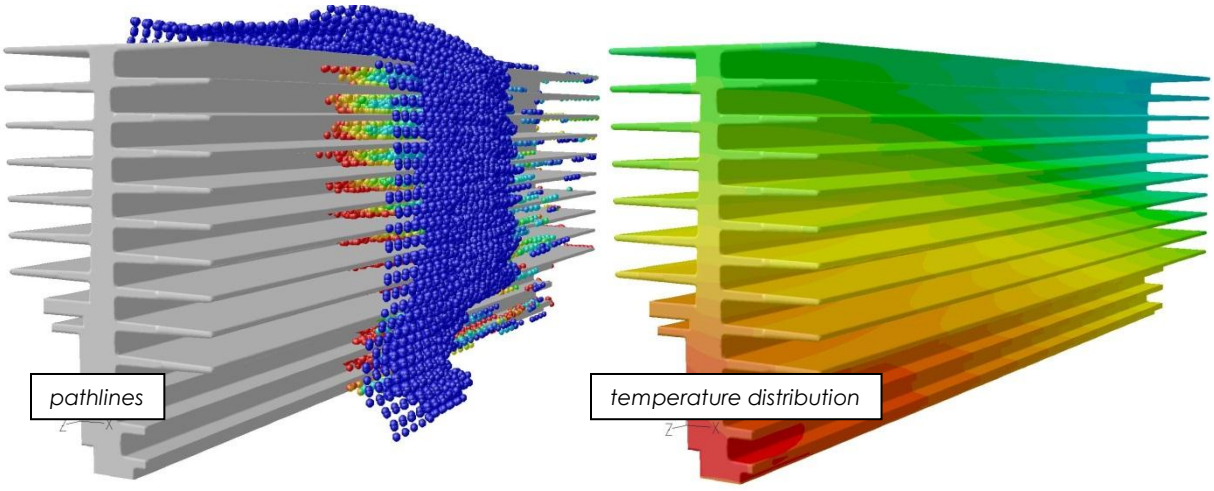
Cooling of electronics in limited space

Nedap develops and manufactures innovative electronical systems for measurement, controlling and automization purposes. In nearly all products a huge amount of electronical components are packed in very limited space. A part of the components releases quite some heat to the air in the housing. Since the competitive market asks for even smaller apparatus with increasing power, optimising the heat transfer is an ongoing process for Nedap.

Therefore FlowMotion was asked to optimise a finned passive cooler with respect to heat transfer and size. To get the most data about the velocity and the temperature distribution of the cooling air passing the cooler, CFD (computational fluid dynamics) calculation has been chosen as the primary investigation method, to simulate the flow and the heat transfer.

For the flow simulation a 3D model of the real finned cooler and the surrounding space have been developed. Afterwards the so-called calculation grid has been built up. This has to be done with great care, since the calculation grid has a dominant influence on the accuracy of the simulation. In the performed simulations not only the heat transfer the the flow, but also thermal conductivity and thermal radiation has been taken into account.



For the development of electronical cooling CFD offers following advantages compared to building prototypes in combination with measurements. CFD calculations are less time and cost consuming and the depth and the quality of the obtained data is much higher. Therefore various geometries of the cooler has been investigated in detail. The analysis of the simulation results led to a deeper insight in the physics of the heat transfer of a finned cooler and the benefit of certain geometrical changes could be shown before a real prototype has been built.

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