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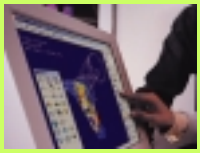
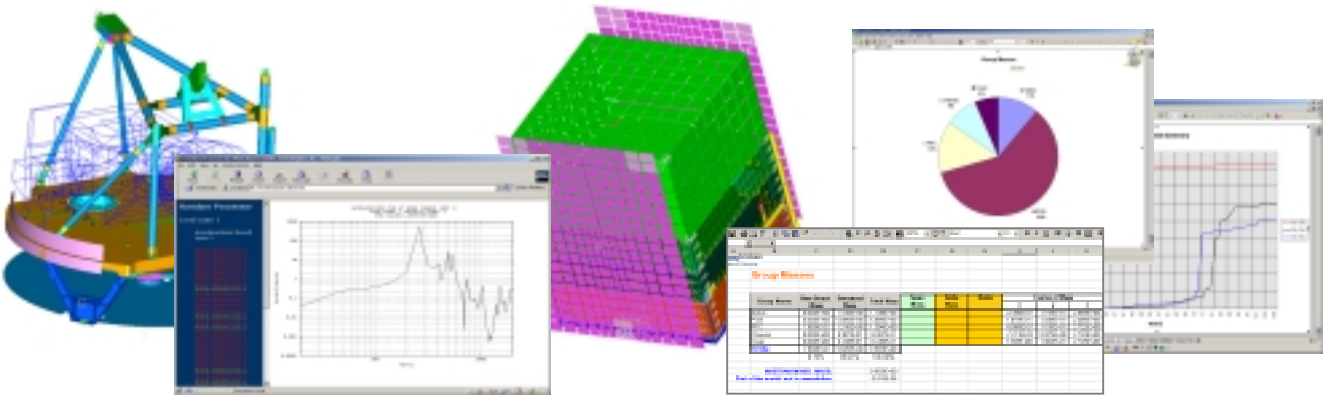
MAYA Structural Analysis Toolkit for NASTRAN

Fast and efficient post-processing of NASTRAN results.



The MAYA Structural Analysis Toolkit for NASTRAN features an advanced post-processing capability for general purpose analyses. It also includes efficient, state-of-the-art analytical tools. In summary, MAYA's Structural Analysis Toolkit:

- Significantly speeds up the analysis of NASTRAN results
- Efficiently processes NASTRAN results for large models over many subcases
- Processes static, transient, normal modes and frequency response analysis data
- Eliminates tedious pre and post processing of dynamic solution data, while increasing the accuracy of the results



For more information about the Structural Analysis Toolkit for NASTRAN contact MAYA at info@mayasim.com, call 514-369-5706 or visit www.mayasim.com

MAYA Structural Analysis Toolkit for NASTRAN

The MAYA Structural Analysis Toolkit for NASTRAN processes selected data from a NASTRAN binary results file and presents the results in ASCII text, Microsoft Excel, Universal file, Neutral file and HTML formats. It is particularly useful in organizing numerous, large results data blocks into meaningful summaries, thereby saving valuable analysis time. It is an excellent complement to existing commercial post-processors. The Toolkit also replaces certain NASTRAN dynamic solutions.

Features

- Completely UI driven. Forms help you select nodes and/or elements, subcases, formatting options, and other processing parameters. Session files store processing options and group definitions for future processing.
- Interface can be launched standalone or directly from the FEMAP CAE platform, and can extract node and element group information from the active model. Also reads groups datasets from universal files. Key results can be brought back into NX I-DEAS and FEMAP for graphical display.
- Direct link to Microsoft Excel. Cut and paste operations are no longer required! Visual basic macros format the Toolkit results, so you don't have to spend time creating reports.
- Efficiently reads large NASTRAN binary results files generated on Windows, Linux and Unix platforms.
- Sorts and identifies maximum element stresses, grid point forces, element forces and other NASTRAN results. Calculates element and joint margins of safety.

Stress and Margin of Safety Processor

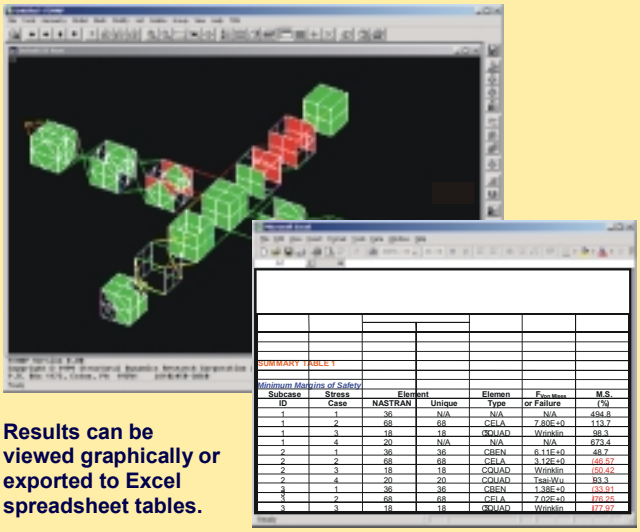
The Stress Processor reads element stresses and calculates margins of safety based on user-defined element groups, material allowables, safety factors and failure theories. The minimum margins of safety for complex structures made of different materials, subjected to various loadings can be assessed more efficiently than ever before. Margins are exported to Excel sheets and ranked by increasing value, by element label or both. They are also exported to NX I-DEAS and FEMAP for graphical post-processing. Supported failure theories include Von Mises stress, honeycomb sandwich panel (Intra-cell buckling, shear crimping and wrinkling) as well as all the laminate failure theories found on the PCOMP card.

Element Force Processor

The Element Force Processor tabulates NASTRAN element forces according to user-defined subcases and element groups. It allows for efficient evaluation of the maximum forces occurring in the entire FEM or in selected regions. Group summaries identify the maximum force components along with the associated element, subcase and consistent forces. Since the forces are written directly to Excel files, ranking can easily be performed.

Grid Point Force Processor

The Grid Point Force Processor tabulates NASTRAN grid point forces according to user-defined subcases as well as element and node groups. It includes an option to define structural joints and associated allowable load vectors, so that joint margins of safety can be computed. Nodal and overall joint margins are given. This permits efficient assessment of bolted and bonded joint integrity in large models, over many subcases. DMAP is provided that calculates the grid point forces for dynamic and transient solutions. The joint margins of safety can be visualized in NX I-DEAS and FEMAP.



SUMMARY TABLE 1

Minimum Margins of Safety

Subcase ID	Stress Case	Element NASTRAN	Element Unique	Elemen Type	$F_{von\ Mises}$ or Failure	M.S. (%)
1	1	36	N/A	N/A	N/A	494.8
1	2	68	68	CELA	7.80E+0	113.7
1	3	18	18	QUAD	Wrinklin	98.3
1	4	20	N/A	N/A	N/A	673.4
2	1	36	36	CBEN	6.11E+0	48.7
2	2	68	68	CELA	3.12E+0	(46.57
2	3	18	18	CQUAD	Wrinklin	(50.42
2	4	20	20	CQUAD	Tsai-Wu	93.3
3	1	36	36	CBEN	1.38E+0	(33.91
3	2	68	68	CELA	7.02E+0	(76.25
3	3	18	18	QUAD	Wrinklin	(77.97

Results can be viewed graphically or exported to Excel spreadsheet tables.

Modal Summary

Understanding normal modes of vibration may be easy for simple structures, but for complex structures this knowledge is difficult to assimilate. The following criteria can be used to assess the importance of global and/or local modes of a structure:

- Effective Mass
- Response of the structure to a base excitation

The NASTRAN modal summary tool processes the modal information from a normal modes (SOL103) analysis. Effective masses are tabulated and graphed in Excel worksheets. Acceleration responses for selected groups of nodes are tabulated. Critical modes, in which effective masses and/or dynamic responses exceed user-defined thresholds, are automatically flagged by the processor.

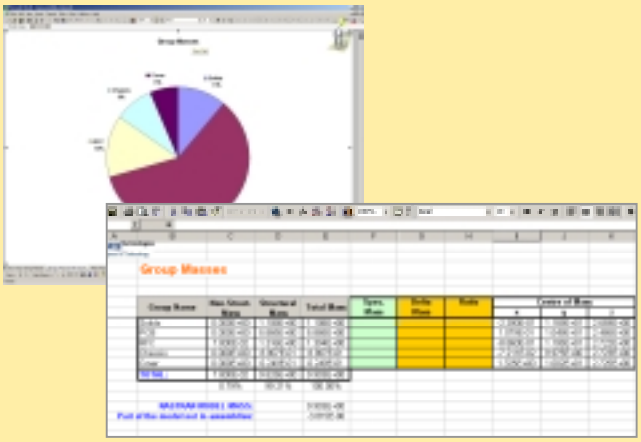
Mass Summary

The Mass Processor computes the mass properties of a NASTRAN finite element model, allowing for efficient comparison with the detailed mass budget. The Mass Processor will scan the NASTRAN results file, identify all the physical property tables and calculate the structural and non-structural mass of all the elements associated to each table. Optionally, it will calculate the mass properties of selected element groups. Excel graphs and pie charts will show the FEM's mass distribution.

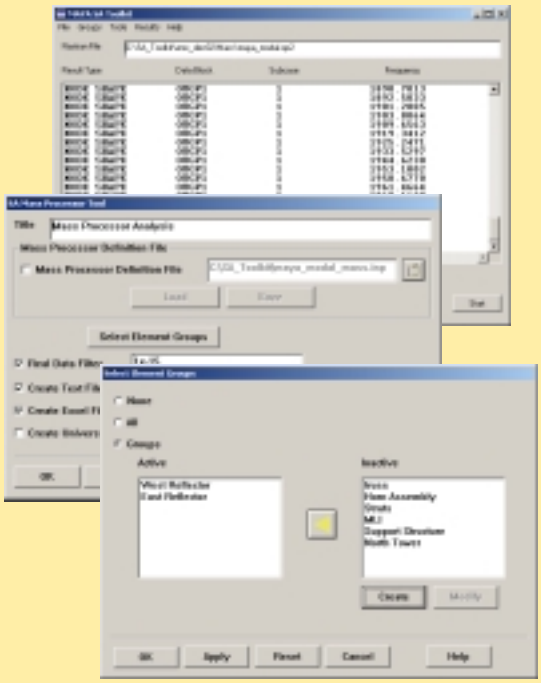
Random Processor

The Random Processor is a parallel solver which reads the results of a NASTRAN normal modes (SOL 103) analysis and evaluates the responses of a structure subjected to a random base acceleration: It efficiently replaces all the steps following the initial NASTRAN normal modes solution. Features of the Random Processor include:

- Parallel solver;
- Computation of stress margins of safety, including the consideration of multiple failure criteria (yield, ultimate) in a single run;
- True Von Mises stresses for a given confidence level are computed using state of the art techniques;
- Efficient hybrid integration method which combines the advantages of analytical and numerical integration schemes;
- Automatic HTML graphical result creation;
- XY graphical data can be brought back into NX I-DEAS for further processing
- Margins of safety can be imported into NX I-DEAS and FEMAP for graphical post-processing.
- The large mass is not required;
- Output of RMS, Peak and Number of positive zero crossings values for all standard result types.
- Efficient residual flexibility method of accounting for modal truncation.
- Tabular output is provided as text files, Excel spreadsheets, FEMAP Neutral files and NX I-DEAS Universal files.
- Graphical XY (results vs. frequency) output is available in the following formats: Plots linked to an HTML page, Excel spreadsheet and NX I-DEAS;



Group Masses



The Structural Analysis Toolkit provides an easy-to-use forms based interface to select results, element groups and define processor parameters.

Sine Processor

The Sine Processor is similar to the random processor except that it sets up a harmonic base acceleration analysis. It features phase-consistent calculation of maximum Von Mises stresses.

Hardware Platforms and File Formats

- MAYA's Structural Analysis Toolkit for NASTRAN is available on all Windows platforms.
- Reads NX/NASTRAN and MSC/NASTRAN .op2 files that were created on Windows, Linux and Unix platforms.

Interfaces to Excel and CAE Applications

- Writes Excel 2007 worksheets.
- Interfaces to NX I-DEAS and FEMAP 10.3.
- Reads FEMAP groups dynamically and NX I-DEAS group datasets 2435, 2452, 2467 and 2477.

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