

# NEi Nastran

## Module NE-L5 (Nonlinear Steady State and Transient Heat Transfer)

### Overview

The Advanced Heat Transfer package adds nonlinear steady state and transient heat transfer to the impressive array of Nastran capabilities. Support is provided for both 2D and 3D models using solid, shell, and line element types. The heat transfer solver is fully integrated into NEi Nastran allowing heat transfer models to also be used for structural analysis. Thermal loading from a heat transfer solution is generated automatically allowing thermal stress analysis to be performed directly following a heat transfer run (multi-physics capability).

### Capabilities:

#### Solutions:

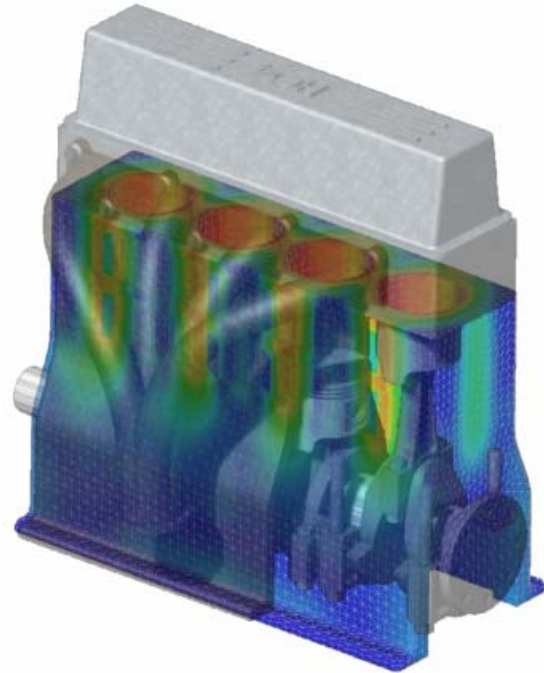
- Steady State Heat Transfer
  - Linear (Available with NE-L1)
  - Nonlinear
- Transient Heat Transfer
  - Linear
  - Nonlinear

#### Conduction:

- Temperature-dependent
  - Conductivity
  - Specific Heat
  - Internal heat generation
- Time-dependent internal heat generation
- Anisotropic thermal conductivity
- Contact element support (gap, slide line, surface to surface)
- Composites

#### Free Convection:

- Temperature-dependent heat transfer coefficient
- Time-dependent heat transfer coefficient
- Spatial-dependent heat transfer coefficient
- Nonlinear functional forms



#### Radiation:

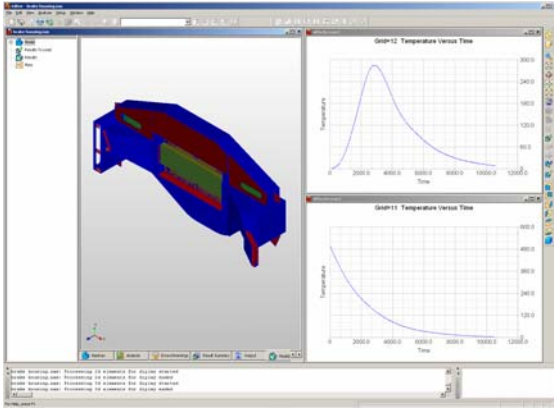
- Temperature-dependent
  - Emissivity
  - Absorptivity
  - Time-dependent exchange

#### Boundary Conditions:

- Specified constant temperatures for steady state analysis
- Specified time-dependent temperatures for transient analysis
- Initial starting temperatures for nonlinear steady state analysis
- Initial starting temperatures for all transient analysis

#### Initial Conditions:

- Starting temperatures for nonlinear steady state analysis
- Automatic initial temperature correction
- Starting temperatures for all transient analysis



#### Output Features:

- Results measures include: heat fluxes, thermal gradients, temperatures, enthalpies, global conductivity matrixes, solution and mesh error estimates, element and grid point results
- Automatic and user definable measure sorting for handling multiple load case results
- Powerful grid and element set generator for generating sets that can be used to control output, define measure coordinate systems, generate grid point temperatures, and define measure sort commands
- Shell and solid element corner stress and strain output
- Element and grid point heat flux and thermal gradients can be output in any coordinate system including: material, grid point, basic, and global
- Automatic generation of structural temperatures for direct modeler import or structural analysis
- Heat flow into heat boundary elements

#### Global Matrix Output:

- Conductivity matrix
- Capacitance matrix

#### Direct Matrix Input Grid (DMIG) Support:

- Conductivity matrix import and export
- Capacitance matrix import and export
- Load vector import and export

**NEi Software, Inc.** is aggressively focused on commitment to the customer. 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](mailto:info@neisoftware.com)

Website: [www.NEiSoftware.com](http://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](mailto:emea@neisoftware.com)

Website: [www.NEiSoftware.com/emea](http://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](mailto:asia@neisoftware.com)



**NEi Nastran for Windows**  
From NEi Software, Inc.