# NX Electronic Systems Cooling

fact sheet

Siemens PLM Software

www.siemens.com/plm


## Summary

NX® Electronic Systems Cooling software is an industry-specific vertical application that leverages the NX Flow and NX Thermal solvers as well as the PCB.xchange capabilities in an integrated multi-physics environment to simulate 3D air flow and thermo-fluid behavior in densely packed, heat sensitive electronic systems. NX Electronic Systems Cooling helps resolve thermal engineering challenges early in the design process and is a valuable aid in understanding the physics of fluid flow and heat transfer for electronic enclosures.


## Benefits

Simulate 3D air flow and thermal behavior in electronic systems

Perform digital thermal simulation early in the design process, reducing the need for building and testing physical prototypes

Integrate analysis with mechanical engineering and design for guidance, not just verification

Minimize tedious rework and modeling errors with direct interfaces to ECAD systems

Display simulation results to gain physical insight and optimize design

## Features

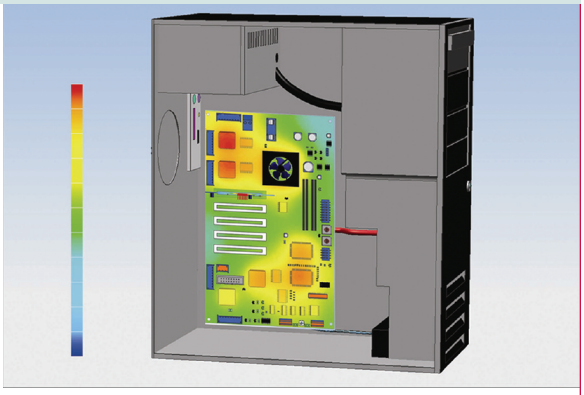
Specific capabilities for electronic systems simulation applications:

- Heat sink models and modeler
- Fan catalog (database of fan curves) with more than 2000 fans from leading manufacturers
- Embedded PCB modeler/xchange (ECAD/MCAD bi-directional data exchange)

Core simulation capabilities:

- Steady-state and transient analysis
- Turbulent (k-E, mixing length), laminar and mixed flows
- Internal or external flows
- Diurnal solar environmental heating (including cloud effects, altitude effects, longitude and latitude effects, pollution effects, etc.)

## Product description



NX Electronic Systems Cooling is ideal for modeling and analyzing electronics cooling applications with complex 3D design geometry. As an integral part of the complete NX digital product development suite, the NX Electronic Systems Cooling solvers enable you to effectively use simulation to provide design guidance early in the design cycle, not just final design verification. Modeling of complex 3D assemblies is made easy with the integrated NX Advanced FEM capabilities (a pre-requisite for the NX Electronic Systems Cooling solvers). No additional input files or geometry conversions are needed to build your coupled thermo-fluid models.

The NX Electronic Systems Cooling package includes the bi-directional PCB.xchange interface with EDA design systems for direct use of PCB and FPC data. All of the leading PCB and FPC layout software packages listed below support the IDF data format for PCB.xchange:

- Zuken
- Mentor Graphics
- Cadence
- VeriBest
- OrCAD
- Incases
- Comtel

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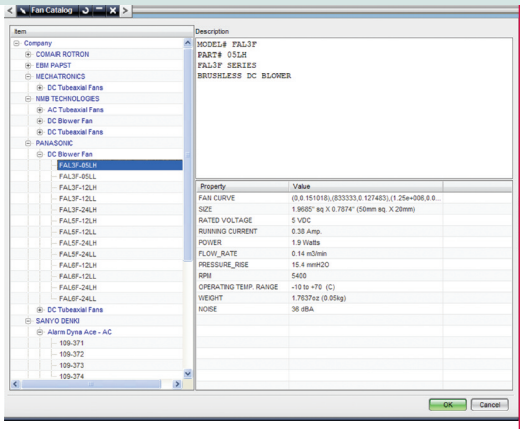
### Features *continued*

- Hydraulic fluid networks
- Joule heating
- Heater and thermostat modeling
- Peltier cooler modeling
- Automatic skin mesh (boundary layer mesh) with unlimited layer options
- Complete set of automatic and/or manual meshing options for the selected fluid domains
- Unstructured fluid meshes (supports any combination of tetrahedral, brick and wedge element types)
- Solution intermediate results recovery allowing solver restart
- Heat loads and temperature restraints on the fluid domain
- Forced, natural and mixed convection
- Fluid buoyancy
- Multiple enclosures
- Multiple fluids
- Losses in fluid flow due to screens, filters and other fluid obstructions (including orthotropic porous blockages)
- Head loss inlets and openings (fixed or proportional to calculated velocity or squared velocity)
- Fluid swirl at inlet and internal fans
- Fluid recirculation loop with head loss or heat input/loss or fluid temperature change between unconnected fluid regions
- Automatic connection between disjoint fluid meshes
- Altitude effects
- Nonlinear flow boundary conditions
- Non-linear thermal contacts
- Thermal couplings (welded, bolted, bonded, etc) for assembly modeling
- Disjoint thermal/fluid meshes support in assembly modeling
- Hemicube-based view factor calculation (using graphics' card hardware)
- Radiation enclosures
- Radiative sources

## Industry applications

The thermal performance simulation capabilities of NX Electronic Systems Cooling can be leveraged to meet the new product design requirements for virtually all industries:

- Aeronautics
- Automotive and ground transportation
- Civil and environmental engineering
- Consumer products
- Defense
- High tech and electronics
- HVAC
- Industrial and manufacturing processes
- Lighting and electro-optic equipment
- Machinery
- Marine and offshore
- Medical equipment and biomed
- Nuclear plants and power generation
- Oil and gas
- Telecommunications




Typical electronic systems cooling applications in these industries include:

- Determining electronic systems cooling strategies
- Enclosures, subsystems, power supplies thermal management
- PC boards, FPCs, multi-chip modules detailed thermal design
- Critical components placement
- Heat sinks modeling
- Spacing requirements between critical parts
- Predicting fan operating conditions
- Volume and mass flow estimations
- Computing pressure inlet/outlet gradients and head losses
- Identifying recirculation areas and hot spot issues

## Supported hardware/OS

NX Electronic Systems Cooling is an add-on module in the NX Advanced Simulation suite of applications. It requires a license of NX Thermal as a prerequisite. All standard NX hardware/OS platforms are supported (including Windows, Linux, Unix and selected 64-bit platforms). Contact Siemens for any other specific hardware/OS support requests.

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