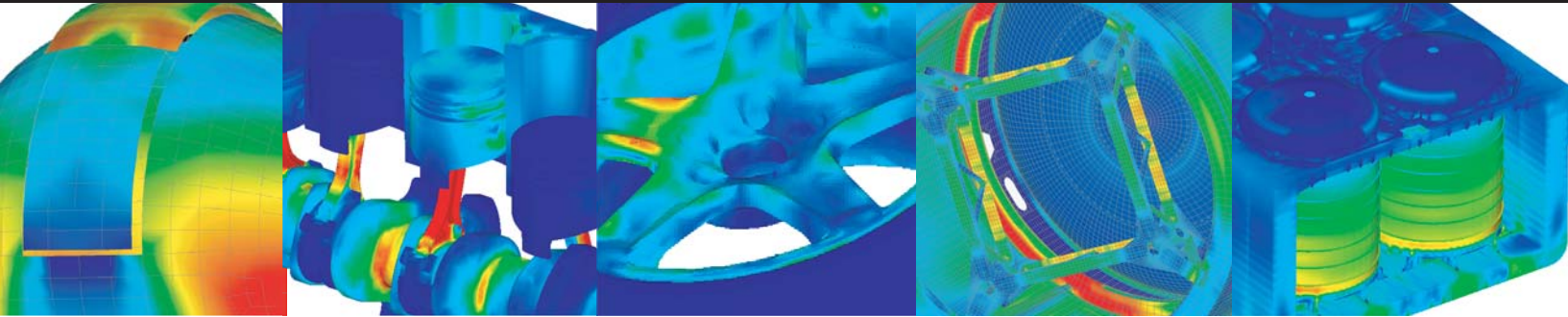


NEiFusion



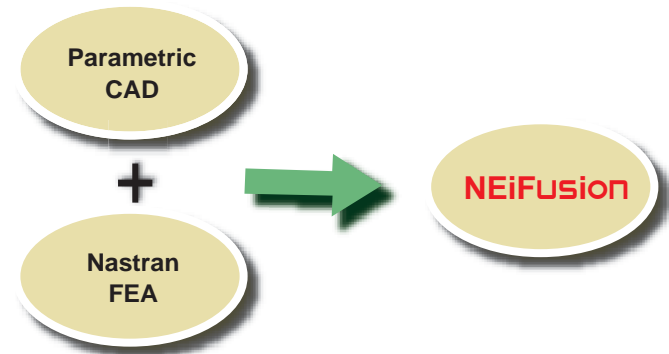
*A fusion of Nastran FEA with the best in class 3D solid parametric modeler*

# NEiFusion - Parametric Modeling + Nastran FEA

## NEiFusion

### A New Approach to Analysis & Simulation

NEiFusion represents a new approach to engineering analysis and simulation software. NEiFusion joins two powerful technologies -- 3D feature based, parametric CAD for model creation, and high accuracy, industry proven Nastran solvers for solution generation. This combination provides a modeling environment that is familiar and user friendly to your entire product development team and gives professional level results acceptable to the community of Nastran analysts as well as your customers, vendors, and design partners. NEiFusion can virtually test parts for a wide range of static and dynamic structural and thermal conditions quickly in a CAD environment that is friendly to changes and exploring design alternatives. The combination of parametric CAD and Nastran is a first in the industry and at its precedent setting price point will enable wide use throughout your organization. In addition, NEiFusion includes a comprehensive suite of features for evaluation, presentation, and reporting of simulation results and the Nastran foundation insures you will have a continuous consistent migration path to higher end analysis if needed.



### Can You Afford To Omit Simulation from Your Development Process?

Why wait until prototypes are built, expensive test fixtures developed or actual field usage to find out how your design will perform? NEiFusion lets you apply forces, pressure, thermal conditions, temperature, vibration, and impact loads and more. You see the deformation, stresses, strains, heat transfer, and modal shapes that your design will experience. Through a variety of highly visual images, contour plots, animations, graphs, and output data, you get the engineering insight you need to innovate and optimize, so you can achieve the best quality, lowest manufacturing costs, and fastest time to market in today's hyper competitive global marketplace.

### NEiFusion - Ease in Exploring Design Alternatives, Confidence in Results

NEiFusion combines an FEA Modeler, comprehensive pre- and post-processing capabilities, and Nastran solvers to create an analysis package for small and medium size companies, consultants, and any engineer who needs affordable, professional level simulation for product development, virtual testing, design validation, and quality assurance. Parts and assemblies can be analyzed for a wide spectrum of static and dynamic structural and thermal loading.

### NEiFusion Modeler

The NEiFusion Modeler is built on an industry proven, Windows based, fully associative, parameterized, feature based, solid modeling engine that provides a full set of advanced and powerful tools for fast, easy, intuitive, and robust model creation. A wide range of CAD data import capabilities complements the 3D modeling tools to help you build your models quickly when existing CAD files are available.

### NEiFusion Pre-Processor

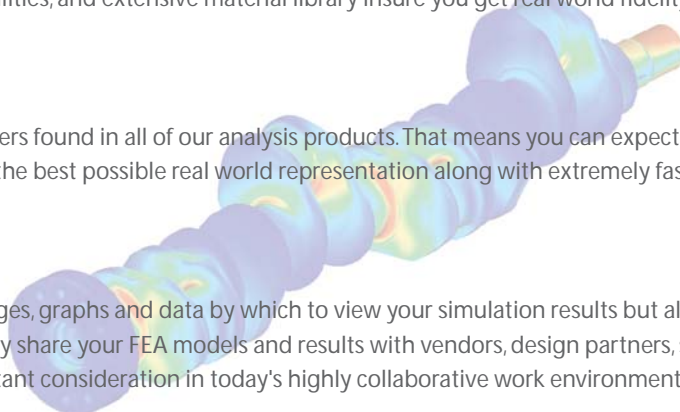
A comprehensive element library, sophisticated meshing capabilities, and extensive material library insure you get real world fidelity and professional level simulation.

### NEiFusion Nastran Solvers

NEiFusion employs the same industry regarded NEiNastran Solvers found in all of our analysis products. That means you can expect solutions that are accurate, precise, and reliable. Nastran assures that you achieve the best possible real world representation along with extremely fast turn around time on solutions.

### NEiFusion Post-Processor

NEiFusion post-processing not only provides a wide variety images, graphs and data by which to view your simulation results but also is equipped with wide file sharing and import/export capabilities so you can easily share your FEA models and results with vendors, design partners, suppliers, customers, and other segments of your organization - an important consideration in today's highly collaborative work environment.



# NEiFUSION Highlights of Features and Benefits

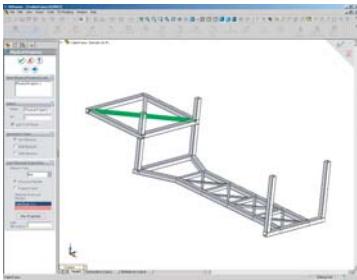
## A New Approach to Analysis & Simulation

NEiFusion represents a new approach to engineering analysis and simulation software. It is the first design, validation, and optimization solution that "fuses" technologies such as:

- ✓ 3D feature based, parametric CAD for **easy** model creation
- ✓ **Powerful** and robust features driven by customer requirements
- ✓ Industry proven Nastran solvers for **precise** solution generation
- ✓ A wide array of implementation options that are **efficient** in allowing your entire product development team to collaborate between departments, customers, vendors, and design partners
- ✓ Precedent setting, **affordable** price points that will enable wide usage throughout your organization.

### NEiFusion: *Easy*

NEiFusion is a breakthrough product fusing an easy to use, industry leading 3D solid modeling interface with a comprehensive element library, sophisticated meshing capabilities, and extensive material library. This fusion assures design professionals of lower learning curves- that translate into faster design cycles, and ultimately faster time to market.

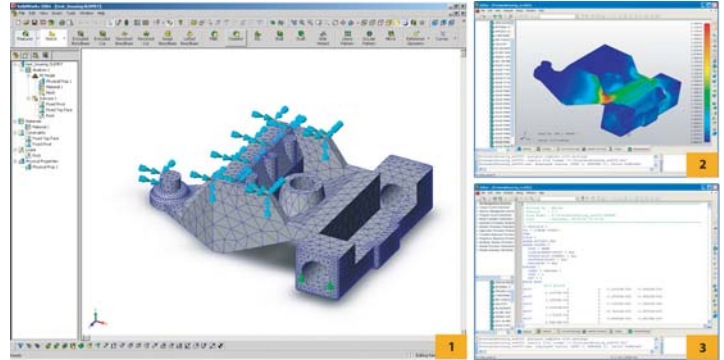


### NEiFusion: *Powerful*

NEiFusion's robust feature set allows users to explore a range of analysis methods including: linear statics, steady state heat transfer, modal, buckling, Prestress, dynamics, and nonlinear. Additionally, every NEiFusion user has our extended capabilities with assembly analysis, composite materials, surface contact, optimization, drop testing, and the ability to output to a Nastran bulk data file. This greatly promotes efficient workflow within organizations, and increases opportunities for consultants looking to expand their services into the automotive, aerospace, and maritime industries.

### NEiFusion: *Precise*

Nastran is the most widely used FEA software in the world. It has been proven over several decades and has become the established standard in aerospace, automotive and maritime industries. NEiNastran has achieved industry acceptance since 1991 because of the fidelity of its precise and accurate results.



NEiFusion gives designers easy-to-use embedded Finite Element Analysis (1 and 2), highly accurate simulation results, and is unique and forward looking in its ability to share this data with the world of NASTRAN analysts (e.g. NEi, NX, MSC) via the Bulk Data File (3).

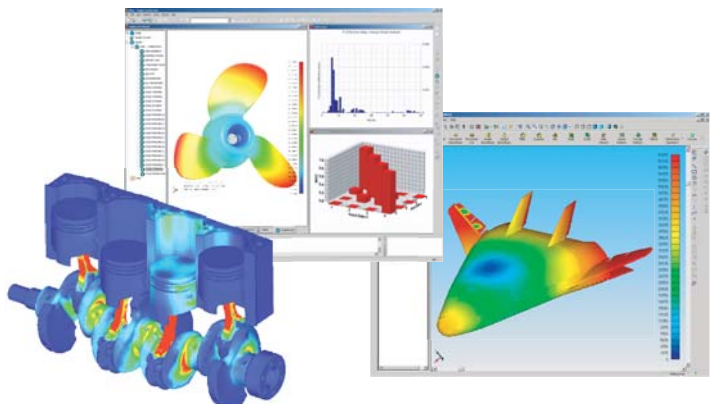
### NEiFusion: *Efficient*

NEiFusion is also unique because of its ability to create a collaborative work environment between designers and analysts, ultimately removing the traditional barriers between these groups. Designers can explore "what-if" scenarios easily with full associativity of FEA and CAD data and validate and optimize concepts. Models can be shared or passed off to analysts for more intensive examination using a portfolio of pre posts if necessary.

The Nastran bulk data file and option for unbundled solver use provides maximum efficiency in purchasing, sharing, and administration of software resources. This efficiency is extended to any design partners such as customers and/or vendors who utilize the Nastran standard.

### NEiFusion: *Affordable*

NEiFusion comes in Designer and Analyst version with a choice of solver packages. The Designer version provides our core validation tools at an affordable price point, while the Analyst version extends the power and flexibility of NEi Fusion to professional levels of fidelity and accuracy with the option of using unbundled solvers with other pre/post-processors (Patran, FEMAP, Hypermesh, etc.). You only pay for those tools you need.

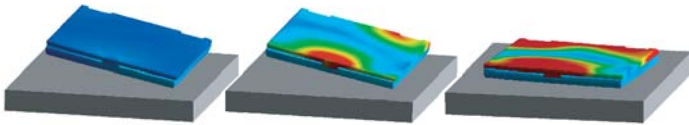


# NEiFusion Unique Capabilities

## Automated Impact Analysis Wizard and Drop Test

Impact analysis is an important consideration for a wide variety of product development projects from drop testing portable electronic products like laptop computers to assessing product packaging effectiveness. Automated Impact Analysis (AIA™) in NEiFusion is an exceptional simulation tool because it makes a complex analysis easy to do while retaining the complexity of the underlying physical phenomena that are present in impacts. The input is simple -- define projectile initial velocity and acceleration. Complexity is handled by NEiNastran solvers as they automatically setup surface contact between the projectile and part, determine the contact surface between the two, calculate the contact duration and time steps needed to capture an accurate nonlinear transient event, and determine the vibration characteristics of the colliding bodies. NEiNastran AIA can provide a thorough and physically realistic simulation of impact because it takes into account surface contact, time duration of impact, and the vibration characteristics of the colliding bodies. This is much more comprehensive and useful than a simplistic imposition of force at a point found in other impact or drop tests.

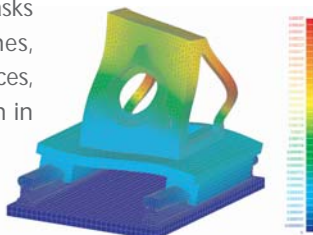
**Distinguishing Advantage: Physically realistic results because it accounts for inherent vibration in the colliding bodies.**



Automated Impact Analysis (AIA) can also be used as a virtual Drop Test. Example shown is for a laptop computer.

## Automated Contact Generation

Modeling contact in large complex structures like those that occur in ships, aircraft, and cars is very time consuming, labor intensive and prone to errors. NEiFusion has unique tools not found in traditional preprocessors that dramatically increase productivity for these type of products. Automated Surface Contact Generation (ASCG) and Automated Edge Contact Generation (AECG) simplify and speed up the tasks of connecting dissimilar meshes, unmatched nodes on different surfaces, and joining edges and surfaces, even in the presence of gaps and offsets.

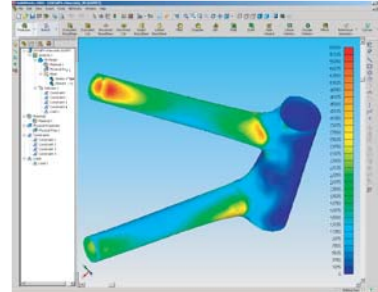


**Distinguishing Advantage: Unique tools not found in traditional preprocessors for dramatic productivity improvement in setting up contact in large complex structures.**

## Composites Capabilities

NEiFusion contains a suite of tools designed to bring engineering insight to the analysis of composites and laminated products and make the process straightforward and less time consuming. These include easy definition of ply lay-ups, plates and shell elements for composites, and an extensive list of supported failure theories.

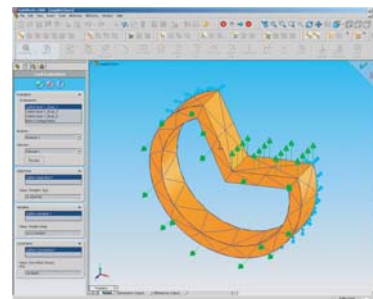
**Distinguishing Advantage: Suite of tools for composite part analysis.**



## Optimization Analysis

Designers need to be equipped with the latest and best technology to meet the demands of global competition. One of the many ways NEiFusion meets this need is with Optimization Analysis. For tough optimization problems that involve a number of complex and opposing parameters, Optimization Analysis developed by Red Cedar Technology is integrated in NEiFusion. NEiFusion users are able to assign design objectives to minimize, maximize or target variables like geometric data values, weight, eigenvalues, von Mises stress and temperature.

**Distinguishing Advantage: Professional level Optimization Analysis included in basic software package.**



## Professional Features for Visualizing and Communicating Results

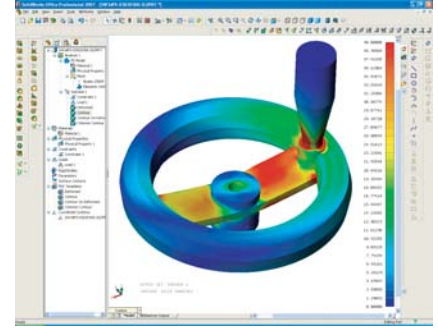
A wide number of features for post-processing, on-screen display enhancements and customizations, and an Analysis Report Writer assure that you can visualize and communicate your results in an effective and powerful manner.

**Distinguishing Advantage: Powerful graphic tools for results visualization and easy report writing.**

# NEiFUSION - Designer Configuration

## NEiFusion Designer

The Designer Configuration is the lowest price option for any NEiFusion software package. The low price is achieved by coupling the NEiFusion Modeler and your choice of either NEiNastran Basic Solver package or Expert Solver package so that they must be used together, that is, the NEiNastran solvers cannot be used with any other pre- or post-processors. If wider level analysis capabilities are ever needed, an upgrade option exists that enables conversion to the Analyst Configuration for unrestricted use of NEiNastran Solver capabilities with other pre/posts.



### NEiFusion Designer Configuration comes with the choice of Basic or Expert solver packages

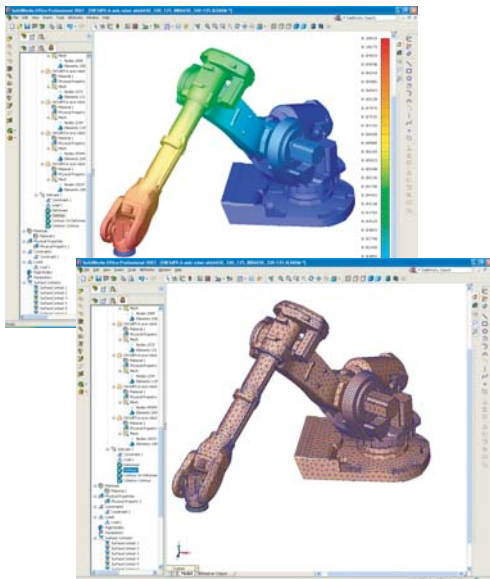
**Basic.** The Basic Solver suite is built on NEiNastran Solver Engines NE-L1 and NE-L2. Product Datasheets for each of these modules contains a full description. The Basic package provides analysis and simulation of Linear Statics, Modal Analysis, Buckling, Prestress, and Steady State Heat Transfer problems.

- ▶ NE-L1 (Linear Static, Steady State Heat Transfer)
- ▶ NE-L2 (Modal, Buckling, Prestress)

**Expert.** The Expert Solver suite is built on NEiNastran Solver Engines NE-L1, NE-L2, NE-L3, NE-L4 and NE-L5. Product Datasheets for each of these modules contains a full description. The Expert package includes all items in the Basic package and adds Advanced Dynamics, Nonlinear Analysis, and Transient Heat Transfer.

- ▶ NE-L1 (Linear Static, Steady State Heat Transfer)
- ▶ NE-L2 (Modal, Buckling, Prestress)
- ▶ NE-L3 (Advanced Dynamics) \*
- ▶ NE-L4 (Nonlinear Analysis)
- ▶ NE-L5 (Nonlinear Transient Heat Transfer) \*

\*Currently applicable through the Editor in the Analyst version. It will be fully added in NEiFusion V2.0.



### NEiNastran Basic Solver Package: Linear Statics, Modal, Buckling, Prestress and Heat Transfer

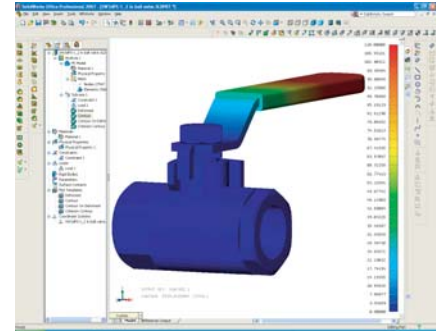
One of the most common types of analysis needed by design engineers is linear static analysis. By far, linear static structural analysis represents the majority of the analyses performed. NEiFusion Basic makes this type of analysis easy. Starting with your parametric part, loads and boundary conditions are applied using a series of pull down menus to define the force or pressure on the structure and the direction. Similarly, constraints are defined. The material is then selected from a material library or you can define a material by entering appropriate properties, including orthotropic materials and composites. The part is meshed automatically with provisions for manual control. Results can be displayed in a wide variety of formats from contour plots of stress, strain and displacement, to graphical outputs, tabular data listings, and animations. Context sensitive Help is available to assist you at every step.

In addition to structural analysis, NEiFusion Basic lets you perform heat transfer analysis providing temperature and heat flux plots. Modal analysis is also included which is used to reveal vibrations in structures. See the NEiFusion Product Chart for a complete listing of Analysis Types and Post-Processing capabilities of NEiFusion Basic and NEiFusion Expert.

# NEiFusion - Analyst Configuration

## NEiFusion Analyst

The Analyst Configuration delivers the NEiNastran Solvers L1-L5 as independent modules from the NEiFusion Modeler so they are available to work with any other pre- and post-processor. The Analyst Configuration arrangement is useful in environments where multiple pre/posts may be needed or are in use (e.g. FEMAP, Patran, HyperMesh, ANSA, and others). Also, the Analyst Configuration includes the NEiNastran Editor. The Editor module in NEiNastran enables additional post-processing capabilities, model data editing, and access to real time solution data.



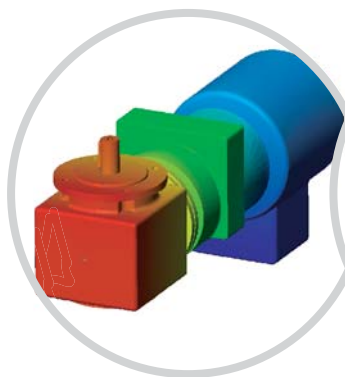
**Basic.** The Basic Solver suite is built on NEiNastran Solver Engines NE-L1 and NE-L2. Product Datasheets for each of these modules contains a full description. The Basic package provides analysis and simulation of Linear Statics, Modal Analysis, Buckling, Prestress, and Steady State Heat Transfer problems.

- ▶ NE-L1 (Linear Static, Steady State Heat Transfer)
- ▶ NE-L2 (Modal, Buckling, Prestress)

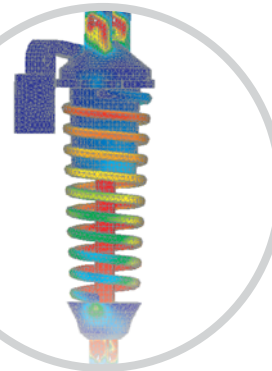
**Expert.** The Expert solver suite is built on NEiNastran Solver Engines NE-L1, NE-L2, NE-L3, NE-L4 and NE-L5. Product Datasheets for each of these modules contains a full description. The Expert package includes all items in the Basic package and adds Advanced Dynamics, Nonlinear Analysis, and Transient Heat Transfer.

- ▶ NE-L1 (Linear Static, Steady State Heat Transfer)
- ▶ NE-L2 (Modal, Buckling, Prestress)
- ▶ NE-L3 (Advanced Dynamics) \*
- ▶ NE-L4 (Nonlinear Analysis)
- ▶ NE-L5 (Nonlinear Transient Heat Transfer) \*

\*Currently applicable through the Editor in the Analyst version. It will be fully added in NEiFusion V2.0.



Introducing  
**ALL NEW**  
Professional,  
Affordable FEA  
for Engineers



**NEiFusion**

The Perfect Combination of  
Easy-to-Use Parasolids Based Modeler + Industry Preferred Nastran Solvers

## ✓ General Capabilities

- Full single-window integration between solid modeling and analysis
- Direct use of CAD geometry for analysis
- Direct application of analysis input data to CAD geometry
- 3D visualization of analysis results on original CAD geometry
- FeatureManager™ for geometry, analysis and result visualization data
- Customizable analysis tree
- Dynamic editing of all geometric and analysis features
- Powerful configuration management for easy “what if” design variations (geometrical and physical)
- Comprehensive support for bi-directional CAD data exchange with most major CAD packages
- Comprehensive, context-sensitive HTML-based help system and tutorials

## ✓ CAD Interoperability

- Native file translators to and from nearly all mechanical CAD products on the market today: SolidWorks®, Pro/ENGINEER®, IPT (Autodesk Inventor®), Mechanical Desktop®, Unigraphics®, PAR (Solid Edge®), CADKEY®, IGES, STEP, Parasolid®, SAT (ACIS®), VDA-FS, VRML, STL, DWG, DXF™, TIFF, JPG, Viewpoint, RealityWave, HSF (Hoops)
- Supported standards: ANSI, DIN, ISO, GOSJIS, GB and BSI

## ✓ Part Modeling

- Feature based, fully associative, parameterized solid modeling
- FeatureManager™ dynamic design tree (e.g. re-order, drag & drop, etc.)
- Integrated sketching (dynamic referencing)
- Extrudes, revolves, feature patterns, holes, etc.
- Advanced 3D operations, e.g. lofting, sweeping, complex blending, filleting, etc.
- Advanced shelling, midsurfaces
- Multi-body support
- Advanced surface modeling: lofts and sweeps with guide curves, fill-in holes, drag-handles for tangency control, etc.
- Trimming, extending, filleting, and knitting surfaces
- Translating, rotating, copying, and mirroring surfaces
- Support for creating 3D models from existing 2D data, e.g. 2D-to-3D extrusion, etc.
- Multiple design variations with Configuration Management, DesignTables

## ✓ Assembly Modeling

- Fully associative: referencing of other parts and maintaining relationships when creating new parts
- Complete range of mating conditions, snap-to-fit SmartMates™
- Locating conflicting mate relationships with Mate Diagnostics
- Dynamic assembly visualization
- Real-time previewing of components, parts
- Easy designing and changing of parts and subassemblies from within an assembly
- Mirrored components to create new parts and assemblies based on existing designs
- Multiple assembly design variations with Configuration Management for easy “what if” design scenarios

## ✓ Assembly Connectors

- True surface contact
- Automatic contact

## ✓ Meshing

- Global and local controls for part geometry with default sizing
- Mesh control on arbitrary user defined regions
- Sketch line or curve meshing
- Free surface meshing: quads or triangles
- Continuous shell (quad or tri) meshing
- Auto mesh, loads and constraints update with geometry changes
- Mesher Status Window

## ✓ Element Library

- 1D line (CBEAM and CBAR)
- 2D linear shell (CQUAD4 and CTRIA3)
- 2D parabolic shell (CQUAD8 and CTRIA6)
- 3D linear and parabolic tetrahedron (CTETRA)
- Composites with plates and shells
- Surface to surface contact with manual or automatic recognition of surfaces
- Rigid elements
- Conduction

## ✓ Loads and Boundary Conditions

- Uniform pressure and force on faces, edges and vertices
- Directional pressure and force
- Acceleration loads (gravity)
- Enforced displacement and rotations
- Temperature, default temperature and heat flux
- Symmetric, antisymmetric, axisymmetric boundary conditions
- Fixed constraints on faces, edges and vertices
- Directional and prescribed constraints
- Thermal constraints
- Thermal body loads
- Initial temperature conditions
- Custom colors and sizes for loads and constraints

## ✓ Material Properties

- Isotropic
- Orthotropic
- Nonlinear materials
  - Nonlinear elastic
  - Elasto-plastic
  - Plastic
- Hardening
  - Isotropic
  - Kinematic
  - Combined
- Yield
  - Von Mises
  - Tresca
  - Mohr-Coulomb
  - Drucker-Prager
- Custom stress-strain data

## ✓ Material Orientation

- Vector projection
- Curve tangent
- Rotated curve tangent
- Translated curve tangent
- Surface U and V directions

## ✓ Surface Contact

- Automatic surface contact generation
- Free and welded contact types
- Static friction
- Linear contact

## ✓ Coordinate Systems

- Cartesian, cylindrical and spherical coordinate systems
- Referencing global assembly, part or custom coordinate systems

## ✓ Analysis Types

- Linear statics
- Normal modes
- Linear buckling
- Nonlinear stress
- Thermal stress
- Prestress static
- Composite
- Contact analysis in assemblies
- Linear steady state heat transfer
- Optimization
- Modal transient response
- Direct transient response

## ✓ Composite Analysis

- Various failure theories supported:
  - Hill
  - Hoffman
  - Tsai-Wu
  - Max. stress
  - Max. strain
  - NASA LARC02

## ✓ Optimization Analysis

- Design objectives to minimize, maximize or reach target values
- Optimize weight, stress, temperature and natural frequency
- Parametrically update geometry dimensions

## ✓ Drop Testing Analysis

- Automatic impact wizard
- Acceleration and contact direction input
- Time stepping automatically calculated based on natural frequency

## ✓ Post-Processing

- Stress, deformation plots
- Principal and directional stress plot
- Strain plot
- Resonant frequencies, mode shape plots
- Temperature, heat flux plots
- Iso-surfaces
- Results across composite laminates
- Export Nastran input deck to other FEA systems
- Customizable material library
- Single and multi-set animations
- Max/min labels

## ✓ Report Generation

- HTML formatted reports for linear static analysis
- Customizable report format
- Step by step wizard for report generation process
- Includes standard model data

## ✓ Graphics

- OpenGL graphics taking advantage of the latest Computer Graphics chips
- 3D dynamic pan, zoom and rotation
- Hidden line and wireframe display
- Light source shading and transparency

## ✓ Compatibilities

- Nastran input file can be sent to any Nastran FE Solver including NEiNastran, NX Nastran, or MSC.Nastran.
- Binary results file in OP2 format usable by all Nastran solvers and wide variety of post-processors

## ✓ Language Support

- GUI: English, Japanese, Italian, French, others upon request
- Technical documentation: English

# Noran Engineering, Inc.

## USA HEADQUARTERS

Noran Engineering, Inc  
5555 Garden Grove Blvd., Ste 300,  
Westminster, CA 92683-1886, USA  
Phone: 1.714.899.1220  
Fax: 1.714.899.1369  
E-mail: [info@noraneng.com](mailto:info@noraneng.com)  
Website: [www.nenastran.com](http://www.nenastran.com)

## EUROPE

SmartCAE  
Piazza della Gualchierina, 9  
59100 Prato, ITALY  
Phone: +39.0.574.404.642  
Fax: +39.0.574.401.265  
E-mail: [info@smartcae.com](mailto:info@smartcae.com)  
Website: [www.smartcae.com](http://www.smartcae.com)

## UK/IRELAND

Epsilon Structural Analysis Ltd.  
Suite 9, Premier House  
Argyle Way, Stevenage  
Herts SG1 2AD  
UNITED KINGDOM  
Phone: +44.0.870.190.9431  
Fax: +44.0.870.190.9432  
E-mail: [info@epsilon-sa.com](mailto:info@epsilon-sa.com)  
Website: [www.epsilon-sa.com](http://www.epsilon-sa.com)

## ASIA/PACIFIC

Digital Solutions  
Kyoei Nakasuji Bldg, 3-7-18  
Nakasuji, Asaminami-ku  
Hiroshima, 731-0122, JAPAN  
Phone: +81.82.831.1190  
Fax: +81.82.831.1193  
E-mail: [post@digital-sol.co.jp](mailto:post@digital-sol.co.jp)  
Website: [www.digital-sol.co.jp](http://www.digital-sol.co.jp)

## SOUTH AMERICA

ComCAD  
Soluções em CAD / CAE / CAM  
Av. Afonso Pena,  
578 - 16º andar  
Centro - Belo Horizonte - MG  
Brasil 30130-001  
Phone: +55.31.3271.1840  
E-mail: [rossano@comcad.com.br](mailto:rossano@comcad.com.br)  
Website: [www.comcad.com.br](http://www.comcad.com.br)



NEi and the NEi logo are trademarks of Noran Engineering, Inc. NASTRAN is a registered trademark of NASA. All other trademarks are the property of their respective owners.  
Copyright © Noran Engineering, Inc. 2008. All rights reserved.