AVL FIRE™ Top Use Cases

Software by AVL List GmbH

# Flows in Pipe & Junction Systems

Challenge
- Analysis and optimization of fluid flow path in terms of pressure drop (e.g. pipes, intake systems, ports, valves) and uniformity (e.g. exhaust systems, turbo chargers)

Solution
- Simulation using AVL FIRE™ M helps to derive design recommendations to reduce parasitic losses and to obtain optimum component & system performance

Benefits
- Saving cost and time
- Ensuring best component performance
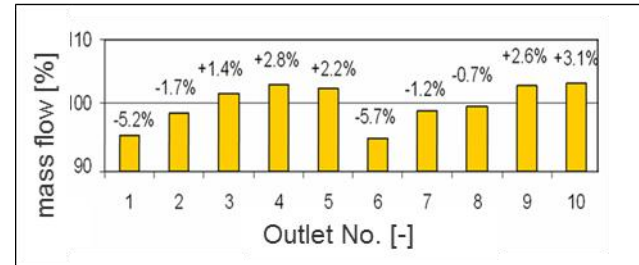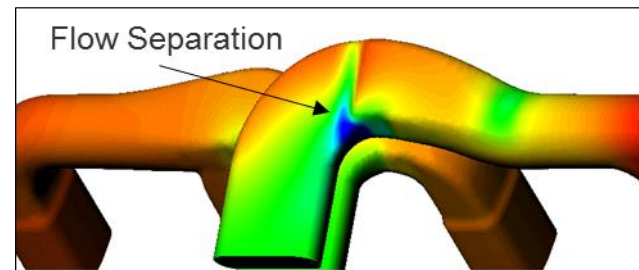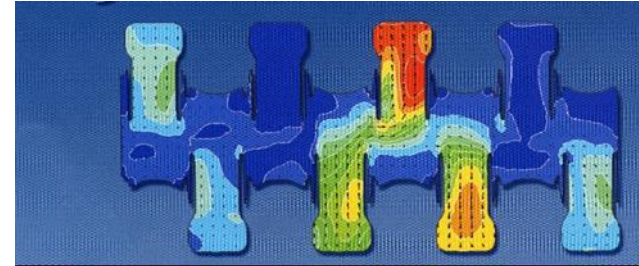
Turbo-Charger Analysis

Challenge
- Turbo-charger housings have to withstand extreme thermal load due to high exhaust gas temperature
- Design has to meet performance and life time requirements

Solution
- Simulation of flow and conjugate heat transfer between fluid and solid domain using AVL FIRE™ M to determine structural temperatures

Benefits
- Cost and time efficient T/C development
- Maximum component performance
- Reduced failure probability, increased life time
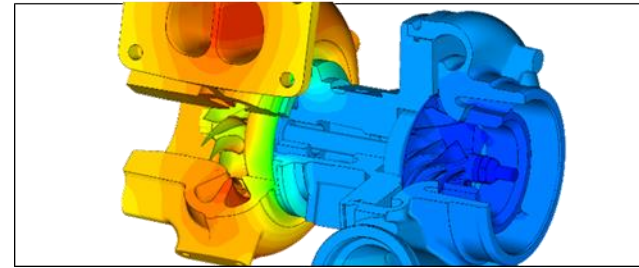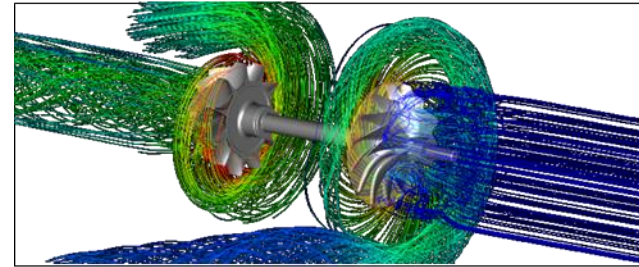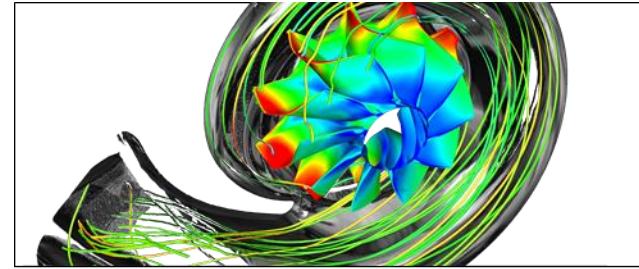
Thermal Load of Head / Block Compound
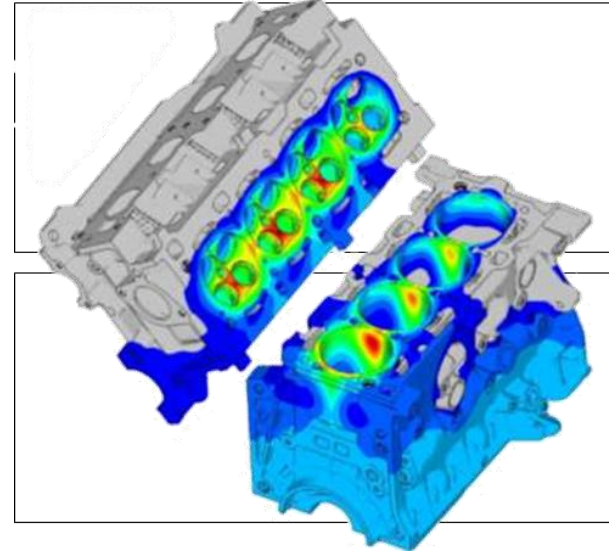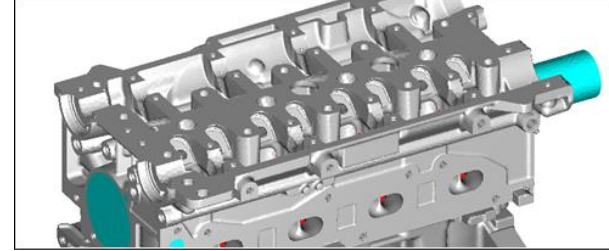
Challenge
- Light weight design, down sizing and increased power density of IC Engines lead to increased thermal load of the engine structure

Solution
- Simultaneous simulation of coolant flow, heat transfer and temperature of the structure parts to analyze and optimize the design in regard to thermal load using AVL FIRE™ M

Benefits
- Reduced failure probability
- Increased life time
- Lowering warranty issues
- Customer satisfaction

Coolant Flow Analysis

Challenge
- Increased thermal load of modern IC Engines requires precision cooling and low energy demand for coolant pumps

Solution
- Simulation of the flow in cooling circuits and its individual components accounting for pressure drop, heat convection, heat conduction and the effect of nucleate boiling using AVL FIRE™ M

Benefits
- Precise prediction of cooling conditions and component thermal load
- Maximizing component & system performance
- Minimizing energy consumption of the coolant pump