MAYA Structural Analysis Toolkit Professional

Best-in-class base-driven random vibration simulation

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

Random Processor

The Random Processor reads the results of a NASTRAN normal modes (SOL 103) solution and evaluates the responses of a structure subjected to a random base acceleration.

Features of the Random Processor include:

- **Parallelized** solver
- Computation of **peak results**: You won't have to scale RMS results anymore
- Computation of **peak Von Mises stresses**, accounting for **non-Gaussian probability distribution**, resulting in up to 30% more accurate results
- **Automatic generation of stress margins of safety,** including the consideration of multiple failure criteria in a single run. You won't have to post-process your stress results anymore
- Outputs number of **positive zero crossings**
- Supports **NX Nastran and MSC Nastran**
- Efficiently accounts for **modal truncation**
- Runs on **Windows and linux** operating systems
- Can be run in **batch**
- Computation of **laminate ply stresses, strains and failure metrics**

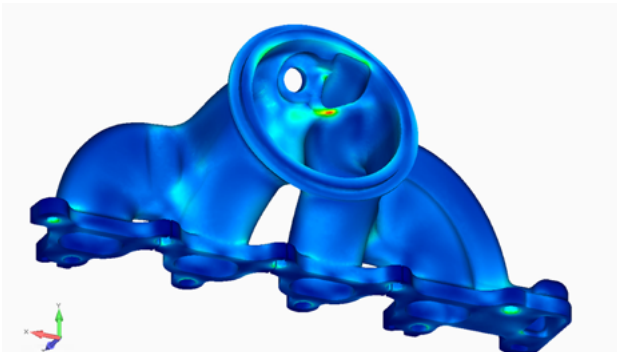
"Structural Analysis Toolkit turned a 2 day analysis (200,000 elements model with 100 modes with 3 random vibe cases) using a competing product, into a 6 minute job. Well worth the investment!"

William Villers, Director of Engineering
TEN TECH LLC

- Contour and XY graph results can be **post-processed in NX and in FEMAP**
- Automatic HTML XY graphs and link to **Excel**
- Efficient hybrid integration method which combines the advantages of analytical and numerical integration schemes: **You won't have to worry about defining too many or too few integration frequencies.** Accurate results are minutes away

Benefits of SAToolkit Pro

- Significantly speeds up base-driven dynamic analysis while increasing accuracy of



SAToolkit Pro's performance changes the game with accurate solutions of very large beam, shell and solid models over the complete frequency band. This model, consisting of 600,000 solid elements, 980,000 nodes and 250 modes, was solved in 120 minutes for all 3 axes

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SAToolkit Pro for NASTRAN offers an advanced post-processing capability for general purpose analyses and features efficient, state-of-the-art analytical tools for modal dynamic simulation

the results

- Speeds up the post-processing of large NX and MSC NASTRAN op2 files generated on Windows or linux
- Efficiently processes NASTRAN results for large models over many subcases
- Processes static, transient, normal modes and frequency response analysis data
- Results sent to formatted Microsoft Excel workbooks

EFFECTIVE MASSES

Total Mass 0.170
Mode Filter 10.00%

MODE	FREQ. (Hz)	Mx	My	Mz	Mx (%)	My (%)	Mz (%)
1	35.699	3.02E-05	7.25E-03	1.90E-02	0.0%	4.3%	11.2%
2	42.660	1.01E-01	2.11E-05	1.03E-06	59.5%	0.0%	0.0%
3	48.096	1.27E-05	3.92E-02	2.56E-05	0.0%	23.1%	0.0%
4	56.635	3.24E-05	2.23E-04	9.86E-03	0.0%	0.1%	5.8%
5	59.778	1.71E-02	1.15E-04	1.51E-05	10.1%	0.1%	0.0%
6	63.169	4.26E-04	1.75E-02	8.34E-03	0.3%	10.3%	4.9%
7	63.542	3.13E-03	5.81E-04	1.95E-04	1.8%	0.3%	0.1%
8	77.875	1.44E-06	1.91E-02	3.41E-03	0.0%	11.2%	2.0%
9	91.526	2.80E-06	2.14E-03	3.01E-05	0.0%	1.3%	0.0%
10	99.417	4.41E-06	3.67E-04	2.54E-04	0.0%	0.2%	0.1%
11	104.449	1.33E-04	4.30E-03	2.16E-03	0.1%	2.5%	1.3%
12	105.533	2.04E-04	4.97E-04	3.07E-04	0.1%	0.3%	0.2%
13	111.367	4.74E-03	5.95E-08	1.59E-05	2.8%	0.0%	0.0%
14	115.234	2.47E-05	1.15E-05	3.42E-06	0.0%	0.0%	0.0%
15	119.163	2.71E-05	1.40E-03	2.70E-06	0.0%	0.8%	0.0%
16	125.164	4.02E-03	8.09E-06	2.01E-06	2.4%	0.0%	0.0%
17	127.359	4.97E-05	9.56E-04	1.07E-03	0.0%	0.5%	0.6%
18	131.556	7.18E-04	3.07E-05	7.26E-05	0.4%	0.0%	0.0%
19	133.202	8.23E-06	1.03E-03	5.60E-03	0.0%	0.6%	3.3%
20	139.332	2.05E-06	3.21E-03	3.28E-05	0.0%	1.9%	0.0%
21	141.230	2.43E-06	1.95E-03	1.81E-08	0.0%	1.2%	0.0%
	Total	0.132	0.100	0.050	77.6%	58.7%	29.7%

Sine Processor

- The Sine Processor performs steady-state harmonic base acceleration analyses using Nastran SOL 103 results
- It features phase-consistent calculation of maximum Von Mises stresses.

Modal Summary

Understanding normal modes of vibration may be easy for simple structures, but for complex structures this knowledge may be difficult to obtain.

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 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.

Energy Processor

The energy processor efficiently ranks strain and kinetic energy by group and by mode, allowing for a thorough understanding of modal behavior in complex models. Formatted Excel workbooks provide both tabular and graphical results

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.

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Optionally, it will calculate the mass properties of selected element groups. Excel graphs and pie charts will show the FEM's mass distribution.

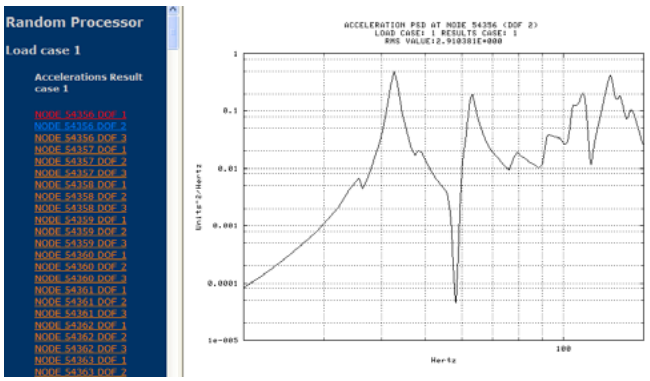
Grid Point Force Processor

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.

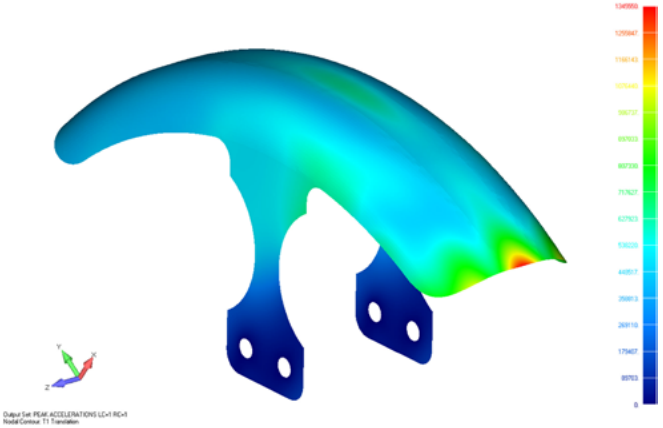
DMAP is provided that calculates the grid point forces for dynamic and transient solutions. The joint margins of safety can be visualized in NX and FEMAP.



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.



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 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.

Hardware Platforms and File Formats

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

Interfaces to Excel and CAE Applications

- Writes Excel 2007 worksheets.

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- Interfaces to NX10 and FEMAP 11.
- Reads FEMAP groups dynamically and universal file group datasets 2435, 2452, 2467 and 2477.

Solution Partner

PLM

SIEMENS

For more information about the Structural Analysis Toolkit for NASTRAN contact MAYA at info@mayahtt.com, call +1.800.343.6292 or visit www.mayahtt.com

Maya HTT is a Siemens PLM foundation partner and a leading software simulation developer with in-depth engineering expertise, author of a variety of CAE solutions within the Siemens CAE portfolio including NX CAE and Femap.