

# NEi Fusion™

## Features

### Overview

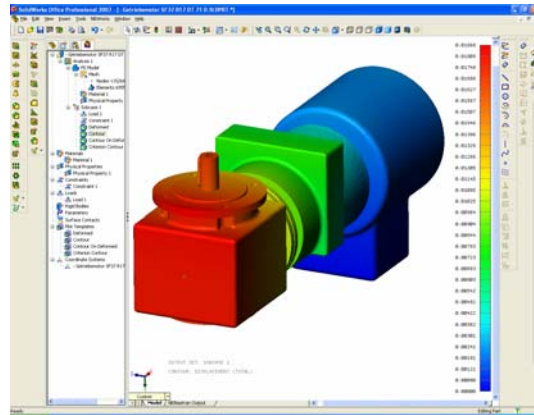
NEi Fusion combines a FEM Modeler with comprehensive pre- and post-processing capabilities, and NASTRAN Solvers. Parts and assemblies can be analyzed for a wide spectrum of static, dynamic, and thermal loading. NEi Fusion features true geometry associativity, composite elements, custom coordinate systems and nonlinear analyses for plasticity and true surface to surface contact.

With NASTRAN being one of the most widely used solutions, NEi Fusion users can now communicate their 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:

#### General:

- Full single-window integration between solid modeling and analysis
- Full support of Windows® functions such as drag-and-drop, point-and-click, and cut-and-paste
- Dynamic viewing (zoom, pan, rotate, sectioning) by mouse or advanced 3D pointing devices
- Toolbars for fast access to main functionality
- Flexible model coloring and transparency control (parts, assemblies, single or groups of faces, etc.)
- 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
- OpenGL graphics taking advantage of the latest Computer Graphics chips

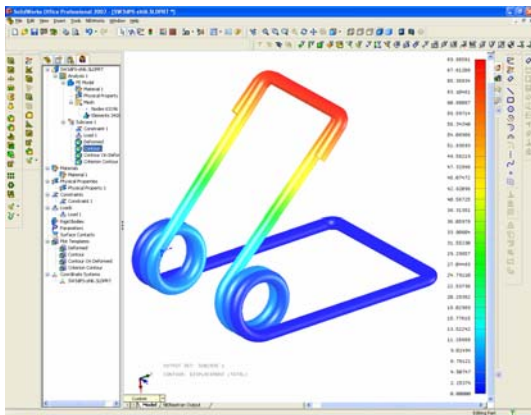
#### CAD Interoperability:

- 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)
- Support of seamless integrated third-party bi-directional file translators, e. g. for CATIA®, Pro/ENGINEER®, etc.
- 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.)

- In-place editing
- 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
- Multiple sub-assembly support
- Design-in-the-context of an assembly (references to other geometry, associative relationships, direct/indirect constraints)

- 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

### 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 and progress bar
- Display/hide shell element normals
- Reverse normals for shell elements
- Mesh validation checks - distortion, Jacobian, and skew
- Display/hide beam element orientation and direction
- Display/hide beam element and shell element cross-section
- 1D element cross-section property definition
- Combined shell (2D) and beam (1D) meshing

### 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 motions: acceleration, velocity, displacement (rotational/translational)
- 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
- Convection
- Conduction
- Radiation
- Heat generation
- Rotational velocity / acceleration
- From output (thermal)
- Load variation using arbitrary 3D scale factors

#### **Element Library:**

- 1D line (CBEAM, CBAR, CPIPE)
- 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
- Concentrated mass
- Connectors:
  - Spring (CBUSH)
  - Rigid elements
  - Rod (CROD)
  - Nonlinear cable

#### **Materials:**

- Isotropic
- Anisotropic (2D & 3D)
- Orthotropic (2D & 3D)
- Nonlinear materials
  - Nonlinear elastic
  - Elasto-plastic
  - Plastic
- Hardening
  - Isotropic
  - Kinematic
  - Combined
- Yield
  - Von Mises
  - Tresca
  - Mohr-Coulomb
  - Drucker-Prager
- Custom stress-strain curve
- Hyperelastic
  - Neo-Hookean
  - Mooney-Rivlin
  - Ogden
  - Yeoh
  - Generalized polynomial

- Temperature dependent property support

#### **Material Orientation:**

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

#### **Properties:**

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

#### **Surface Contact:**

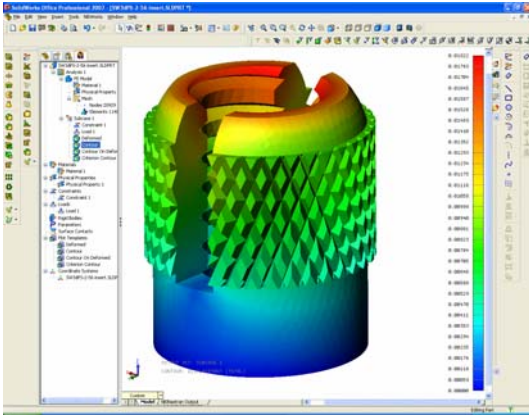
- Automatic surface contact generation
- General, welded, slide, rough, offset weld and RBE3 element contact types
- Static friction

#### **Analysis Types:**

- Linear statics
- Normal modes
- Linear buckling
- Nonlinear static
- Thermal stress
- Prestress static
- Composite
- Contact analysis in assemblies
- Linear steady state heat transfer
- Optimization
- Modal transient response
- Direct transient response
- Direct frequency response
- Modal frequency response
- Nonlinear steady state heat transfer
- Nonlinear transient heat transfer
- Nonlinear 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
- Parametrically update geometry dimensions
- Optimize weight, stress, material properties, temperature, eigenvalue, plate and laminate properties thickness

### Drop Testing Analysis:

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

### Coordinate Systems:

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

### 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 NEi Fusion Modeler view with sensitive Help and analysis control, such as pausing and solution termination

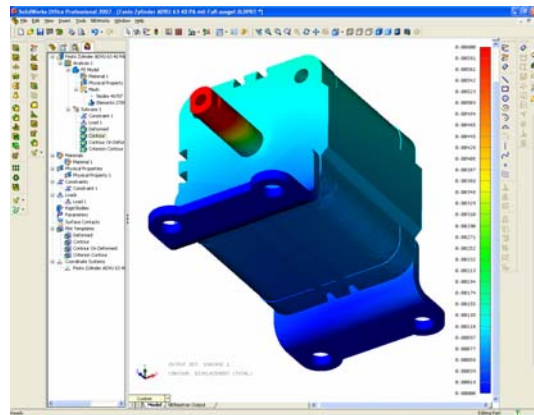
- Import results using Femap Binary Neutral file format (FNO)
- Single and multi-set animations
- Max/min labels
- Results processed on selected parts of assemblies
- Dynamic result data display during nonlinear analysis
- Loads and constraints shown on deformed plots
- XY plot capability
- Section cut capability

### Report Generation:

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

### Compatibilities:

- Part and Assembly geometry is fully compatible with SolidWorks' Parts and Assemblies
- Nastran input file can be sent to any Nastran FE Solver including NEi Nastran, NX Nastran, or MSC.Nastran
- Binary results file in OP2 format usable by all Nastran solvers and wide variety of post-processors



### User Interface:

- Menu support for all features
- Toolbar shortcuts
- 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

**International Languages:**

- GUI: English, Japanese, Italian, French
- Technical documentation: English

**System Requirements:**

- Intel Pentium® 4 or AMD based PC as a minimum, Intel Core™ i7, Xeon, AMD Opteron recommended
- 1 GB RAM minimum, more recommended
- 4 GB free hard disk space for installation, more required for simulation models
- Microsoft Windows XP® Professional with SP2 or greater, Vista Ultimate, Business and Enterprise editions, Windows 7 Professional, Ultimate and Enterprise, 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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NEi Fusion

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