Simulating Electronic Cooling Applications
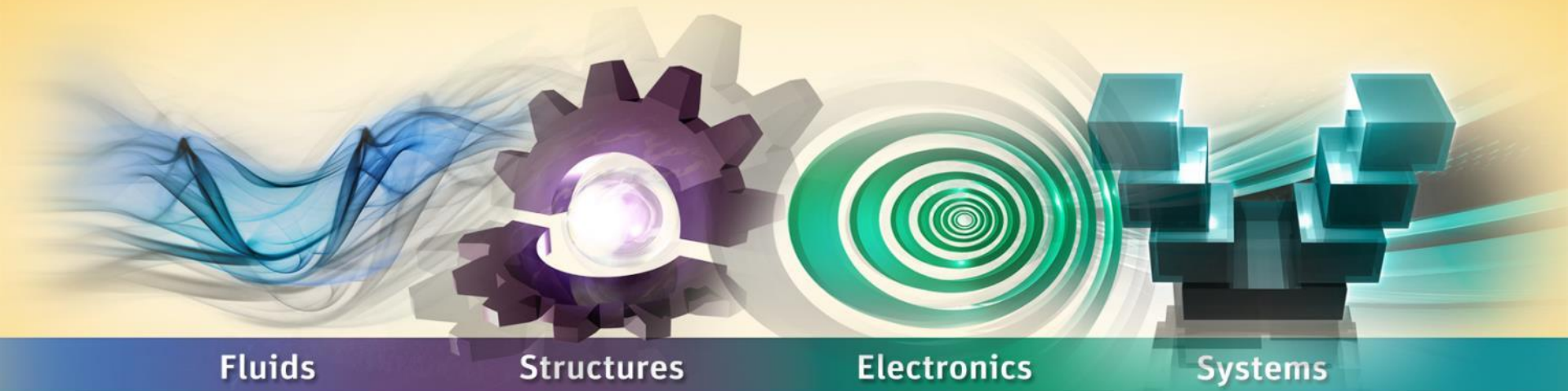
Fluids   **Structures**   **Electronics**   **Systems**
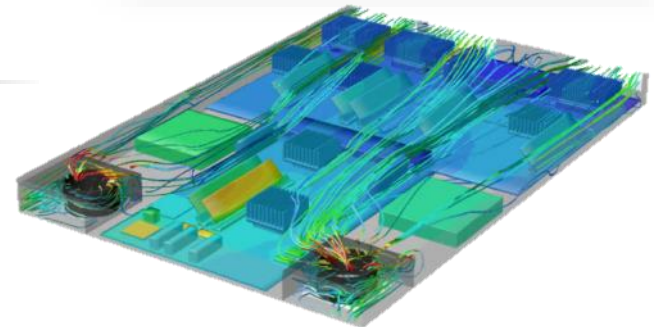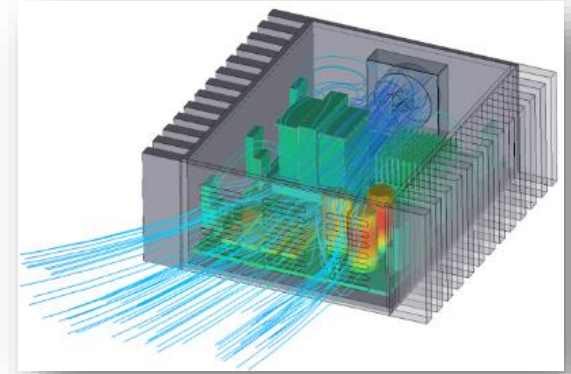
Electronic Cooling

Summary

Whatever the heat electronic cooling challenge, ANSYS simulation technologies enable engineers and companies to improve their design performance. ANSYS CFD solutions can simulate electronic cooling for printed circuit boards, chips, packages, etc.

Design Impact

- **Avoiding excess heat in packages**
- **Thermal management in PCB**

Avoiding Excess Heat in Packages

Application Example

- **Objective: Resolve Thermal Challenges in Packages**
  - 3-D integrated circuit designs in which multiple ICs are stacked in vertical layers create a high-density circuit and therefore more thermal challenges

- **ANSYS Solution**
  - Solution specially designed for electronic cooling
  - Ability to connect to power integrity analysis of electronic packages and PCBs tools

- **Value of Simulation**
  - Simulation shows that the bottom chip gets hotter than the upper chip. Simulation was used to check thermal issues in high-density 3-D IC were below maximal authorized values

Thermal Management in PCB
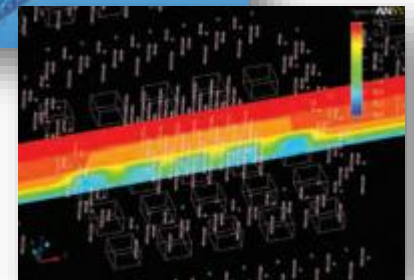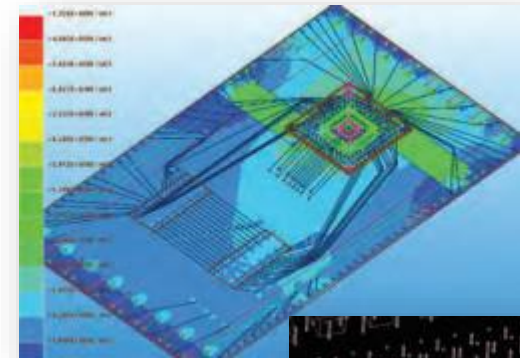
Application Example

- **Objective: Electric Motor**
  - Optimize the heat sink of an electric motor for an automotive cooling fan assembly

- **ANSYS Solution**
  - Direct ECAD Import
  - Solution specially designed for electronic cooling

- **Value of Simulation**
  - A new evolution of a real motor cooling system has been designed with the optimization in weight reduction, reliability (internal electronics temperatures under safety limits), and cost reduction (materials usage optimization) modules
  - CFD is a good tool to drive effective design decisions

Thermal Management in PCB
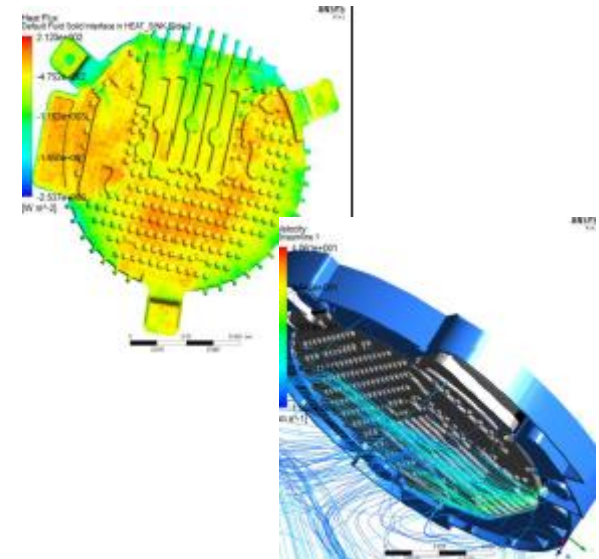
Application Example

- **Objective: Resolve Thermal Challenges in PCB**
  - Ensure that there is no hot spot in PCB that could lead to PCB warpage

- **ANSYS Solution**
  - Direct ECAD import
  - Solution specially designed for electronic cooling

- **Value of Simulation**
  - Simulation predicts the PCB temperature and CFD allows for more accurate simulation of the thermal behavior of the PCB when compared to Structural analysis, which makes many assumption on the flow thermal conditions

     May 22, 2018

Electronic Cooling
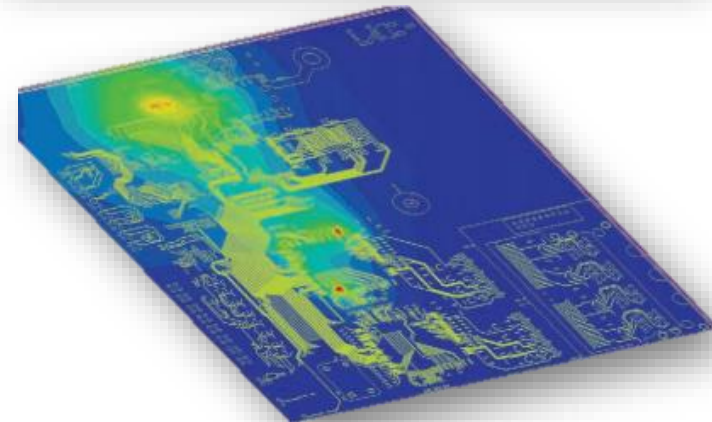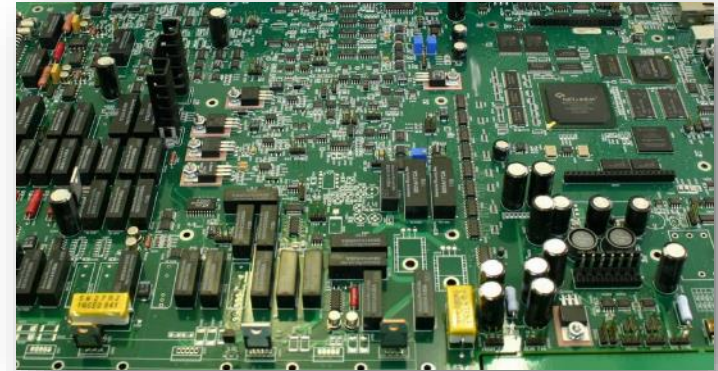
ANSYS Advantages

- **Ability to capture all complex geometries**

- **Based on a world-leading CFD solver (Fluent)**

- **Ability to import ECAD geometries**

- **Ability to couple with electronic and structural (FEA) analysis tools**

- **The fastest solution on the market**

- **The most validated solution on the market**

- **A world-class team of technical support experts**