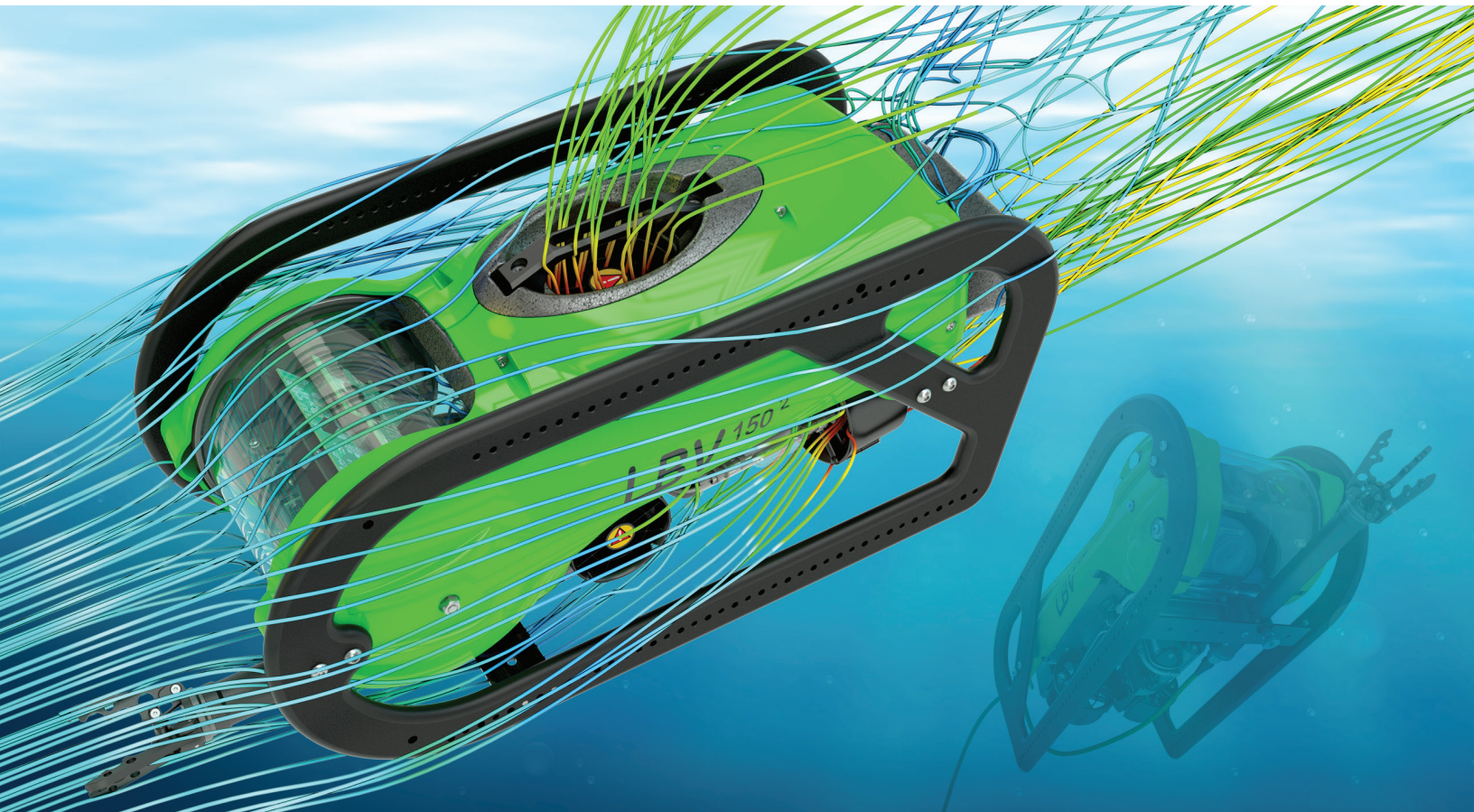# SOLIDWORKS FLOW SIMULATION
GET ENGINEERING INSIGHTS WITH CONCURRENT CFD ANALYSIS FOR MARKET WINNING INNOVATION

SOPHISTICATED SIMULATION IS NO LONGER JUST FOR SPECIALISTS

"What if?" It's the inspiration that fuels innovation—and with SOLIDWORKS® Flow Simulation software, you remove the risk and replace it with a 3D workspace to virtually test your new ideas, develop new designs, and help accelerate your products to market.

> "Using SOLIDWORKS Flow Simulation, we were able to challenge some fundamental ideas about design and dramatically boost performance, improving efficiency by 25 percent."
>
> — Travis Kenworthy, Engineer , ClearStream Environmental, Inc

## Concurrent engineering for more informed design

SOLIDWORKS Flow Simulation gives product engineers access to powerful CFD (computational fluid dynamics) analysis capabilities that help enable them to speed up product innovation. Leveraging the familiar SOLIDWORKS 3D CAD environment, this extensive technology isn't just about making sure your product works, it's about understanding how your product will behave in the real world.

POWERFUL AND INTUITIVE CFD SIMULATION FOR PRODUCT ENGINEERS

Built to tackle CFD engineering challenges, SOLIDWORKS Flow Simulation enables engineers to take advantage of CAD integration, advanced geometry meshing capabilities, powerful solution convergence, and automatic flow regime determination without sacrificing ease of use or accuracy.

Product engineers and CFD experts alike, armed with the power of SOLIDWORKS Flow Simulation, can predict flow fields, mixing processes, and heat transfer, and directly determine pressure drop, comfort parameters, fluid forces, and fluid structure interaction during design. SOLIDWORKS Flow Simulation enables true concurrent CFD, without the need for advanced CFD expertise.

SOLIDWORKS Flow Simulation software takes the complexity out of flow analysis and enables engineers to easily simulate fluid flow, heat transfer, and fluid forces so engineers can investigate the impact of a liquid or gas flow on product performance.
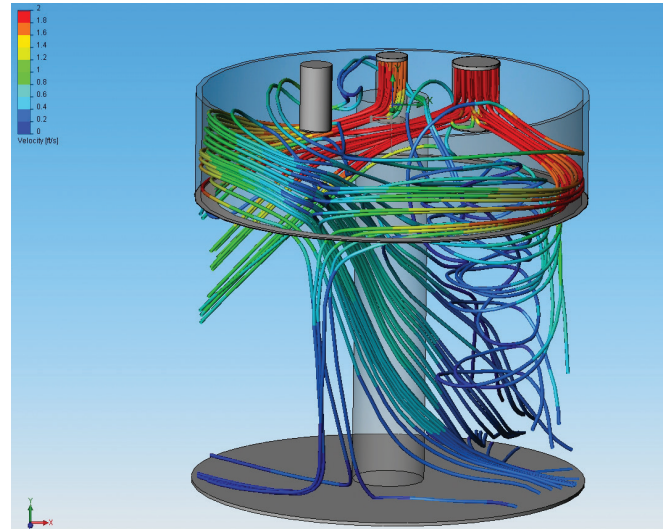
Evaluate and optimize complex flows

- Examine complex flows through and around your components with parametric analysis
- Align your model with flow conditions, such as pressure drop, to satisfy design goals
- Detect turbulences and recirculation issues with animated flow trajectories
- Understand the flow of non-Newtonian liquids, such as blood and liquid plastic
- Assess the impact of different impellers and fans on your design
- Include sophisticated effects like porosity, cavitation, and humidity

Reduce the risk of overheating in your designs

- Visualize and understand temperature distribution in and around your products
- Couple flow with thermal analysis, simulating convection, conduction, and radiation effects
- Simulate advanced radiation with semitransparent material and wavelength-dependent radiative properties with the HVAC module
- Apply time- and coordinate-dependent boundary conditions and heat sources
- Find the best dimensions to satisfy your design goals, such as heat exchanger efficiency
- Get thermal heat sources and PCB layer definition from EDA thermal properties

Examine complex flow in and around components to detect turbulence and recirculation issues.
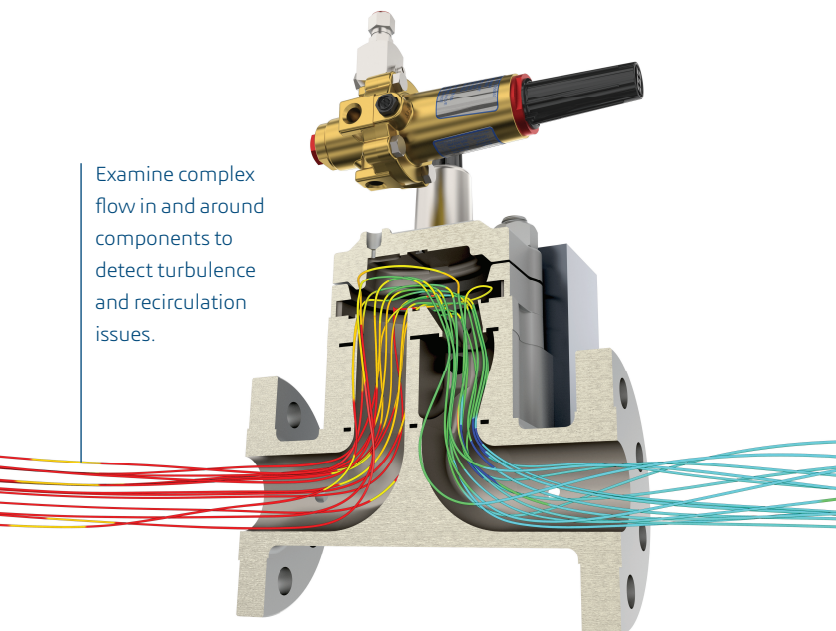
> **"SOLIDWORKS Flow Simulation not only improves our productivity and efficiency, but also lets us tackle heat transfer challenges that we would not be able to resolve without it."**
>
> — Bernd Knab, Development Manager, POLYRACK Tech-Group

Optimize the thermal performance of your PCBs and electronic components

You can perform component thermal analysis on designs incorporating printed circuit boards (PCBs) and electronics with SOLIDWORKS Flow Simulation and the Electronic Cooling Module.
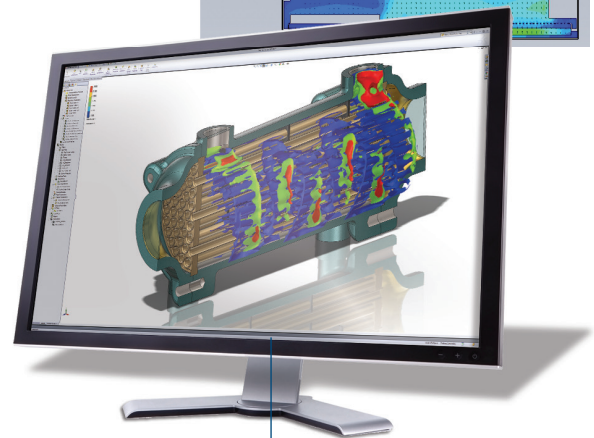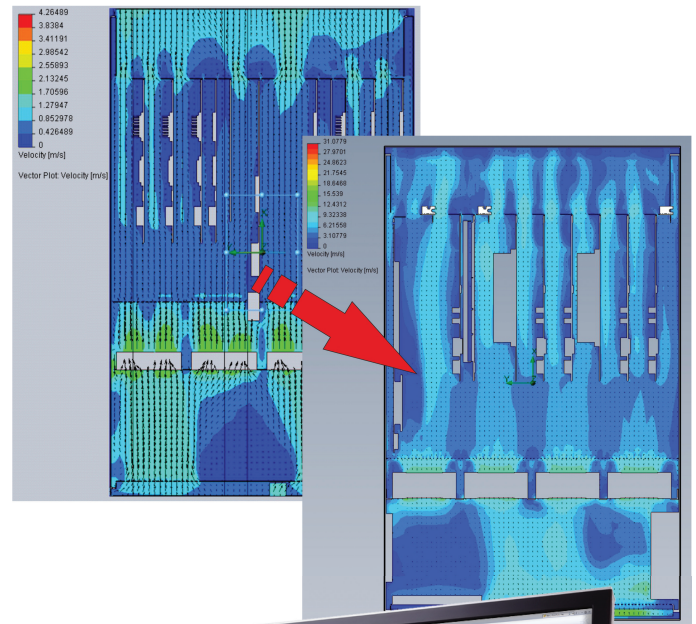
The Electronic Cooling Module features a comprehensive set of intelligent models in addition to the core SOLIDWORKS Flow Simulation models to enable a broad range of electronic cooling applications to be built quickly and accurately. The models included for electronic thermal simulations are:

- Fans
- Thermoelectric cooler (TEC)
- Heat sink simulation
- Two-Resistor Component Compact Model (JEDEC standard)
- Heat Pipe Compact model
- PCB generator tool
- Electrical contact condition
- Joule Heating calculation
- Extensive library of electronic models

Predict and achieve airflow and comfort parameters in working and living environments

You can understand and evaluate thermal comfort levels for multiple environments using thermal comfort factor analysis with SOLIDWORKS Flow Simulation and the HVAC Application Module. Assessment of the thermal environment in the occupied zone requires knowing the Thermal Comfort Parameters as well as factors which provide information about air quality, calculated with the HVAC module, including:

- Predicted Mean Vote (PMV)
- Predicted Percent Dissatisfied (PPD)
- Operative Temperature
- Draft Temperature
- Air Diffusion Performance Index (ADPI)
- Contaminant Removal Effectiveness (CRE)
- Local Air Quality Index (LAQI)

Detect heating problems by inspecting temperature distribution and heat fluxes.
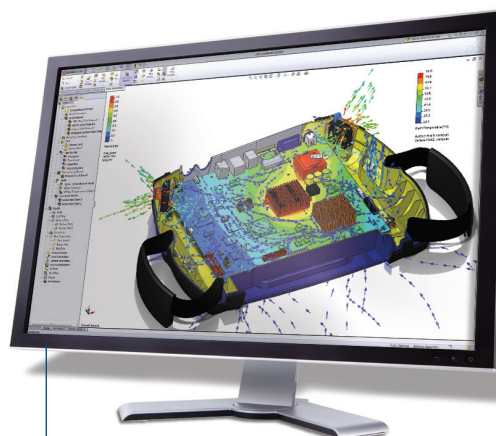
Use the Electronic Cooling Module to help optimize thermal performance of your electronic components.

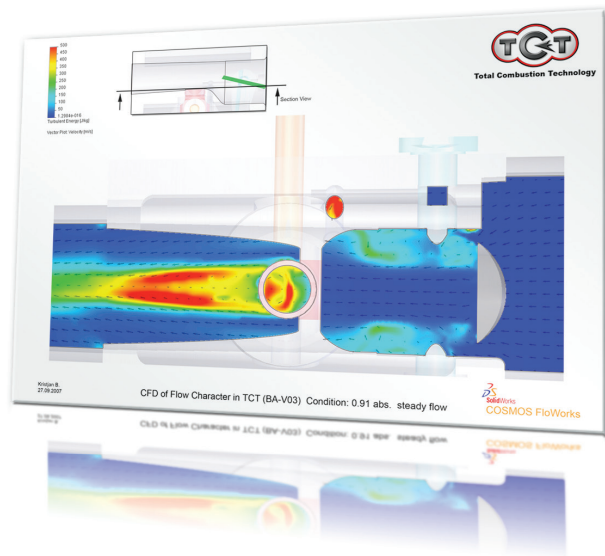## Gain valuable insights with powerful and intuitive results visualization tools

- Utilize Section or Surface plots to study the distribution of resultant values, including velocity, pressure, vorticity, temperature, and mass fraction
- Compare the Fluid Flow results for various configurations with the Compare Mode
- Measure results at any location with the Point, Surface, and Volume Parameter tool
- Graph results variation along any SOLIDWORKS sketch
- List results and automatically export data to Microsoft® Excel®
- Communicate your CFD results in 3D with SOLIDWORKS eDrawings®

SOLIDWORKS PRODUCT DEVELOPMENT SOLUTION

SOLIDWORKS software provides users with an intuitive 3D development environment that helps maximize the productivity of your design and engineering resources to create better products faster and more cost-effectively. See the full range of SOLIDWORKS software for design, simulation, technical communication, and data management at **www.solidworks.com/products2015**.

SYSTEM REQUIREMENTS

- Windows 7® (preferably x64) or Windows 8
- 2 GB RAM minimum (8 to 16 GB RAM recommended)
- 50 GB disk space free (minimum)
- SOLIDWORKS-Certified graphics card
- Intel® or AMD® processor (4 to 8 cores recommended)
- Broadband Internet connection
- Microsoft Excel and Word (for reporting and exporting)

LEARN MORE

Visit www.solidworks.com/simulation or contact your local authorized SOLIDWORKS reseller to learn more.

"What I like most about SOLIDWORKS Flow Simulation is that I can eliminate between 10 and 15 prototype cycles on each project."

— Kristján Björn Ómarsson, Chief Designer, Total Combustion Technology

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