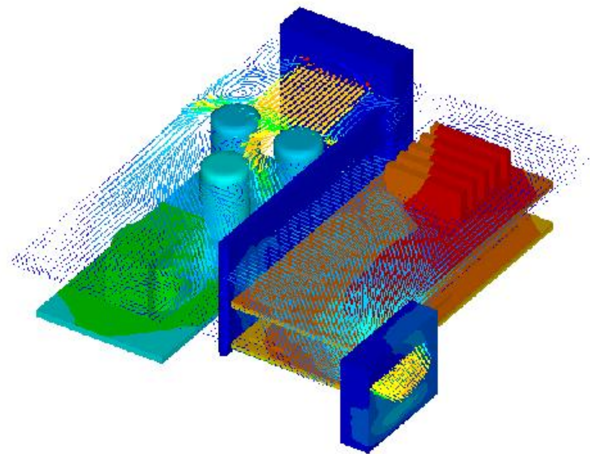
Case Study

Electronics Product CFD Heat Transfer Analysis

Description

A heat transfer analysis was required for a high density, advanced technology, electronics product, to ensure an acceptable temperature profile for the product and its components.



Flow distribution results prior to heat transfer analysis

A number of different product specifications were examined under different environmental conditions. 3D CAD data was used to produce the CFD model, which was used initially to analyse the flow through the product.

This involved the analysis of fans, vents, mesh screens etc, as well as the flow around the major components. The heat transfer analysis was then undertaken, assuming the worst case heat generation for each of the relevant major components and the worst external environment heat transfer coefficient conditions.

Plots of flow and temperature distribution were then produced and allowed re-design where necessary, so significantly reducing overall development lead time and cost of the product.

Disciplines Used

- 3D CAD design, CFD analysis for fluid flow and heat transfer

Specification Summary

- 4 different product levels investigated with and without a cooling fan
- Maximum environmental temperature = 65 deg C
- Maximum allowable outlet air temperature = 85 deg C
- Data supplied as .STP files, converted to SolidWorks parasolids for CFD analysis
- Total component heat rejection varied from 32 W to 64 W, depending on configuration
- Hand calculations used to check CFD results. Typical heat transfer coefficient = 8 W/m ^ 2 for natural convection
- Max PCB temperature = + 100 deg C (with fan) and + 200 deg C (without fan)

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