# NEi Nastran in-CAD™

Features

Overview

NEi Nastran in-CAD 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 Nastran in-CAD 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 Nastran in-CAD 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:

Unique Methodologies:

- Innovative Part Design, Intuitive feature history with flexible design intent
- 3D Dynamic Modeling, Mixed feature based and direct editing design
- Single scene part and assembly environment
- IntelliShape™ Handled based design editing
- IntelliShape Modeling Intelligence, Advanced modeling settings connected to features
- SmartSnap™ Technology enabling automatic catching to existing geometry
- SmartAssembly® Technology for automatic positioning, sizing, and orientation of parts, and assemblies
- DesignVariation™ parametric and property configurations at any part, feature, and assembly level
- TriBall® advance positioning and operation tool
- Catalog based design environment for drag and drop design
- IntelliStretch™ dynamic resizing for assemblies/parts
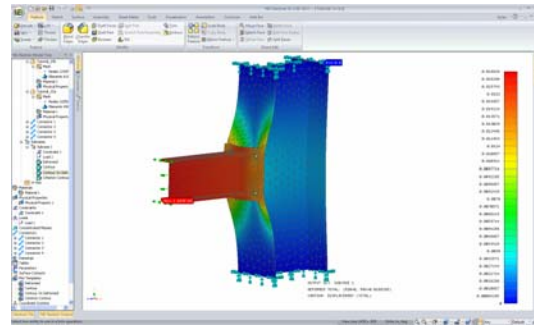
- Dual Kernel Support and Kernel collaboration (ACIS and Parasolid)
- Support both top-down and bottom-up design process

CAD Interoperability:

- Native file translators to and from nearly all mechanical CAD products and graphical applications on the market today: CATIA® V4 & V5, SolidWorks®, Pro/ENGINEER®, IPT & IAM (Autodesk Inventor®), Unigraphics®, IGES, STEP, X_T (Parasolid®), SAT (ACIS®), VRML, STL, DWG, DXF™, EXB (CAXA DRAFT), TIFF, JPG, PNG, TGA, BMP, EPS, HSF (Hoops), 3DS (3D Studio), POV-Ray, Raw, Romulus, TrueSpace, OBJ (Wavefront), 3D PDF
- Supported standards: ANSI, DIN, ISO, JIS, and GB

Part Modeling:

- Feature based, parameterized solid modeling
- Scene Browser dynamic design tree (e.g. re-order, drag and drop, etc.)
- Property Browser direct input and context based actions
- Quick Access contextual pop-up hotkey commands for in-place design creation
- In-place editing of features, parts, and faces
- History Independent referencing to part geometry
- Integrated sketching with dynamic optional constraints

- Extrudes, revolves, feature patterns, holes, etc.
- Advanced 3D operations, e.g. lofting, sweeping, complex blending, chamfering, etc.
- Advanced shelling, trim operations, and Boolean operations
- Catalog based functional features, e.g. Custom Holes, Fasteners, Gears, Bearing, etc.
- Direct Face modification support for native features and imported data
- Support for creating 3D models from existing 2D data, e.g. 2D-to-3D extrusion, etc.
- Multiple design variations with Configuration Management support
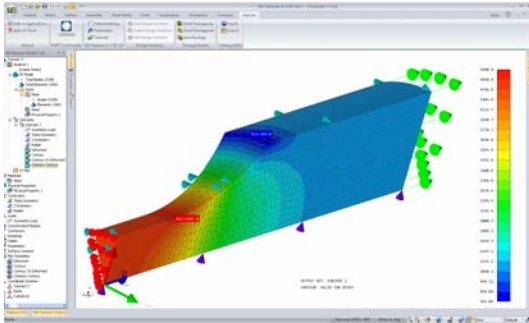
Assembly Modeling:
- Flexible Assemble and Disassemble support
- Complete range of mating conditions, snap-to-fit SmartAssembly® Technology
- Cross parent constraint relation support
- Real-time Collision Detection and Interference Checking
- Multiple sub-assembly support
- Easily design-in-the-context of an assembly
- 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
- Statistical analysis support for mass, center of gravity, and moments of inertia

Communication:
- Photo-Realistic real-time realistic settings with Image export

- Advance Photo-Realistic Rendering Engine
- Drag and Drop color and image capabilities
- Drag and Drop animation support
- Key Frame animation manipulation and advance animation positioning with TriBall
- 3D E-mail Package builder for sharing
- Web Publishing for project review and communication
- Free 3D IC-Viewer

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
- 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
- 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

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 Nastran in-CAD 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 Iron-CAD's 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
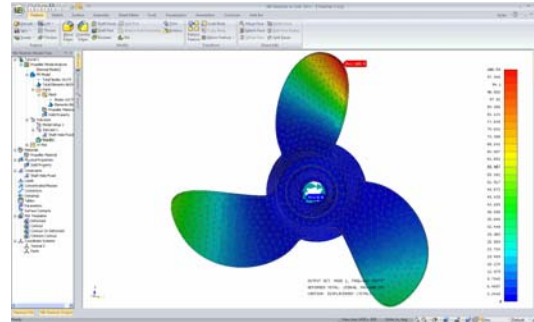
User Interface:
- Menu support for all features
- Toolbar shortcuts
- Modern tree view layout
- Query display of real time information on nodes and elements
- Highlight specific nodes and elements on the model
- Total number of nodes/elements displayed in assembly tree
- Section view for parts and assemblies
- Dynamic update of loads, constraints, and rigid bodies

International Languages:
- GUI: English
- German in NEi Nastran in-CAD Product Update 1 (PU1)
- Other languages by request
- 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.

For more information about our company or our products, please contact:

Headquarters:
NEi Software, Inc.
5555 Garden Grove Blvd., Suite 300
Westminster, CA 92683-1886
USA
Phone: +1.714.899.1220
Fax: +1.714.899.1369
Email: info@neisoftware.com
Website: www.NEiSoftware.com

Europe:
NEi Software EMEA Office
The Old Barrel Store
Draymans Lane, Marlow
Buckinghamshire, SL7 2FF
United Kingdom
Phone: +44.0.1628.400.645
Fax: +44.0.1628.891.701
E-mail: emea@neisoftware.com
Website: www.NEiSoftware.com/emea

Asia:
NEi Software Asia Office
Shinjuku Park Tower
N30th Floor 3-7-1 Nishi-Shinjuku
Shinjuku-ku, Tokyo, 163-1030
Japan
Phone: +81.03.5326.3062
Fax: +81.03.5326.3001
E-mail: asia@neisoftware.com

NEi Nastran in-CAD
From NEi Software, Inc.