- Added better support for thermal stress analysis in plane strain models. Previously the z-direction or through thickness stress generated when thermal loads were applied was ignored. Now the invariant stresses include the z-direction stress.

## Element Enhancements

- Enhanced hex element spurious mode control for non-parabolic hex elements with PARAM, HEXINODE set to OFF.
- Added PARAM, TETINODE which when set to ON will add an internal node to parabolic tet elements making them more accurate when highly distorted and in the areas where surface contact is present.
- Added support for plane strain elements in material nonlinear solutions.
- Added thermal expansion support for rigid elements (RBE2). When a coefficient of thermal expansion is specified on the RBE2 Bulk Data entry and the RIGIDELEM2ELAS model parameter is set to ON or AUTO a new rigid element will be used capable of rigid thermal expansion.
- Added a new large displacement/rotation rigid element (RBE2). When PARAM, LGDISP is set to ON or 1 and the RIGIDELEM2ELAS model parameter is set to ON or AUTO and the RIGIDELEMTYPE model parameter set to BAR, a new rigid element capable of large displacement/rotation will be used.
- Improved accuracy and robustness of offset welded contact when connecting shell elements to other shell or solid elements.
- Changed the default for the MID2 and MID3 fields on the PSHELL Bulk Data entry to MID1 when MID1 is a nonlinear material.
- Increased the integration order for parabolic hex elements that reference linear materials in nonlinear analysis.

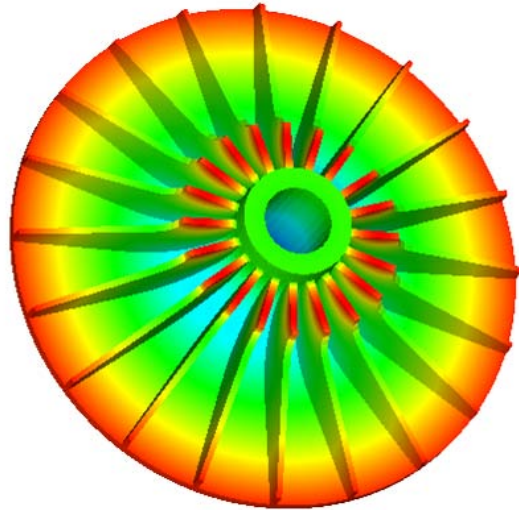
- Changed the behavior of HEXINODE when set to ON to now force an internal node when the hex element is parabolic in nonlinear analysis. Previously, parabolic hex elements in nonlinear analysis had the internal disabled. The internal node option increases accuracy when a coarse mesh is used.
- Added support for the UM field on RBE3 Bulk Data entries.
- Modified ASCG and AECG to skip element faces with surface contact already defined.
- Enhanced PARAM, AUTOFIXRIGIDSPC to now include slave degrees of freedom connected to other slaves.

### Results Enhancements

- Added PARAM, GPRSLTAVEMETHOD which specifies how shell element corner results are averaged to determine grid point values. When set to INVARIANT, all element corner result measures are calculated first and then averaged including invariant stress and strain. When set to DIRECT, only direct stress and strain is averaged and invariant results are determined from the averaged direct values.
- Added an Original Sequence column in the Real Eigenvalue output table when the MODESET Case Control command is specified. The Original Sequence lists the original mode numbers before the modal set is reduced.
- Added eigenvalue rigid body strain energy output.
- Added contact force and stress output to linear contact analysis.

### Other Enhancements

- Added MSC option to OPTIMIZESETTINGS directive to use initialization directive and model parameter and settings more compatible with MSC Nastran.
- Changed the logic when selecting the PCGLSS solver (DECOMPMETHOD = AUTO) to consider solver memory requirements or model size (DECOMPAUTOSIZE) versus requiring both conditions to be met.
- Enhanced network licensing by eliminating the delay between analysis start and license checkout. Previously licenses were checked out after model translation resulting in a significant delay depending on translation time.



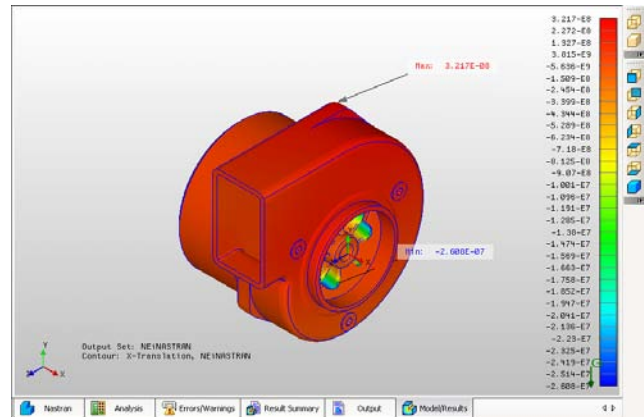
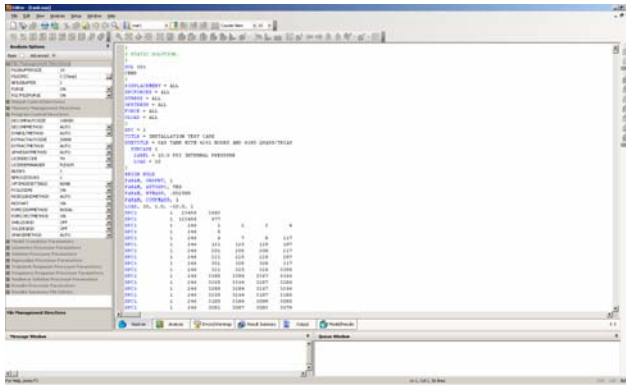
- The Model Input File can now have a .BDF extension when specified on the Nastran command line. In this case the Translated Bulk Data File will default to a .DAT extension to avoid conflicts.
- Added the AUTO option for PARAM, KRIGIDELEM. The AUTO option will generate an appropriate KRIGIDELEM setting based on the largest Young's modulus specified in the model.
- Added PARAM, RIGIDELEMCORD which when set to ON or AUTO will allow rigid or interpolation elements or MPC equations which are linked to be in separate coordinate systems through internally generated collocated spring elements whose stiffness is specified by PARAM, KRIGIDELEM. The OFF setting provides the previous behavior which internally forces the dominant coordinate system at all connected points.
- Added the OUTSTRNSETID directive for specifying the setid for STRAIN Bulk Data entries exported with the TRSLSTRNDATA directive.
- Case is now preserved in Case Control TITLE, SUBTITLE, and LABEL commands. Lower case characters will not be automatically converted to upper case.
- Added support for the CLAN method on EIGC Bulk Data entries.
- Added an element id field to the CONTACTGENERATE Case Control command.

- Added bolt preload via the BOLT and BOLTFOR Bulk Data entries and the BOLTLN Case Control command. Bolt preloads can also be specified directly on PBAR, PBARL, PBEAM, and PBEAML properties and CBAR and CBEAM element connection Bulk Data entries. Support is provided for all static, prestress, buckling and direct transient solutions.

- Added Gravity load symbol when there is a GRAV card in the Bulk Data file (appears as a green symbol at the bottom right-hand corner of the model view).
- Added display symbol for enforced displacements.
- Max/min labels are set to transparent so the model can be seen behind the labels

## Editor Enhancements

- Editor Graphical User Interface now has a new look and feel.



- The Parameters/Directives tree on the left-hand side has been categorized into Basic and Advanced.
- Added support for the visualization of many entities including CDAMPi, CBUSH, CBUSH1D and CELASi.
- Dynamic plots are automatically generated during nonlinear analysis when the “Nonlinear Options/Generate Intermediate Results” and “Nonlinear Options/Load and Display Intermediate Results” options are checked. They have their own dynamics plots settings in the Default Settings dialog.

