

# NEiWorks *for SolidWorks*

## Features

### Overview

NEiWorks provides SolidWorks users with an embedded finite element modeling tool. It features the familiar SolidWorks look and feel for all menus and functions, providing seamless integration between design and analysis. NEiWorks features true geometry associativity, which means your loads, boundary conditions and even meshes are updated interactively whenever changes are made in SolidWorks.

With NASTRAN being one of the most widely used solutions, SolidWorks users can now communicate their FEA data to most standard pre- and post-processors through support of the NASTRAN file format. This provides versatility to a product which is already easy to use and backed by the renowned NASTRAN solution.

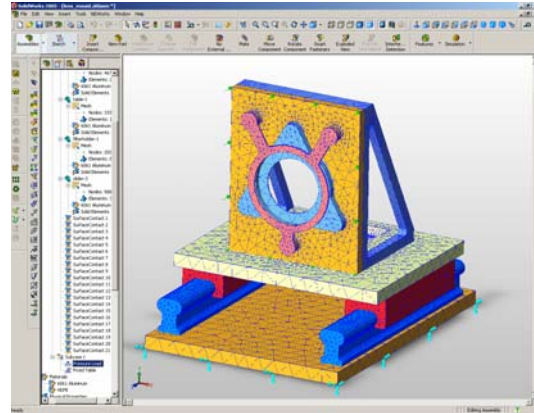
### Capabilities:

#### Model Geometry Access:

- Part geometry data is accessed directly through SolidWorks API
- Data accessed for finite element mesh generation and application of loads and boundary conditions
- Supports SolidWorks type surfaces, such as mid-surfaces and sheet metal
- Supports assembly analysis

#### Meshing:

- Global and local controls applied to 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 and progress bar
- Display/hide shell element normals
- Reverse normals for shell elements



#### Assembly Connectors:

- True surface contact
- Automatic contact
- Thermal contact resistance

#### 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
- Loads defined using edges

#### 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

#### Materials:

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

#### Material Orientation:

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

#### Properties:

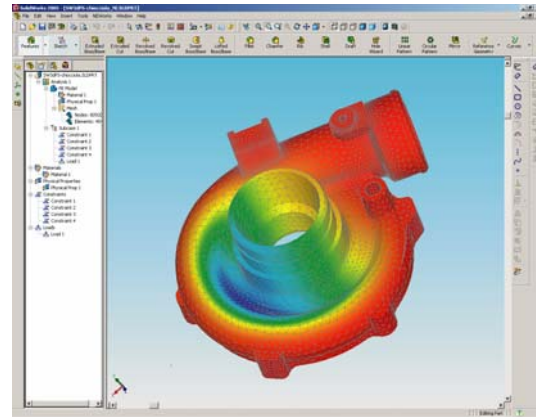
- 1D beam (PBEAM) and bar (PBAR)
- 2D plate (PSHELL) and composite (PCOMP)
- 3D solid (PSOLID)
- Contact (BSCONP)

#### Surface Contact:

- Automatic surface contact generation
- General, welded, slide, rough, offset weld and RBE3 element contact types
- Static friction

#### Coordinate Systems:

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



#### User Interface:

- Seamless integration with SolidWorks GUI
- Menu support for all features
- Modern tree view layout
- Query display of real time information on nodes and elements
- Highlight specific nodes and elements on the model
- Total number of nodes/elements displayed in assembly tree
- Section view for parts and assemblies
- Dynamic update of loads, constraints, and rigid bodies

#### 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:

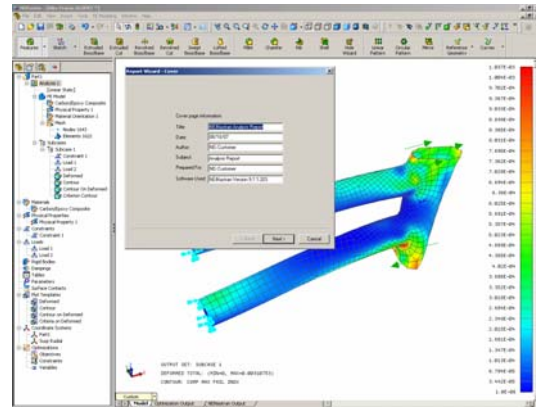
- Automatic impact wizard
- Acceleration and contact direction input
- Time stepping automatically calculated based on natural frequency

### 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
- Partial results generation for modal and transient analysis types
- Export Nastran input deck to other FEA systems
- Customizable material library
- Output within SolidWorks view with sensitive Help and analysis control, such as pausing and solution termination
- Import results using FEMAP Binary Neutral file format (FNO)
- Single and multi-set animations
- Max/min labels
- Results processed on selected parts of assemblies
- Dynamic result data display during nonlinear analysis
- Loads and constraints shown on deformed plots

### 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
- Multi-view display of Part/Assemblies

### Direct Matrix Input Grid (DMIG) Support (Analyst version only):

- Stiffness matrix import and export
- Conductivity matrix import and export
- Mass matrix import and export
- Load vector import and export

### Global Matrix Output (Analyst version only):

- Stiffness matrix
- Conductivity matrix
- Mass matrix

### Model Reduction (Analyst version only):

- Static condensation
- Export reduced stiffness matrix using DMIG format
- Automated model reduction tools and correction
- Export reduced mass, stiffness, damping, and load matrices to DMIG or NASTRAN Output2 (.OP2)
- Craig-Bampton reduction (component modes synthesis)

### Modal Correlation (Analyst version only):

- Modal assurance criterion (MAC) output and 3D plots
- Model cross-orthogonality output and 3D plots

- MS Excel comma separated variable (.CSV) and NEiNastran modal database (.MDB) input formats
- Automatic interpolation of input data to closest grid

**Editor (Analyst version only):**

- Fully integrated and customizable Nastran Editor controls program operation and provides results summary data through an easy to use GUI
- Features tabbed windows to give immediate access to all input and output files
- Field markers make manual editing simple and increase productivity dramatically
- Complete online documentation and context sensitive help
- Tabular results listing
- Detailed HTML report customization
- Single and multi-load set animations
- Interactive data query with mouse
- Parameter setup and control
- Real time control of solution parameters
- Real time 2D x-y plotting and 3D deformed shape and contour plotting
- Batch job queuing system
- Graphical nonlinear convergence form displays nonlinear work, load, and displacement convergences in percent complete bar format
- Configuration trade study generator automatically generates queued models with user specified design variable changes such as thickness or dimension for design sensitivity analysis
- Real time deformed shape results contour displays with automatic updating for nonlinear static and transient solutions
- Real time results x-y plot support at min/max and user specified models locations with automatic updating for nonlinear static and transient solutions
- Export x-y plots to MS Excel Comma Separated Variable (.CSV) file format
- 3D vertical bar plot support for Modal Assurance Criterion (MAC) and Modal Cross Orthogonality (MXO)
- User defined settings can be customized and saved for different solution types
- Special input forms for classified DDAM data allows models to run in an unclassified environment

- Parabolic shell to linear shell element converter

**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
- Part and Assembly geometry is fully compatible with SolidWorks' Parts and Assemblies

**International Languages:**

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

**System Requirements:**

- Intel Pentium® 4 or AMD Athlon™ based PC
- 512 MB RAM minimum, more recommended
- 1.5 GB free hard disk space for installation, more required for simulation models
- Microsoft Windows XP® Professional, Vista 32-bit and 64-bit

**NEi Software, Inc.** is committed to the success of our customers. Detailed documentation, customized on-site training, and comprehensive technical support ensures that you will see immediate return on your investment.

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