

## DIGITAL INDUSTRIES SOFTWARE

# Simcenter Flotherm XT

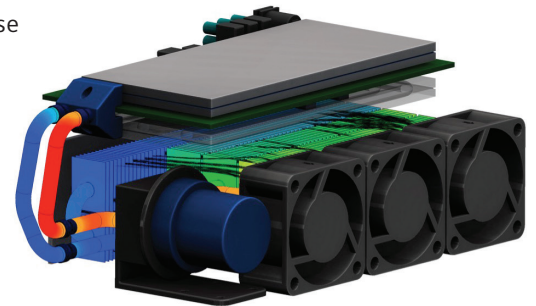
Closing your thermal design faster to minimize rework and physical prototyping

### Benefits

- Front-loading thermal design prevents late-design re-spins and can eliminate physical prototyping
- Right-by-design cooling solution minimizes product weight and cost
- Use to choose cooling architecture in ideation to final design verification
- Simcenter Flotherm Smartparts support rapid model creation
- Fast and robust meshing and solution supports fully-automated design space exploration and design optimization
- Unique Flexx licensing option gives access to run either Simcenter Flotherm or Simcenter Flotherm XT software

### Summary

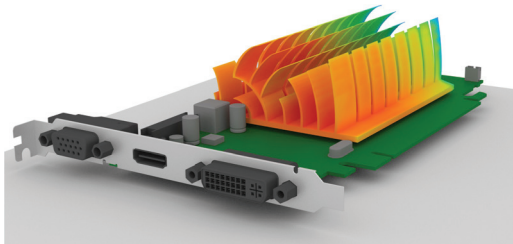
Electronics are increasing the complexity of products across all industry sectors, including automotive and transportation, aerospace and defense (A&D), electronics and semiconductor and consumer products. While product complexity is increasing, the time and budget for product design is shrinking. Miniaturization is forcing the mechanical and electronic design flows to converge, and is increasing power densities. This makes it harder than ever to efficiently remove heat, which causes performance and reliability problems and can cause safety concerns. Front-loading electronics cooling specific thermal design software is helping companies develop products that are light, thin, silent and lower in cost.



Liquid cooled autonomous vehicle sensor fusion box.

**Using Simcenter Flotherm XT**

Using a complete set of Simcenter™ Flotherm™ Smartparts software provides users with intelligent multilevel model creation macros that deliver detailed and compact representations in a single object. Simcenter Flotherm Smartparts combine geometry definition, material attributes and grid settings supporting easy model creation and re-use across different projects. Supported Simcenter Flotherm Smartparts cover everything from semiconductor dies to enclosures.

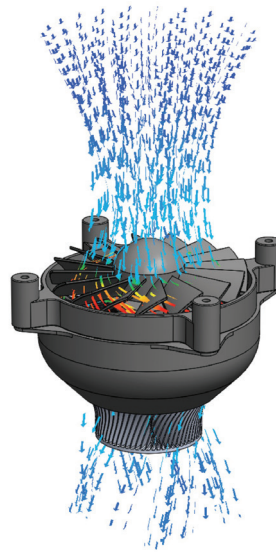


Graphics card with aesthetic heatsink design, showing heatsink temperature.

Simcenter Flotherm XT software has a Windows explorer-style user interface (UI) that incorporates a Parasolid-based solid modeler with drag-and-drop functionality a library system. Model sharing across the electronics supply chain is supported through hundreds of Simcenter Flotherm Smartparts-based objects and attributes available in an installed library including fans, blowers, components, heat-sinks, materials, thermal interface materials and more.

**Modeling electronics assemblies**

Populated printed circuit boards (PCBs) are the heart of electronics products. Simcenter Flotherm XT provides various PCB modeling levels to maximize solution speed and accuracy as data becomes available across the development workflow.



Fansink cooling performance test.

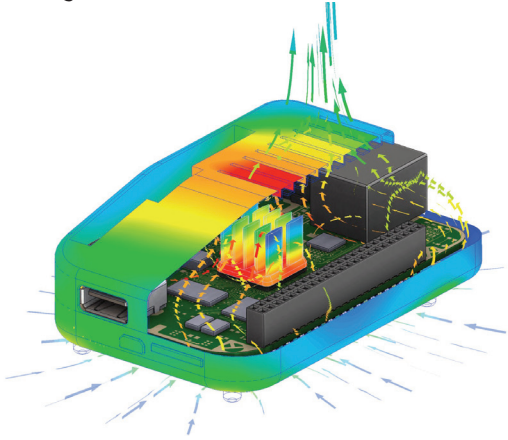
Simple block models use an empirical approach to calculate the effective PCB thermal conductivity in early design before the details of the board or layout are clear. In late design, material maps allow the spatial location of copper traces, vias, ground and power planes to be accurately captured. Thermal territories can be used to directly model the 3D copper structure under and around a component for the highest possible accuracy. Individual nets can also be considered to calculate Joule heating effects in traces, power and ground planes.

**Modeling chip packages**

Simcenter Flotherm XT supports various component thermal models. Fast evaluation of architectural choices and design space exploration during conceptual design is enabled using simple block and 2-resistor models. Detailed, 2-resistor and DELPHI thermal resistor models can be created with Simcenter Flotherm Pack software as a service (SaaS).

Responses of the actual part in different environments can be measured with

Simcenter T3STER™ hardware and Simcenter POWERTESTER™ hardware. RC ladder models derived from these measurements can be used directly in Simcenter Flotherm XT for use in transient simulations to investigate transient effects and evaluate temperature control strategies.



Small consumer electronics product showing surface temperature and airflow.

Using the Ultra version, detailed thermal models can be calibrated against the measurement data, tuning model parameters to match provides the response of the actual part, to provide greater than 99 percent model accuracy in both space and time.

Detailed CAD-based 3D thermal model can be created with Simcenter Flotherm XT Package Creator software for common chip package families including internal features such as lead frame fingers and bond wires.

**Conduction, convection, radiation, phase change and solar loading**

Electronics cooling applications require full conjugate heat transfer as the norm, not as a special case, along with the ability to account for solar loading and thermal radiation between the large numbers of objects that typically make up an electronics system.

Multiphysics simulations are supported, capturing Joule heating in electrical conductors such as power supply nets and power planes and even in bond wires in power packages. Multiphysics modeling also captures the latent heat effect of packaged phase change materials (PCMs).

**Working with MCAD data**

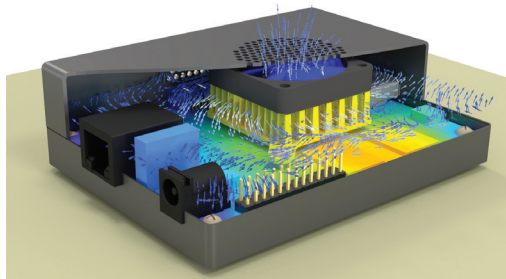
Simcenter Flotherm XT incorporates a parasolid-based solid modeller giving a CAD-centric user experience and ability to work directly with native computer-aided design (CAD) geometry. Native geometry can be imported from NX™ software and Solid Edge® software, PTC Creo Parametric and Dassault Systemes SOLIDWORKS and manipulated directly within Simcenter Flotherm XT.

**Working with ECAD (EDA) data**

Simcenter Flotherm XT EDA Bridge module imports IDF, .idx, ODB++, CCE and IPC2581 files. Using the EDA Bridge modules components can be swapped for thermal models from the library, and components can be filtered on import based on size, power and power density, with thermal power lists imported and exported as .csv files.

**Workflow integration**

Simcenter Flotherm XT imports Simcenter Flotherm PDML project and assembly files. ECXML support provides thermal model interchange with tools from other vendors. Simcenter Flotherm XT also imports thermal models in JEDEC JEP30-T100 format.



Industrial IoT Device.

Temperatures can be exported from Simcenter Flotherm XT for use downstream in finite element analysis (FEA) software for thermo-mechanical simulations for reliability assessment.

**Fast, robust meshing and solution**

Simcenter Flotherm XT unstructured Cartesian-based Smartcells™ meshing technology provides rapid refinement around small geometric features with the ability to ignore unwanted details. CAD geometry of any complexity can be handled without the need for user simplification. Simcenter Flotherm XT delivers fast, robust meshing, with multicore parallel solution on Windows with remote solving capability on Windows or Linux.

Mesh settings are associated with the geometry preserving resolution if objects are moved within the model or added to the library for future use and sharing.

**Postprocessing**

Comprehensive postprocessing capabilities provide plane, surface and iso-surface plots, complemented by call outs on plots to annotate simulation result values. Patented BottleNeck (BN) number helps identify aspects of the design that can be exploited to improve cooling.

**Design space exploration and optimization**

Simcenter Flotherm XT build in parametric study capability provides an efficient way to investigate the effects of varying input parameters. Parametric study capability can be extended with design-of-experiment (DoE) and response surface optimization (RSO).

Simcenter Flotherm XT is also accessible through the HEEDS™ software portal for multidisciplinary optimization using HEEDS.

**Free 30-Day cloud-based trial**

Not convinced? Try Simcenter Flotherm XT for yourself with a free 30-day cloud-based trial where you can become proficient in driving the software and work through a series of self-paced tutorials to explore the full range of features available in Simcenter Flotherm XT.

**Note:**

Transient simulations, rotating regions, design of experiment and response surface optimization require an Ultra license.

Model calibration requires an additional license.

Simcenter Flotherm Pack software as a service is licensed separately.

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