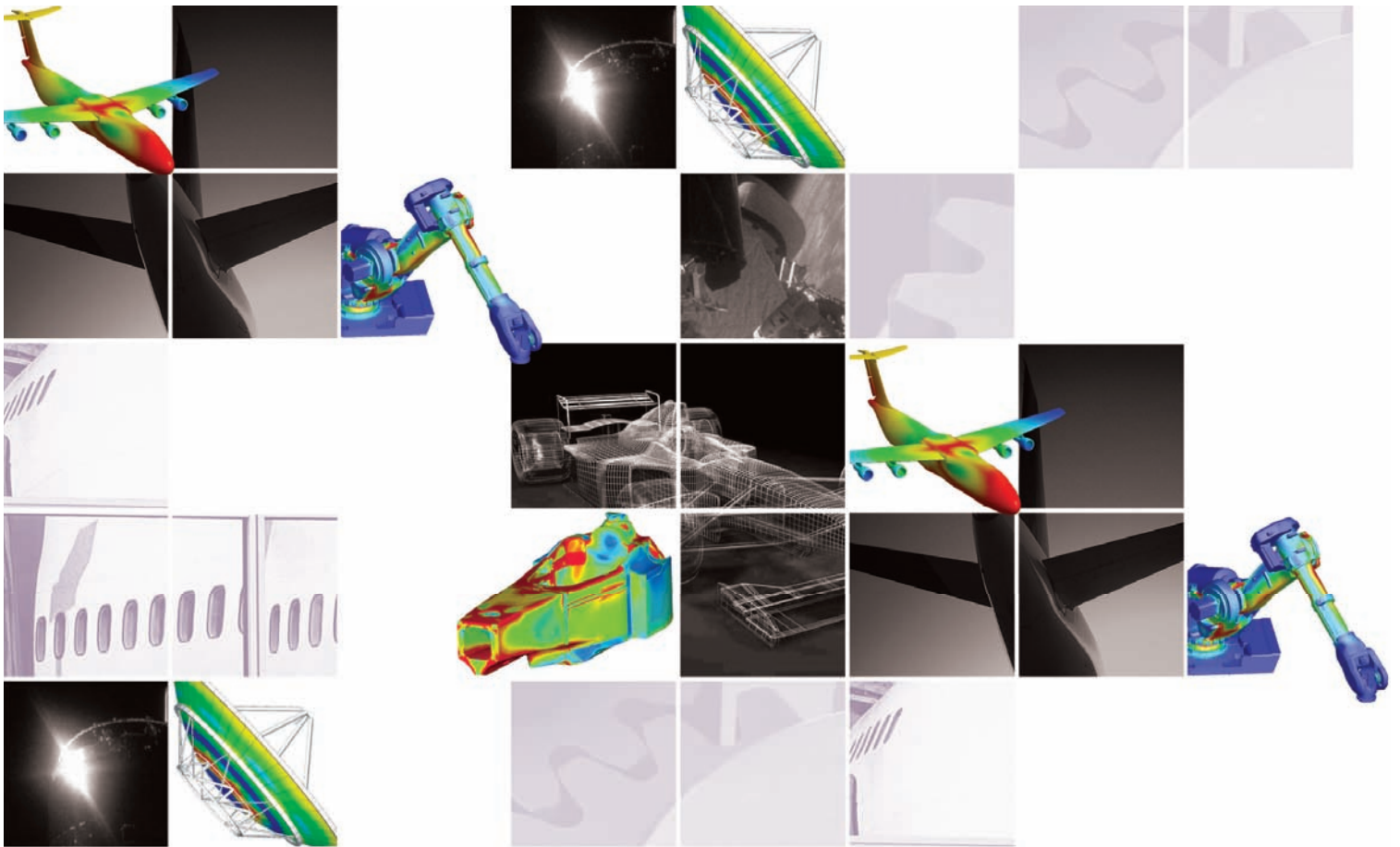




Nastran FX

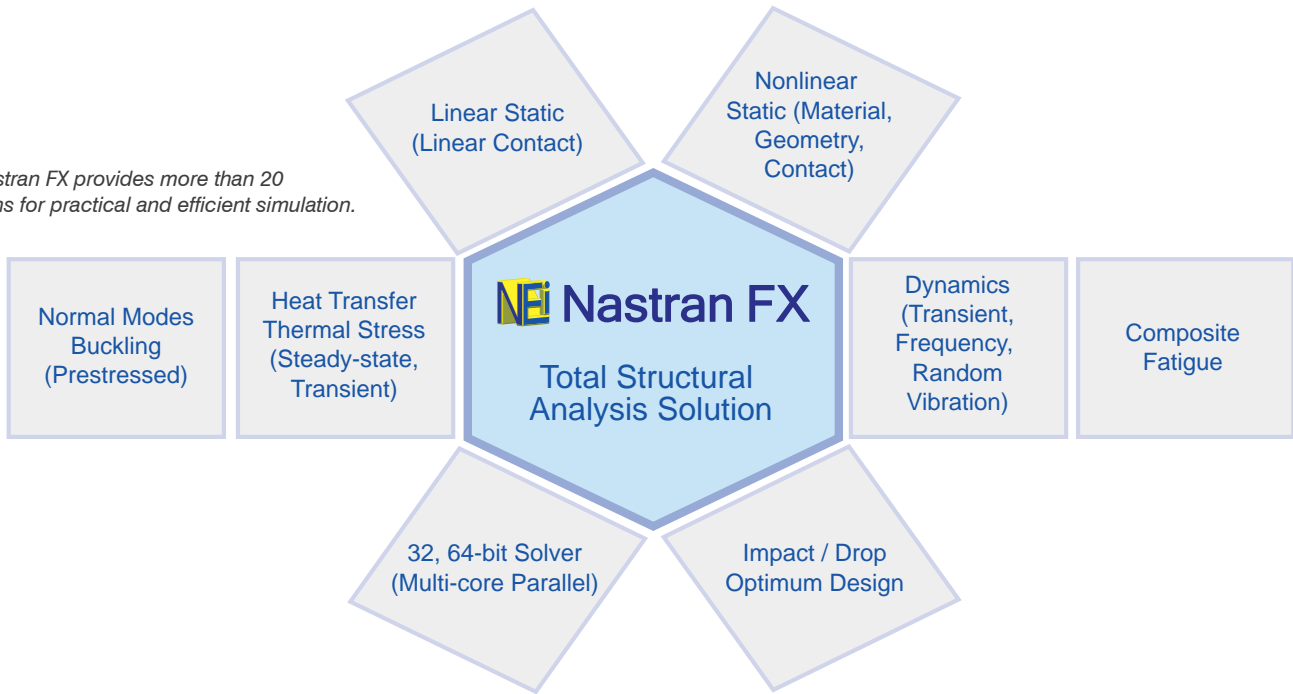
3D FEA Modeler + Nastran Solver



A New Structural Analysis Solution Based on True Nastran Technology

NEi Nastran FX is an integrated Finite Element Analysis program developed by MIDAS Information Technology specifically for NEi Nastran. NEi Nastran FX provides advanced analysis solutions, such as nonlinear analysis, surface contact, and optimum design based on the industry standard of Nastran solutions. An efficient solver with an integrated pre/post-processor developed by expert software engineers provides accurate results for advanced analysis and design.

NEi Nastran FX provides more than 20 solutions for practical and efficient simulation.



Seamlessly Integrated and Task-Oriented Environment

NEi Nastran FX provides the complete FEA environment by seamlessly integrating pre/post-processor and solver.

Undo/Redo

Unlimited Undo/Redo

Works Tree

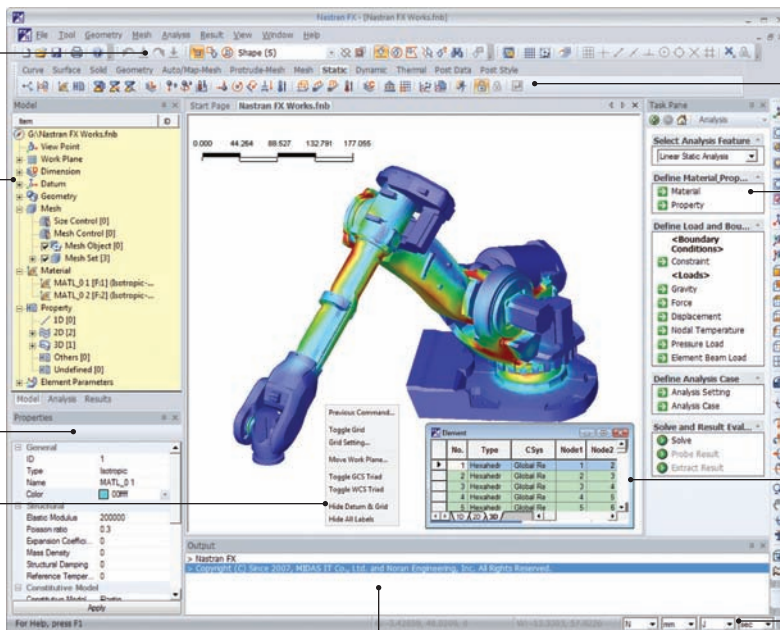
Provides mode data in a tree structure and useful functions for data management

Properties Window

Provides various information and an editing function

Context Menu

Provides frequently used menus depending on selected entities



Tabbed Toolbar

Provides categorized toolbar icons

Task Panel

Provides guides to standard procedures and offers quick access to corresponding functions

Table Window

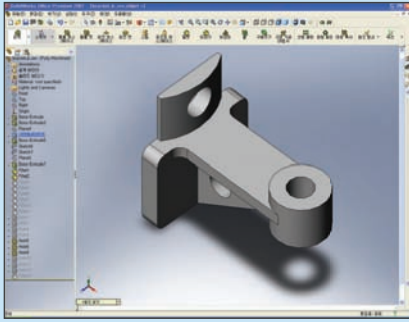
Provides input data and result values in Excel-like tables

Unit Manager

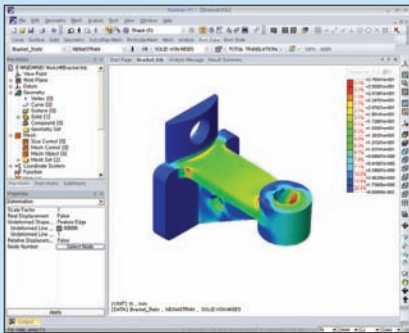
Provides real time unit conversion

Message Window

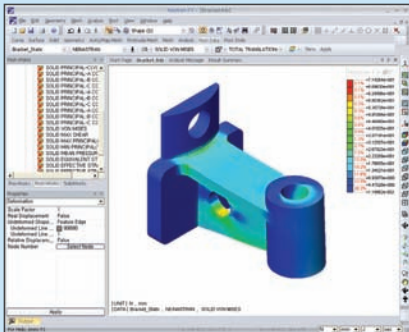
Provides various information and operation results in modeling



CAD model



Initial analysis



Updated model and re-analysis results with changed dimensions

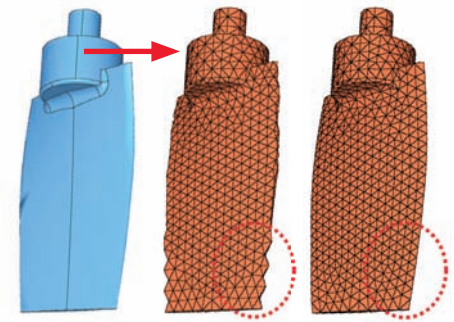
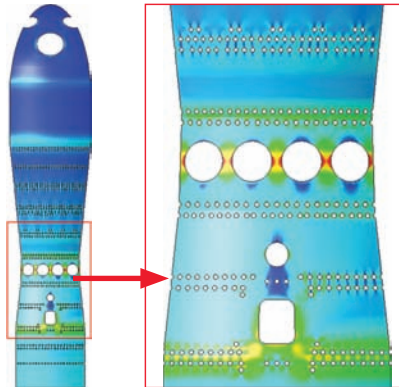
Various CAD Interfaces and CAD Parameters Update

NEi Nastran FX provides direct interface with various CAD programs.

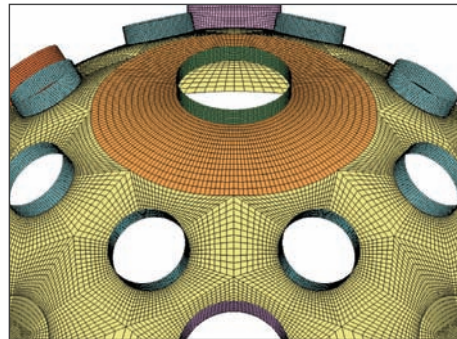
- STEP
- IGES
- Parasolid (V17.1)
- CATIA V5 (R10-R19 SP5)
- SolidEdge (10-20, ST, ST2)
- SolidWorks (2000-2010)
- UG (15-NX7)
- Pro/ENGINEER (2000i~Wildfire5)
- Inventor (V10-2010)

NEi Nastran FX provides CAD parameters update using CAD API's. Currently, SolidWorks, SolidEdge, Inventor and CATIA V5 are supported.

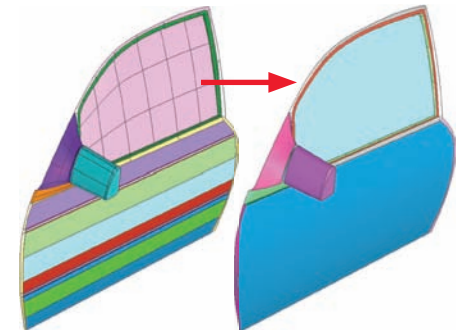
Updating of CAD parameters update allows easy CAD model change and parametric studies to find the optimum design variables.



Check and split continuity of NURBS



Examples of complex plant structures modeled in NEi Nastran FX (shell)



Merge faces for high quality mesh

Practical Geometry Modeling and Clean-Up

In addition to providing various geometric modeling functions for surfaces and solids, NEi Nastran FX also supports non-manifold surface modeling. This is very useful for plant and civil structures which have many stiffeners and complex connections. NEi Nastran FX provides practical geometry clean-up functions for CAD generated geometries.

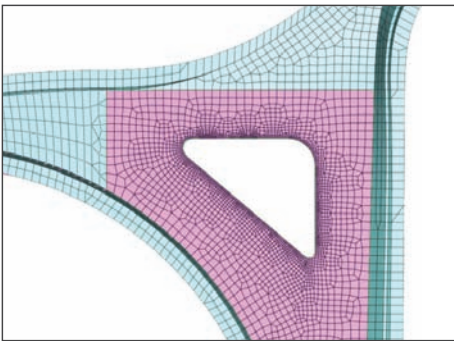
- Auto-check and repair, NURBS simplification
- Merge or break faces and edges
- Search and remove sliver faces and short edges
- Search and remove pin holes in faces
- Check and remove duplicated faces and edges

High Quality Mesh Generation and Management

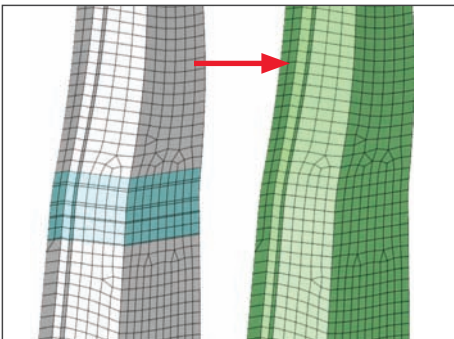
NEi Nastran FX supports free and mapped meshing for surface and solids. Using various meshing algorithms, adaptive size control, element-based re-meshing and manipulation functions, even novices can generate high quality meshes without hassle.

NEi Nastran FX also provides:

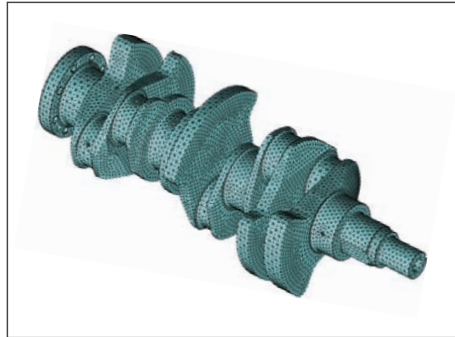
- Mesh grouping and management functions
- A Works Tree for easy, hierarchical check and management of materials, properties and mesh groups
- The ability to import mesh from other projects
- High performance auto-tetra mesher



Optimum mesh generated using various meshing algorithms depending on the characteristic of faces



Improved mesh by element-based re-meshing (resolves problems of parametric meshing)

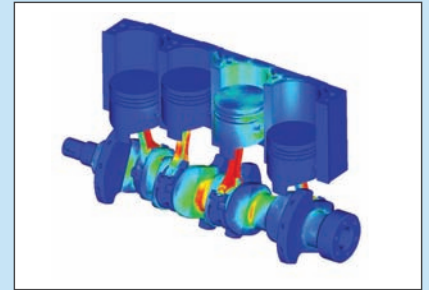


Auto-generated 2nd-order tetra mesh

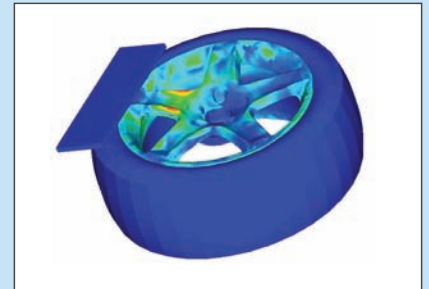
Surface Contact Suited for Complex Assembly

NEi Nastran FX provides auto contact pair search by solver, which makes contact analysis very easy for large and complex assembly models. This feature requires only the activation of the option for applying contact condition for all solutions.

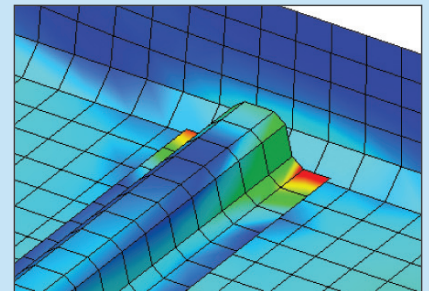
- Surface to surface, surface to line contact
- Contact definition
 - auto-search by solver, contact wizard, manual, etc.
- Linear contact
 - weld (bonded), gap, static/modal
- Nonlinear contact
 - material, geometric nonlinear
 - weld (bonded), friction, sliding, rough
 - friction coefficient, stiffness, offset



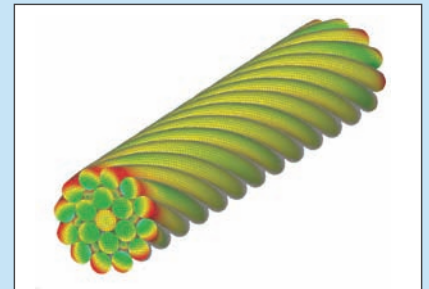
Contact in an engine assembly (nonlinear transient)



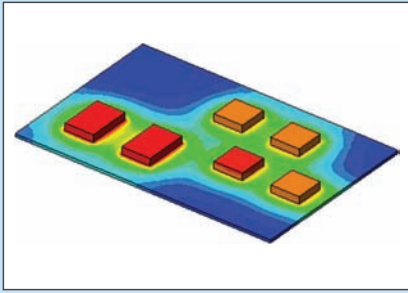
Durability test of a tire rim



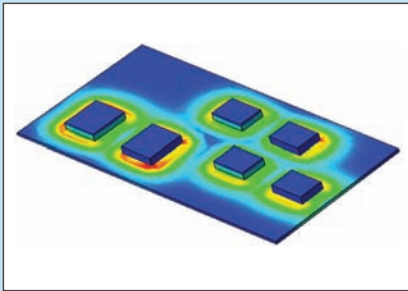
Linear contact of a shell model (gap considered)



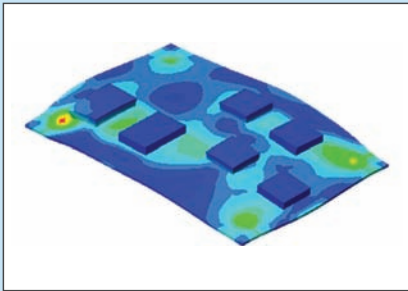
Nonlinear contact of a twisted cable (Auto-search by solver)



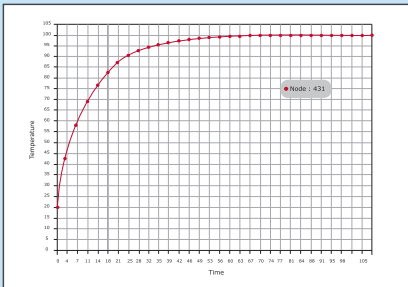
Temperature distribution
(conduction by thermal contact)



Temperature gradient



Thermal stress and deformation



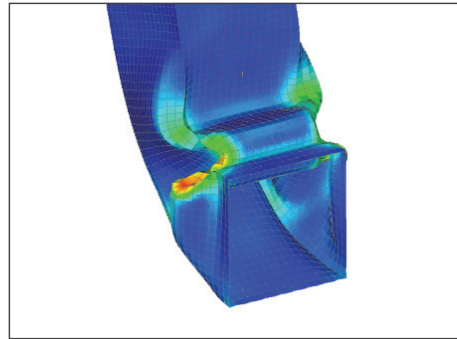
Temperature variation graph
at a specified node

One Stop Analysis of Heat Transfer and Thermal Stress

NEi Nastran FX provides steady-state and transient heat transfer analyses.

In order to support one stop simulation of thermal stress, NEi Nastran FX provides thermal stress analysis as an independent solution type. Using this solution, users can easily get both temperature and stress results in one analysis.

- Steady-state and transient heat transfer
- Linear and nonlinear heat transfer (temperature-dependent materials and boundary conditions)
- Heat generation, conduction, convection, radiation and prescribed temperature (time/temperature-dependent)
- Thermal contact (conduction between discontinuous parts)
- Automatic time stepping



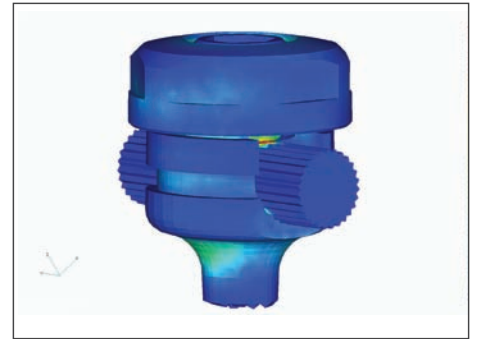
Post-buckling of tube
(material/geometric nonlinear)

Nonlinear Static Analyses with Excellent Convergence

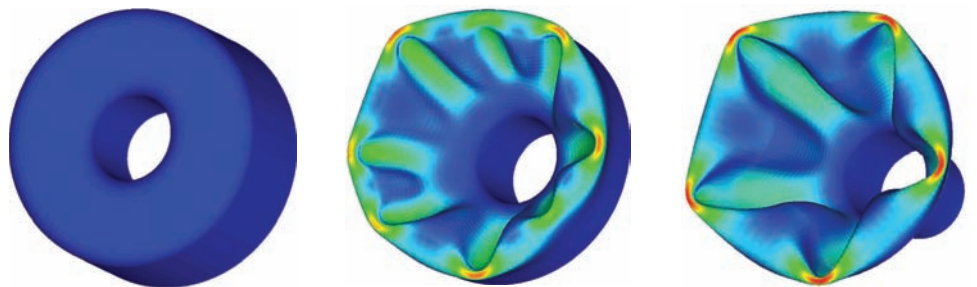
NEi Nastran FX provides excellent convergence for material and geometric, nonlinear analyses.

Nonlinear static analysis functions of NEi Nastran FX are developed based-on the original Nastran codes (not a 3rd-party module like other Nastrans).

- Material models
 - elasto-plastic, hyperelastic, creep, etc.
- Yield criteria
 - von Mises, Tresca, Mohr-Coulumb
- Hardening
 - isotropic, kinematic, combined
- Large displacement and rotation (updated Lagrangian)
- Follower forces (force, pressure, moment, etc.)
- Automatic load stepping



Nonlinear analysis of an implant
(material/geometric nonlinear)



Nonlinear analysis of a rubber membrane (material/geometric/contact nonlinear)

High Performance Parallel Solver

NEi Nastran FX provides the extremely fast CASI PCGLSS solver. This parallel and iterative solver is capable of handling models with over 7 million DOFs.

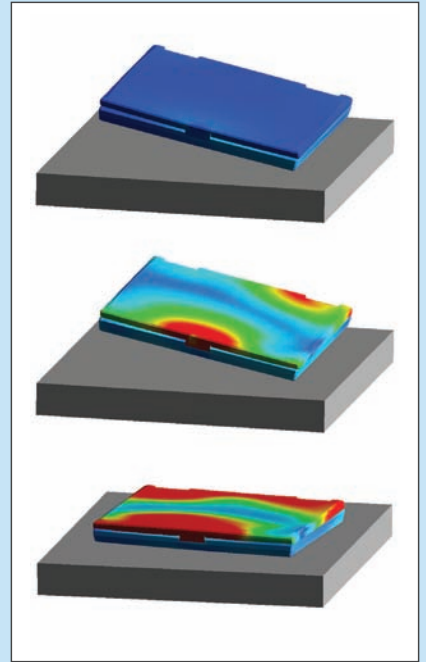
NEi Nastran FX provides four linear solvers (PCGLSS, VSS, VIS, and PSS) and two eigensolvers (LANCZOS and SUBSPACE) for large and complex models. The PSS (Parallel Sparse Solver) is an extremely fast parallel direct solver designed for x64 operating systems where large amounts of memory can be directly accessed.

“Drop test is provided as a stand-alone function in Nastran FX. It requires only the input of initial velocity, acceleration and projectile.”

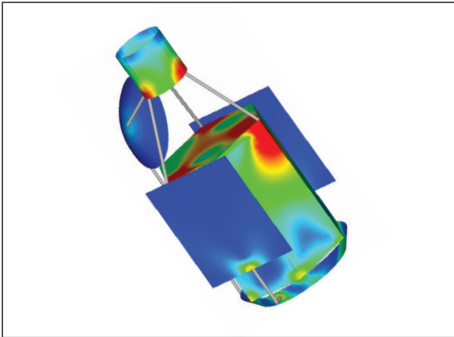
Dynamic Analysis (Key Solution of Nastran)

Dynamic solutions are the most reputed functions of Nastran for over 30 years. NEi Nastran FX provides the following dynamic solutions:

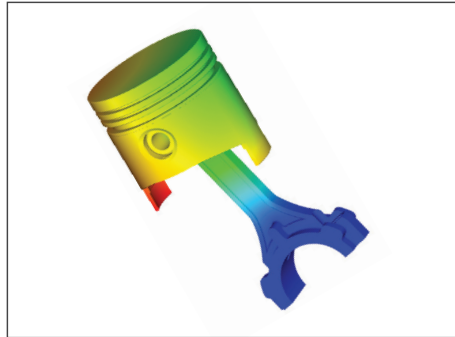
- Linear and nonlinear dynamics
 - mode superposition, direct integration
 - transient response
 - frequency response
 - spectrum response
 - random vibration
 - complex eigenvalue
 - enforced motion
- Automatic time stepping
- Linear and nonlinear pre-stresses
- Various damping types
- Modal database for efficient and fast analysis



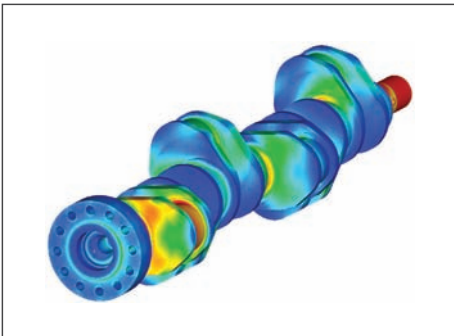
*Drop simulation of laptop
(nonlinear transient, contact)*



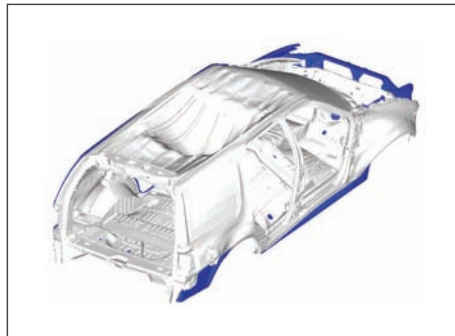
*64-bit parallel
Frequency-response (100 freq's)
Shell and beam elements
358,000 DOFs
Solution time: 2.1 hrs*



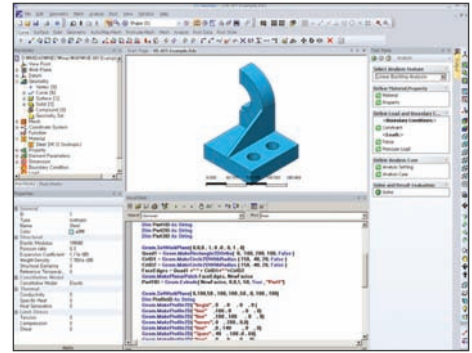
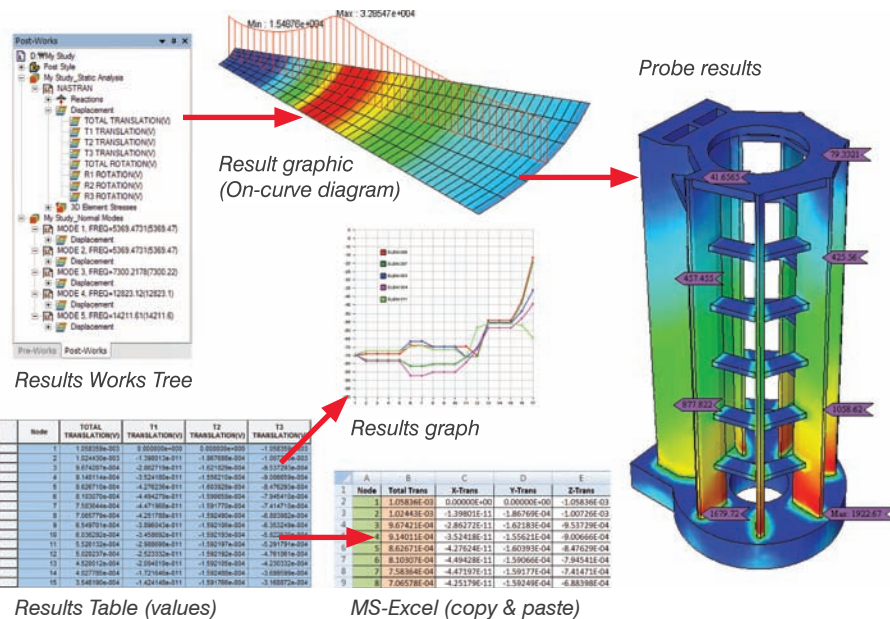
*64-bit parallel
Normal modes (75 modes)
Solid elements
2,600,000 DOFs
Solution time: 5.8 hrs*



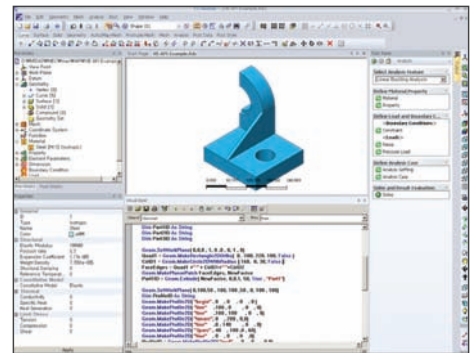
*Linear static
Solid elements
6,858,000 DOFs
Solution time: 2.75 hrs*



*Normal modes
Shell elements
1,230,000 DOFs
Solution time: 1.27 hrs*



VBA API generated model (parameter input)



Updated model by parameters change

```

Visual Basic
Object (General)
Proc (Main)

Dim Part1ID As String
Dim Part2ID As String
Dim Part3ID As String

Geom.SetWorkPlane[ 0,0,0 , 1, 0,0 , 0, 1, 0 ]
Quad1 = Geom.MakeRectangle2DOrtho[ 0, -100, 200, 100, False
CIRID1 = Geom.MakeCircle2DWithRadius [ 150, 40, 20, False ]
CIRID2 = Geom.MakeCircle2DWithRadius [ 150, -40, 20, False ]
FaceEdges = Quad1 + CIRID1 + CIRID2
Geom.MakePlanarPatch FaceEdges, NewFacies
Part1ID = Geom.Extrude[ NewFacies, 0,0,1, 50, True , "Part1" ]

Geom.SetWorkPlane[ 0,100,50 , 100, 100,50 , 0, 100, 100 ]
Dim ProfileID As String
Geom.MakeProfile2D[ "begin" , 0 , 0 , 0 , 0 ]
Geom.MakeProfile2D[ "line" , 100 , 0 , 0 , 0 ]
Geom.MakeProfile2D[ "line" , 100 , 100 , 0 , 0 ]
Geom.MakeProfile2D[ "harc", 0 , 200 , 0,0 ]
Geom.MakeProfile2D[ "line" , 0 , 140 , 0 , 0 ]
Geom.MakeProfile2D[ "3parc" , 40 , 100,0 , 60 ]
Geom.MakeProfile2D[ "end" , 0 , 0 , 0 , 0 ]

```

VBA API code example

State-of-the-Art Graphic Based Post-Processing

NEi Nastran FX provides a Results Works Tree for easy check and access to various result data. Because NEi Nastran FX supports multiple result files for the same models, users can easily evaluate and compare results of various solutions. NEi Nastran FX provides many useful plot functions, like Iso-Surface Plot (same level surface), Slice Plot (result on an arbitrary slice plane) and Clipped Plot (clipped plot for internal part checking) to effectively check and generate report figures.

Using NEi Nastran FX's Results Table, users can easily check the result values and copy them to MS Excel to generate reports and graphs.

VBA API for Customizing

Because NEi Nastran FX provides VBA API which is the most popular programming language, users can easily customize program for automation and/or customization. Useful examples of customizing are as follows:

- Simple VBA interface for customization and automation
- Automation of routine tasks
- Works in conjunction with other VBA based applications such as MS Excel

About NEi Software

NEi Software is a world leader in Finite Element Analysis (FEA), engineering simulation, and virtual test software. The core product NEi Nastran is a powerful, industry-proven FEA solver that thousands of companies routinely use to perform linear and nonlinear structural stress, dynamics, and heat transfer analysis. In addition, NEi Software's portfolio includes products for impact, kinematics, fatigue, acoustics, optimization, aeroelasticity, and Computational Fluid Dynamics (CFD) with support for a full range of materials from composites to hyperelastic rubber. NEi Software covers the different needs of each stage of the product development process, from designers looking for affordable, easy-to-use, CAD-based simulation for validation and trade-off studies to dedicated FE analysts looking for high accuracy, productivity, and real world fidelity. The website features case studies in aerospace, automotive, maritime, military, civil, petroleum, medical, and consumer products with videos, webinars, tutorials, and options for evaluation.

Global Headquarters

5555 Garden Grove Blvd. Ste 300
Westminster, CA 92683-1886
United States

Phone: +1 (714) 899-1220
Fax: +1 (714) 899-1369
E-mail: info@neisoftware.com
Website: www.NEiSoftware.com

NEi Software EMEA Office

The Old Barrel Store
Draymans Lane, Marlow
Buckinghamshire, SL7 2FF
United Kingdom

Phone: +44 (0)1628-400645
Fax: +44 (0)1628-891701
E-mail: emea@neisoftware.com
Website: www.NEiSoftware.com/emea

NEi Software Asia Office

Shinjuku Park Tower
N30th Floor 3-7-1 Nishi-Shinjuku
Shinjuku-ku, Tokyo, 163-1030
Japan

Phone: +81-(0)3-5326-3062
Fax: +81-(0)3-5326-3001
Email: asia@neisoftware.com



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+44 (0) 1628 400645