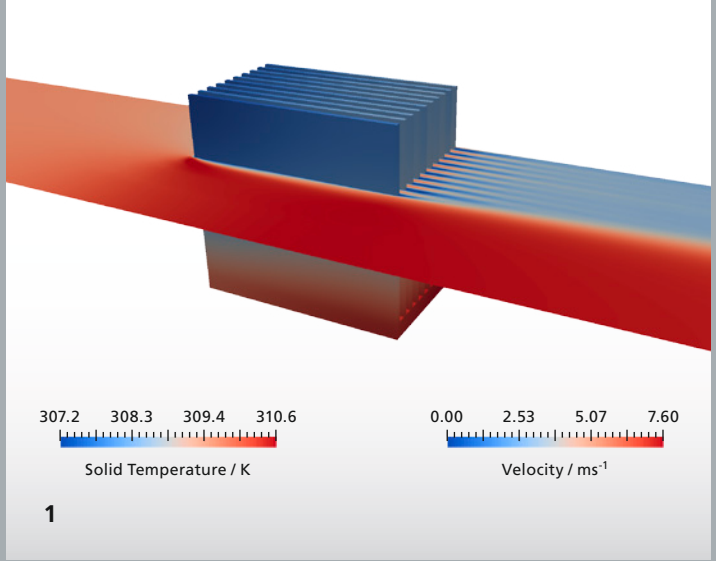

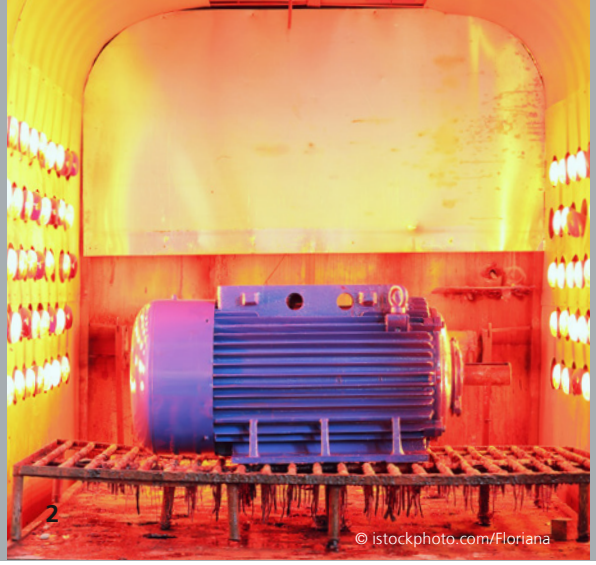

OPTIMIZING HEAT TRANSFER AND COOLING OF ELECTRONIC COMPONENTS

During the operation of electronic components and computer processors, electrical resistance causes heat. Higher computational power increases the temperature. In the worst case, over-heated components malfunction or break. We improve heat-sink designs to provide sufficient cooling for industrial products.

1 *Simulation of air flow and heat transfer*

2 *Oven curing of an electric motor*

Our algorithms outperform the genetic algorithms

Commercial plate-fin heat-sinks transfer heat from the source along multiple fins to the cooling air. The number of fins, their thickness, the height and the distance between them define the heat transfer and fluid dynamics during the cooling process. Our algorithms for the computation of best geometries are efficient and precise. In comparison to commonly used evolutionary algorithms, they outperform by a factor of ten.

Ranging from electronics over paper making to oven curing, we can optimize any problem modeled by a CAD engine. Sandwiching algorithms perform best for convex problems. Hyperboxing algorithms are not as efficient, but, they can process nonconvex information. Sometimes model simplifications help us to reach the optimum faster. If necessary, algorithms are adjusted to adapt to new problems. We are constantly working to improve our algorithms.

Automotive industry, watch out – we optimize cooling processes

Our next goal is the optimization of oven curing processes in the automotive industry. Temperature, air flow and position of painted car parts change the oven curing process. We optimize this process in terms of heat distribution and energy consumption while quality shall not be lost.

Our cooperating partners, the Fraunhofer-Chalmers Research Centre for Industrial Mathematics FCC at Sweden, have developed an innovative simulation method. Due to IPS IBOFlow, we can implement many industrial processes and analyze them automatically. We use it to compute the heat transfer and fluid dynamics during the cooling process.