

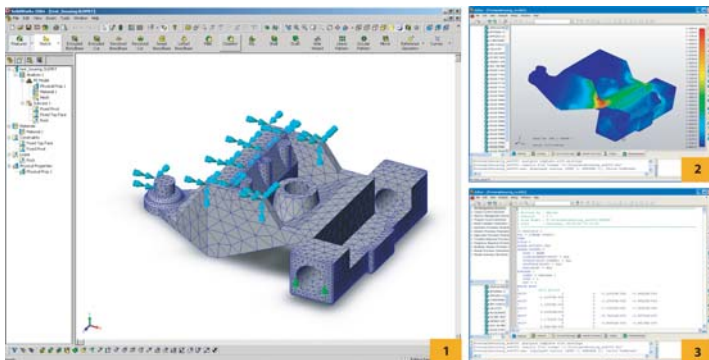
NEiWorks Overview

High Performance Embedded Nastran FEA for SolidWorks.

Nastran Finite Element Analysis (FEA)

As a SolidWorks® user, you appreciate the ease-of-use, integration, productivity and communication tools that let you produce high quality, accurate designs and get them to market faster. Similarly, you want your FEA software to provide the same benefits in the area of engineering analysis and simulation. You want to gain insight into different aspects of your design -- structural, thermal, dynamic, and verify critical design elements on your desktop before you commit resources to expensive and time consuming prototypes and test programs.

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. However, for most of its history, Nastran FEA has been a tool confined to high end analysis in very large corporations because of the cost and sophistication of the hardware and software. Now Noran Engineering, Inc. (NEi) has developed a product strategy that allows Nastran FEA technology to move in a different direction making it affordable, easier to use, and accessible to a much wider engineering and design community.

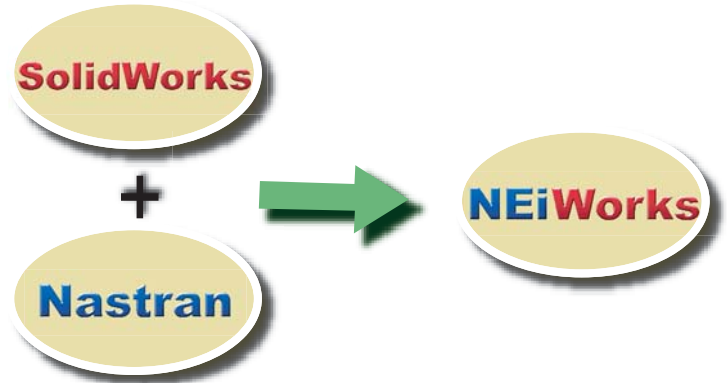


NEiWorks not only gives SolidWorks designers easy-to-use embedded Finite Element Analysis (1 and 2) but is unique and forward looking in its ability to share this data with the world of NASTRAN analysts (e.g. NEi, NX, MSC) via the Bulk Data File (3).

Recognized, Powerful, Affordable Nastran FEA

Introduced in December 2004, NEiWorks has received recognition from NASA Tech Briefs magazine, being named as a finalist in its Product of the Year Competition. Desktop Engineering magazine also picked NEiWorks in its Editor's choice. NEiWorks has also received SolidWorks Solution Partner status.

Most importantly, SolidWorks users will find NEiWorks extremely affordable because it can be purchased in a configuration that matches their work environment. For example, network installations can benefit from sharing solvers over multiple users with multi seat discounts. NEiWorks comes in Basic or Expert versions with affordable maintenance and upgrade options.



NEiWorks, Embedded Nastran FEA for SolidWorks

NEiWorks is a breakthrough product. Embedded in SolidWorks, NEiWorks is able to integrate all the comprehensive high end FEA capabilities of NEiNastran with 3D solid modeling. NEiWorks retains the same look-and-feel, menu, and tree type structures of SolidWorks. Users experience the familiar environment and ease of use they have come to expect while getting a comprehensive range of new engineering analysis capabilities. With NEiWorks you can start with linear statics and move up to highly advanced nonlinear and transient analysis or virtual simulation of structural, thermal and dynamic problems. Plus, NEiWorks can share results with the entire community of Nastran users, like NEi, NX and MSC using text files for input data and results via standard OP2 format - an important consideration if you need to work with customers, suppliers or design partners using Nastran.



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✓ Model Geometry Access

- Part geometry data is accessed directly through SolidWorks API
- Support for assemblies
- Data accessed for finite element mesh generation and application of loads and boundary conditions

✓ Meshing

- Global and local controls applied to part geometry with default sizing
- Free surface meshing: quads or triangles
- Automatic solid meshing with tetrahedral elements
- Model can have simultaneous shell and solid meshes

✓ Loads and Boundary Conditions

- Specified on part geometry
- Nodal forces and moments
- Pressure loads
- Gravity and centrifugal loads
- Thermal loads
- Heat flux
- Rotational acceleration and velocity
- Single and multipoint constraints
- Symmetric, antisymmetric, axisymmetric boundary conditions

✓ Material Properties

- Isotropic
- Orthotropic
- Anisotropic
- Composite
- Temperature-dependent

✓ User Interface

- SolidWorks look and feel
- Seamless integration with SolidWorks GUI
- Modern tree view layout

✓ Element Library

- 3D solid: tetrahedron both linear or parabolic
- 2D shell: quadrilateral and triangular plates, membranes, shells

✓ Analysis

- Linear Static Analysis
- Inertial Relief
- Buckling Analysis
- Natural Frequencies and Mode Shapes
 - Constrained, unconstrained, and rigid body
 - Modal participation factors
 - Modal reaction forces
 - Effective mass and percent effective mass
 - Extremely fast blocked Lanczos and subspace method

- Prestress in modal and static solutions
- Mass Properties Analysis
- Thermal Stress and Deflection Analysis
- Temperature dependent materials in all solutions
- Steady State Heat Transfer
- Composite laminate materials supported in all solutions
- Nonlinear analysis including large displacement/rotation, material nonlinear, and surface contact
- Transient and Frequency Response

✓ Results

- Deformations, animations, and vector displays
- Filled color contours and criteria displays
- Results across composite laminates
- Extensive result sorting capabilities
- XY-plots with multiple curves
- Text reports: standard and user-customized
- Interactive data query with mouse
- Import/export in comma separated tables
- Save animations with animated GIF support
- Save plots as BMP or JPEG

✓ Graphics

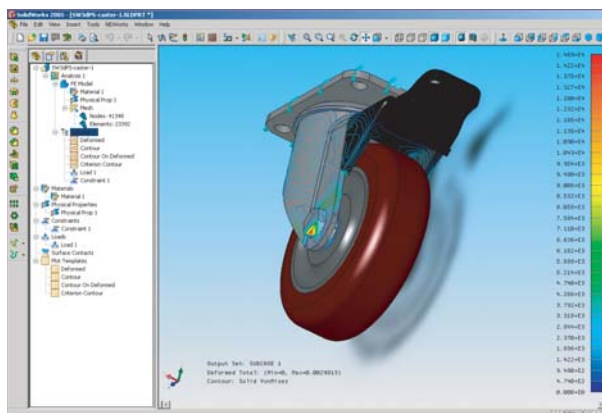
- OpenGL graphics taking advantage of the latest Computer Graphics chips
- 3D dynamic pan, zoom and rotation
- Hidden line and wireframe display
- Free edge and free face display
- Light source shading and transparency

✓ Editor

- 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
- Permits batch queuing of jobs for sensitivity and configuration trade studies

✓ Compatibilities

- Nastran input file can be sent to any Nastran FEA 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



	NEiWorks Basic	NEiWorks Expert
Geometry		
Part Analysis	✓	✓
Assembly Analysis	✓	✓
Thin Parts, Sheetmetal Parts, Shells	✓	✓
Beams, Trusses	✓	✓
Rods	✓	✓
Meshing		
Mesh Control on Arbitrary User Defined Regions	✓	✓
Mesher Status Window	✓	✓
H-element Adaptive Mesh Convergence Based on Stress	✓	✓
Analysis Types		
Linear Statics	✓	✓
Nonlinear Stress		✓
Thermal Stress	✓	✓
Prestress	✓	✓
Initial Strain		✓
Inertia Relief	✓	✓
Model Reduction (substructuring)		✓
Nonlinear Event Simulation		✓
Composite	✓	✓
Linear Dynamics		✓
Linear Buckling	✓	✓
Nonlinear Buckling		✓
Contact Analysis in Assemblies	✓	✓
Heat Transfer	✓	✓
Temperature Dependent Materials		✓
Temperature, Point Loads, Displacements, Pressure Interpolation	✓	✓
Drop Test		✓
Aeroelastic	✓	✓
Optimization	+	+
Fluid Flow	+	+
Motion Simulation	+	+
Loads and Constraints		
Uniform Pressure and Force on Faces	✓	✓
Fixed Constraints on Faces	✓	✓
Directional and Non-uniform Pressure and Force	✓	✓
Force on Edges and Vertices	✓	✓
Body Loads	✓	✓
Centrifugal Loads	✓	✓
Torque, Remote and Bearing Loads	✓	✓
Fixed Constraints on Edges and Vertices	✓	✓
Directional and Prescribed Constraints	✓	✓
Radiation, Convection, Heat Power		✓
Assembly Connectors		
Springs	✓	✓
Rigid Element	✓	✓
Thermal Contact Resistance	✓	✓
Post Processing		
Stress, Deformation, Displacement Plot	✓	✓
Factor of Safety Calculation and Plot	✓	✓
Principal and Directional Stress Plot	✓	✓
Strain Plot	✓	✓
Tabular Results Listing	✓	✓
Resonant Frequencies, Mode Shape Plots	✓	✓
Temperature, Heat Flux Plots	✓	✓
HTML Report	✓	✓
Single and Multi-set Animations	✓	✓
Detailed HTML Report Customizations	✓	✓
Save as Bitmap, JPEG, VRML, XGL	✓	✓
Export to other FEA Systems	✓	✓
Customizable Material Library	✓	✓
Parameter Setup and Control	✓	✓
Program Control		
Editor	✓	✓
Batch Job Queuing System	✓	✓
Full Model Parameter Control	✓	✓

✓ = Currently Available + = Add On

NEiWorks Basic

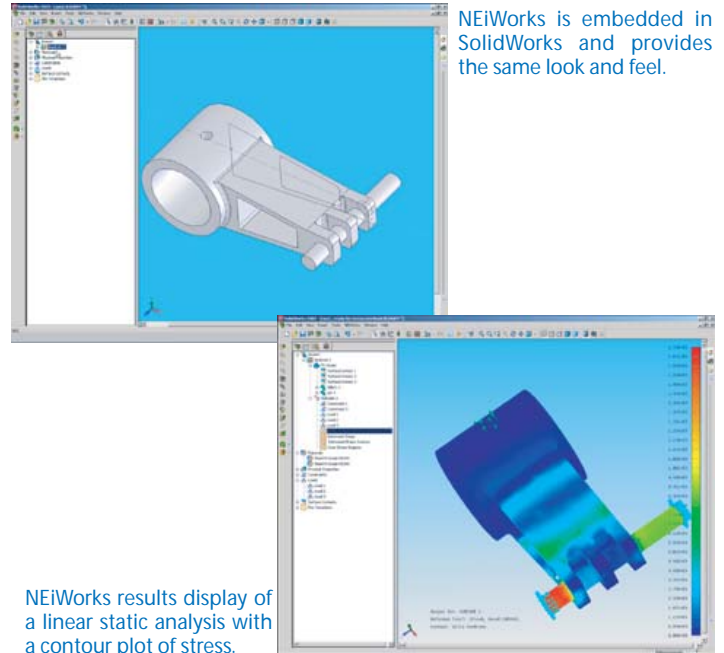
High Performance Embedded Nastran FEA for SolidWorks.

NEiWorks Basic, embedded Nastran FEA for SolidWorks®

NEiWorks Basic is a true Nastran Finite Element Analysis (FEA) Program embedded into the SolidWorks solid modeling program. You can carry out FEA on SolidWorks parts and assemblies from within the SolidWorks environment. NEiWorks Basic is fully integrated, uses the SolidWorks geometry engine, and provides the same look and feel as the host SolidWorks program, via an identical menu and tree type structure. NEiWorks Basic has received Solution Partner status.

Easy to learn and use, covers the major analyses types

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. NEiWorks Basic makes this type of analysis easy to do. Starting with your SolidWorks 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.



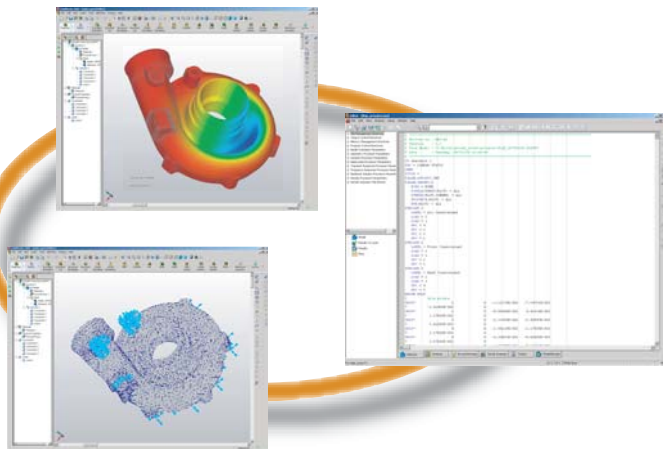
NEiWorks is embedded in SolidWorks and provides the same look and feel.

NEiWorks results display of a linear static analysis with a contour plot of stress.

In addition to structural analysis, NEiWorks 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 NEiWorks Product Chart for a complete listing of Analysis Types and Post Processing capabilities of NEiWorks Basic and NEiWorks Expert.

Saves Time and Money, Connects You with Customers and Design Partners

NEiWorks Basic lets you graduate from hand calculations, eliminate successive rounds of prototypes and testing, explore design alternatives, and verify your engineering judgments. Plus, a major feature of NEiWorks - you will be able to pass your work on to a large established base of analysts who use NEiNastran, NX Nastran and MSC.Nastran. This can be a key business consideration in allowing you to easily communicate and work with potential customers, suppliers, or design partners.



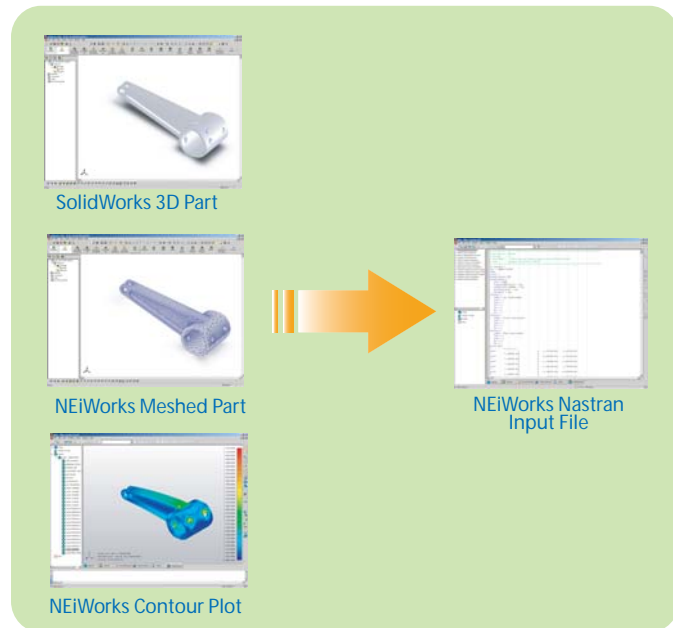
NEiWorks lets you pass your FEA results to all other Nastran users using common file formats.

NEi
Nastran
Customer Driven Solutions

NEiWorks Expert

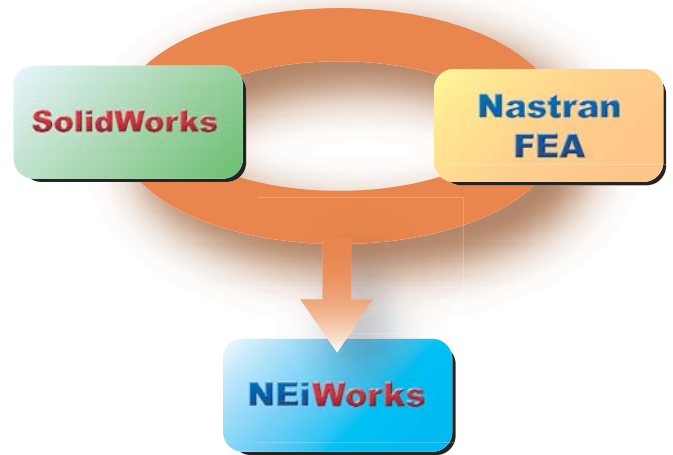
NEiWorks Expert, the power of Nastran FEA Solvers combined with SolidWorks® ease of use

NEiWorks Expert brings high end Nastran FEA to SolidWorks users and to experienced Nastran analysts who are looking for the next generation in innovative pre and post processing capabilities. NEiWorks Expert integrates the solid geometry capabilities of SolidWorks with the accuracy, speed, and power of NEiNastran solvers to give users an FEA environment that eliminates time consuming and frustrating associated tasks like geometry cleanup and remeshing for part changes allowing more time for true analysis and simulation work. Plus, a major feature of NEiWorks - you can pass your work on to the large established base of analysts who use NEiNastran, NX Nastran and MSC.Nastran. This can be a key business consideration in allowing you to easily communicate and work with potential customers, suppliers, or design partners.



A full complement of high end analysis types and features

NEiWorks Expert builds on the linear, modal, and steady state heat transfer capabilities of NEiWorks Basic by adding linear dynamics and nonlinear capabilities for stress, strain, buckling, and event simulation. For thermal problems, temperature dependent materials, radiation, convection, and heat power are included. Plus NEiWorks Expert includes Drop Test analysis and Model Reduction capabilities. See the NEiWorks Expert Product Chart for a complete listing of Analysis Types and Post Processing capabilities.



NEiWorks Expert also includes a number of features that will appeal to experienced Nastran FEA analysts. The 3D Surface Contact capabilities greatly simplify this type of commonly needed analysis. The industry unique Editor feature boosts productivity, saves time and frustration in setting up solutions and simplifies problem set-up by providing control of program operation, model editing, trade off study generation, and results analysis. NEiWorks' Cause, Action, Remarks formatted error and warning messages make it easy to diagnose and quickly correct model errors. It is a welcomed change from cryptic and obscure error messages that can make software frustrating and unnecessarily difficult.

Connection with the Nastran community, at an affordable price

NEiWorks Expert will give you entry to the large established base of analysts who use NEiNastran, NX Nastran and MSC.Nastran allowing you to more easily communicate with potential customers, suppliers, or design partners. This is a great way to break down barriers between design and analysis functions, improve communication, shorten design cycles and connect with valuable business partners. Additionally, NEiWorks is highly affordable. You get the most FEA for your budget with discounts for multiple seat installations, the ability to share solvers in network installations, and the ability to run SolidWorks simultaneously with the NEiNastran solver.