

# Engine Cooling Systems Analysis

SimericsMP

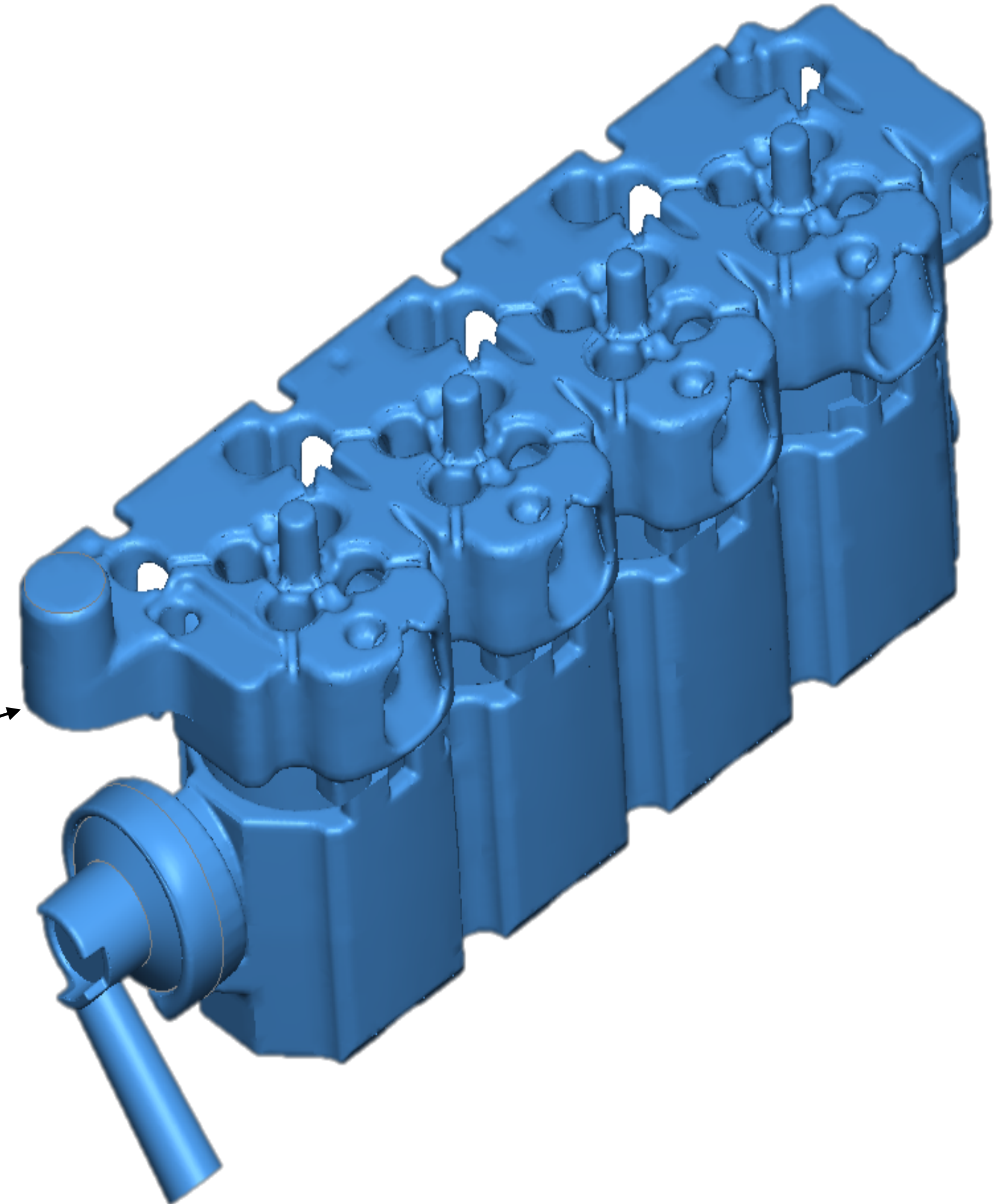
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# Introduction

- SimericsMP has been used to model an example of Engine Cooling System including flow and heat transfer
- SimericsMP, thanks to its SpaceClaim Engineer direct plugin, can easily import fluid volume geometries ready for meshing and analysis.

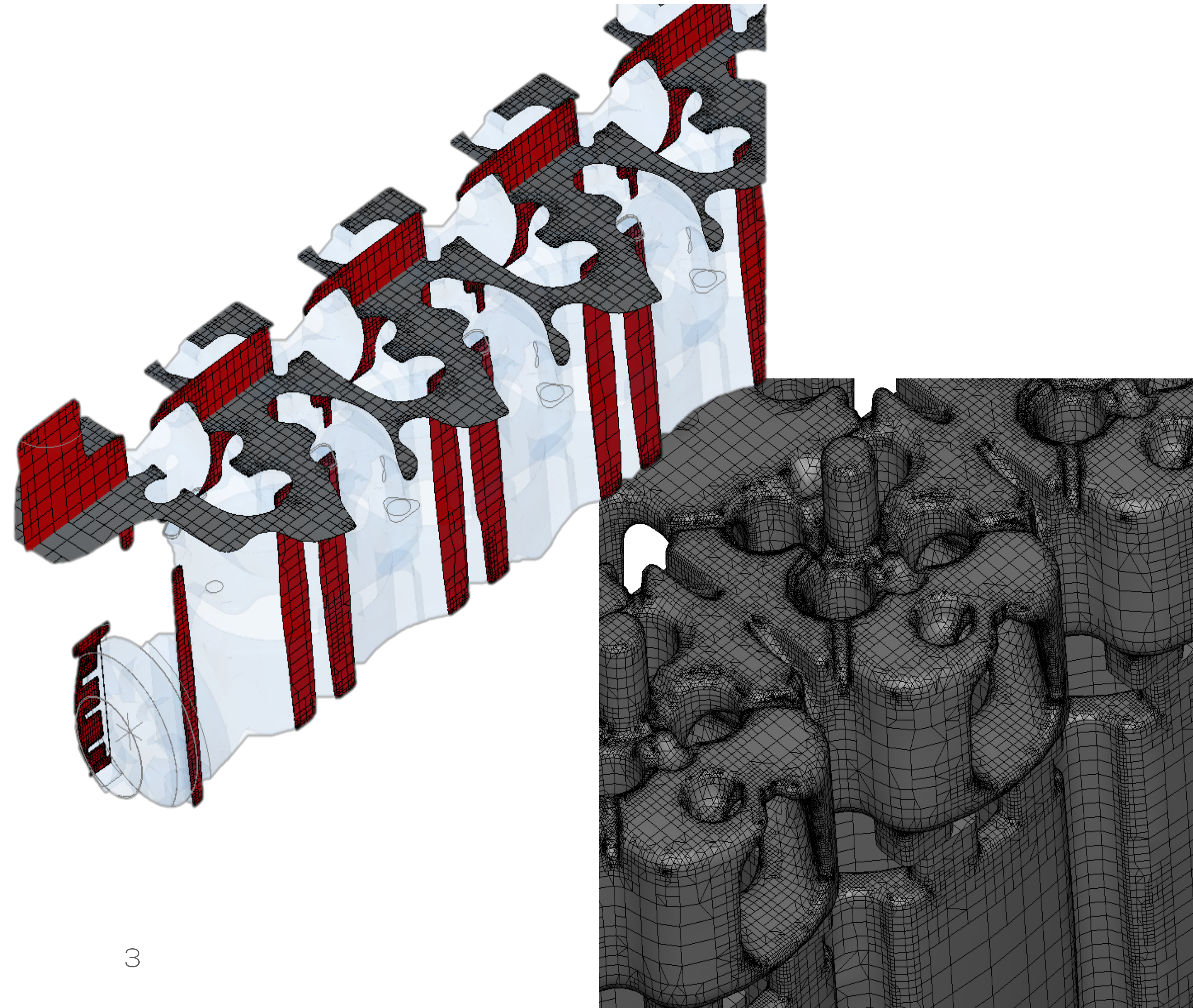
**SPACECLAIM**  
ENGINEER





# Building the Computational Model

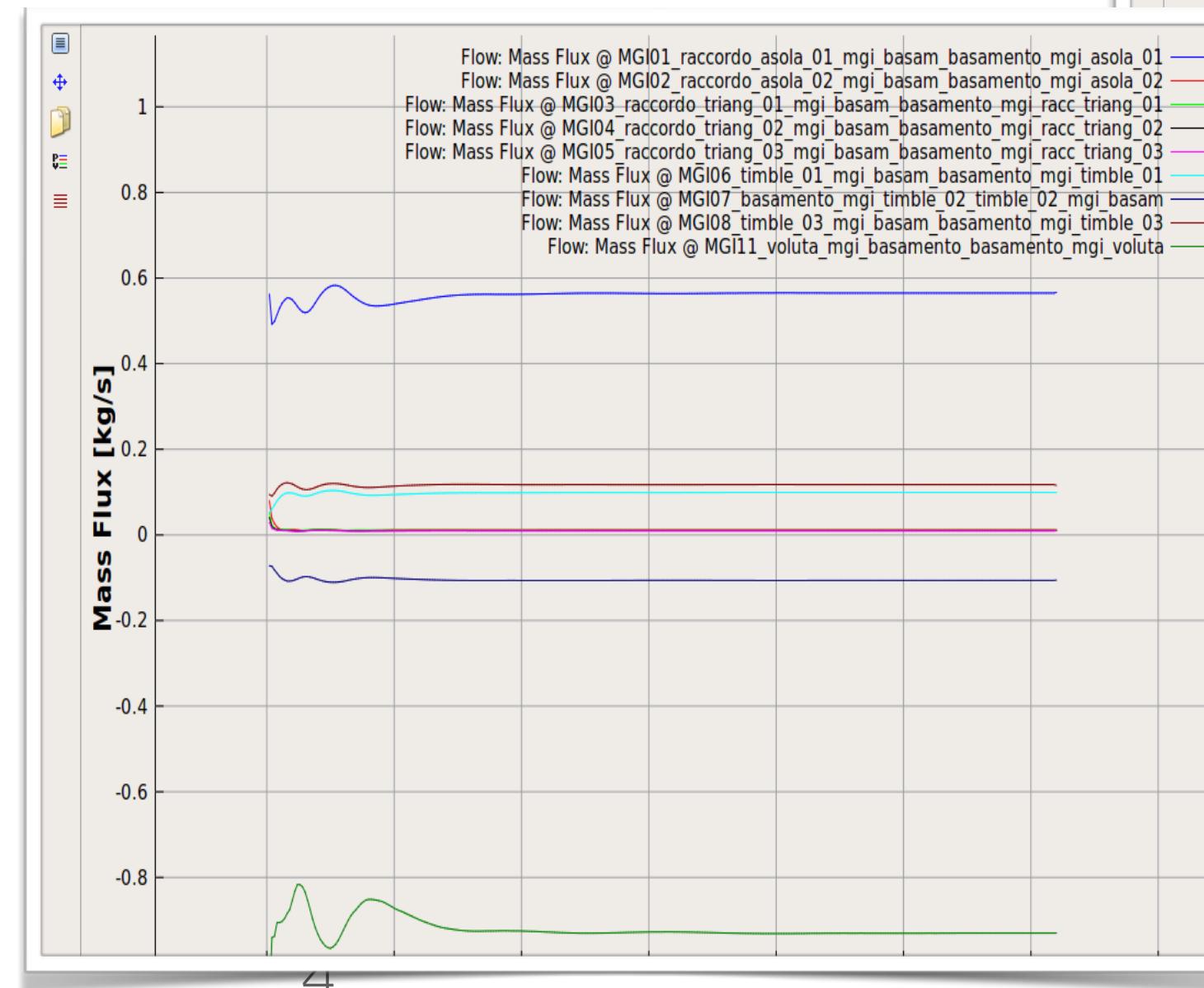
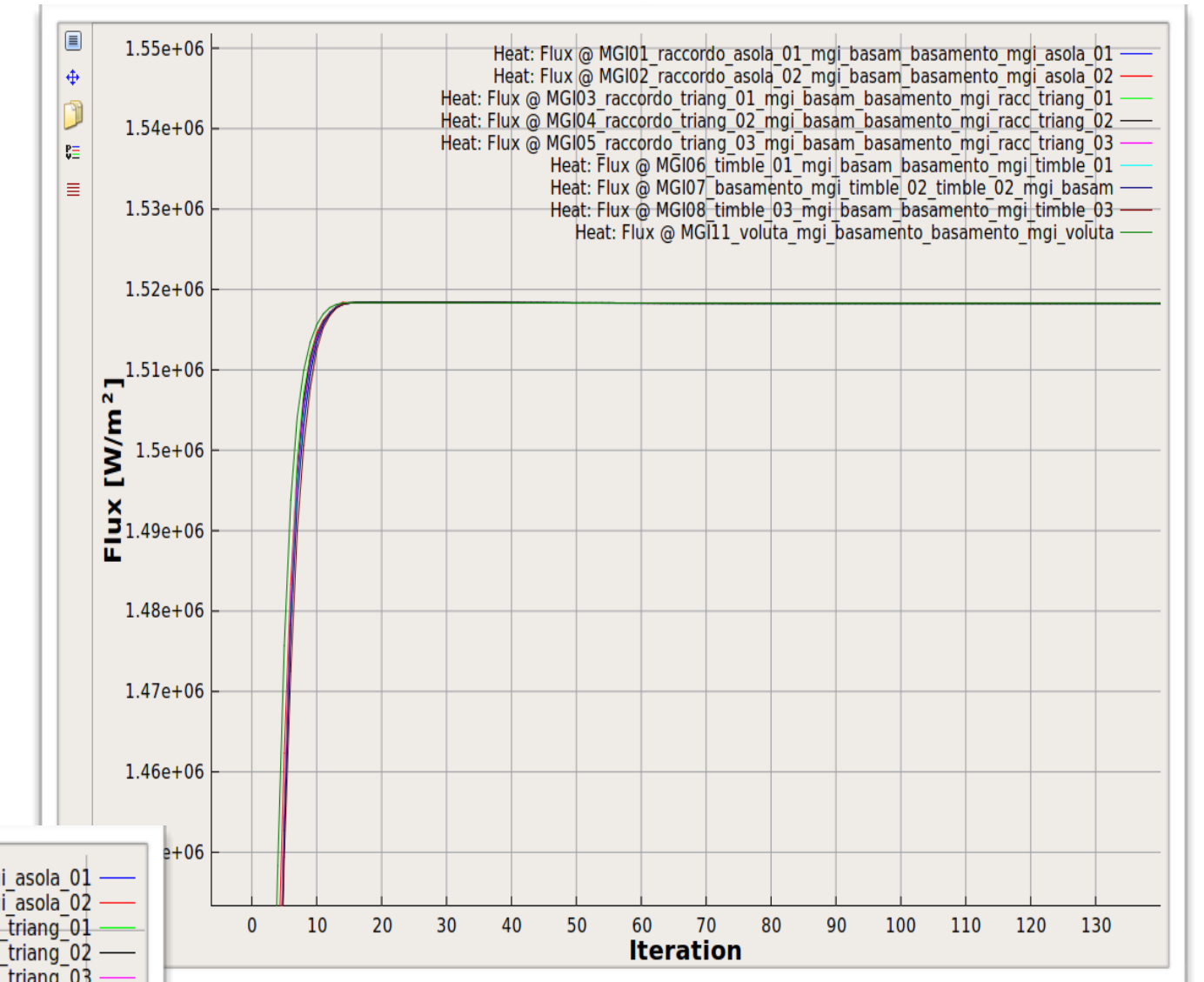
- The Cooling System computational model is automatically generated with the SimericsMP proprietary CAB mesher, resulting in a model of slightly over 300 thousands cells.
- PumpLinx allows to model very small gaps (order of microns)
- Independently meshed volumes are linked through a proprietary implicit matching algorithm





# Quantitative Results

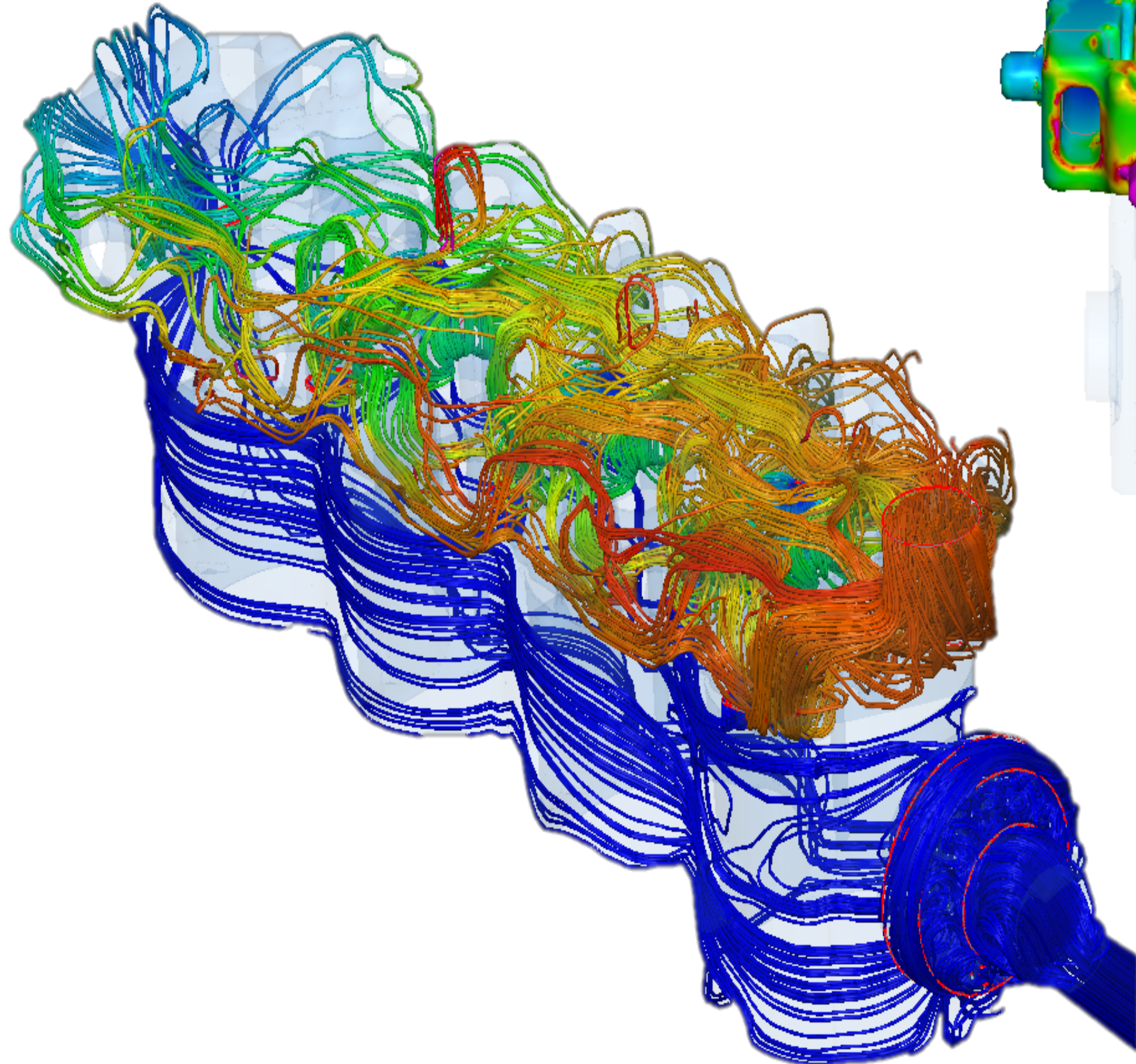
- SimericsMP automatically provides engineering data (fluxes, surface averaged integrals, forces) within its user interface.
- Data can be exported to Excel for further post-processing.
- Monitor points can be placed within the model to extract relevant quantities at specific locations.



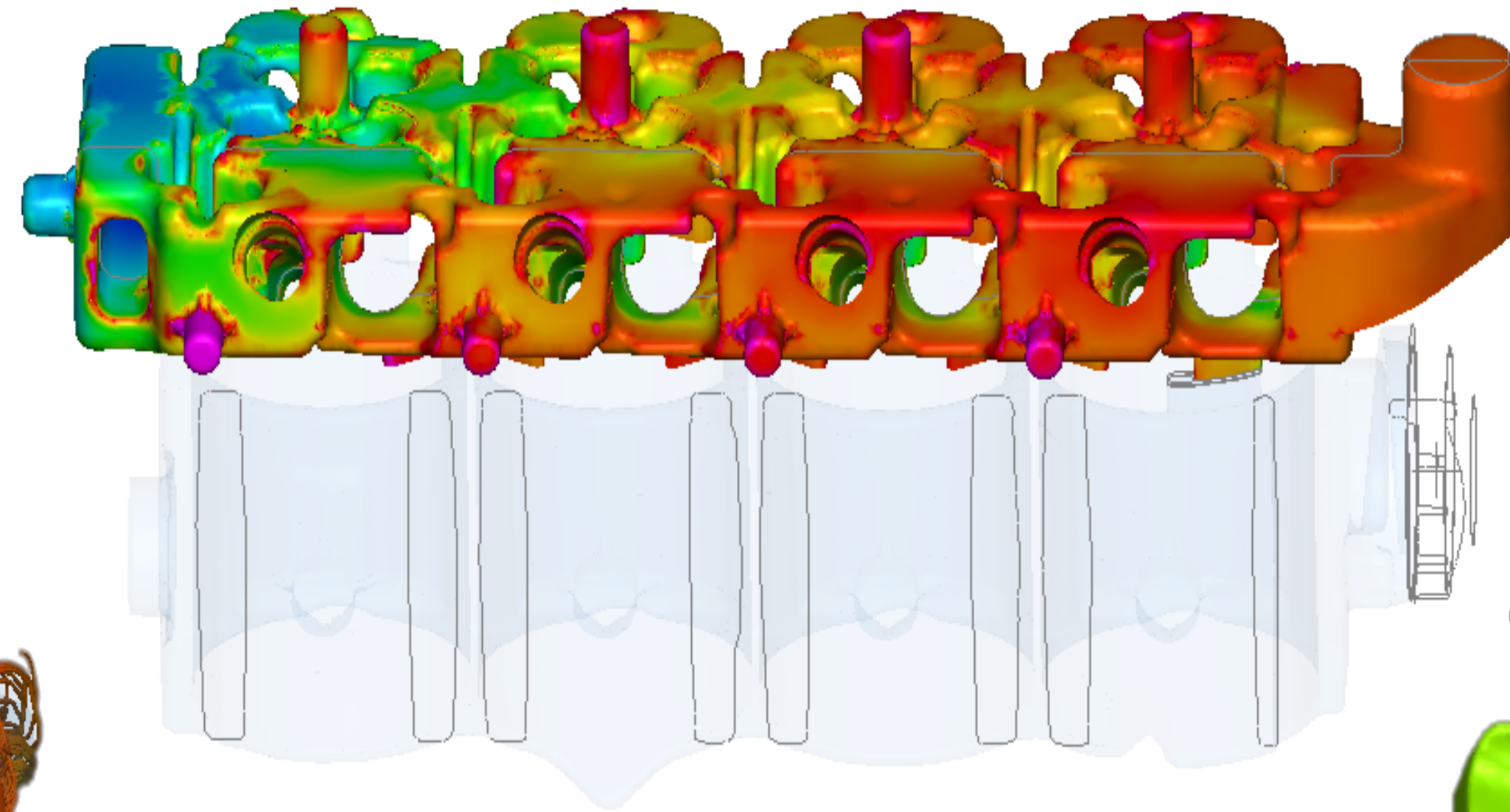


# Qualitative Results

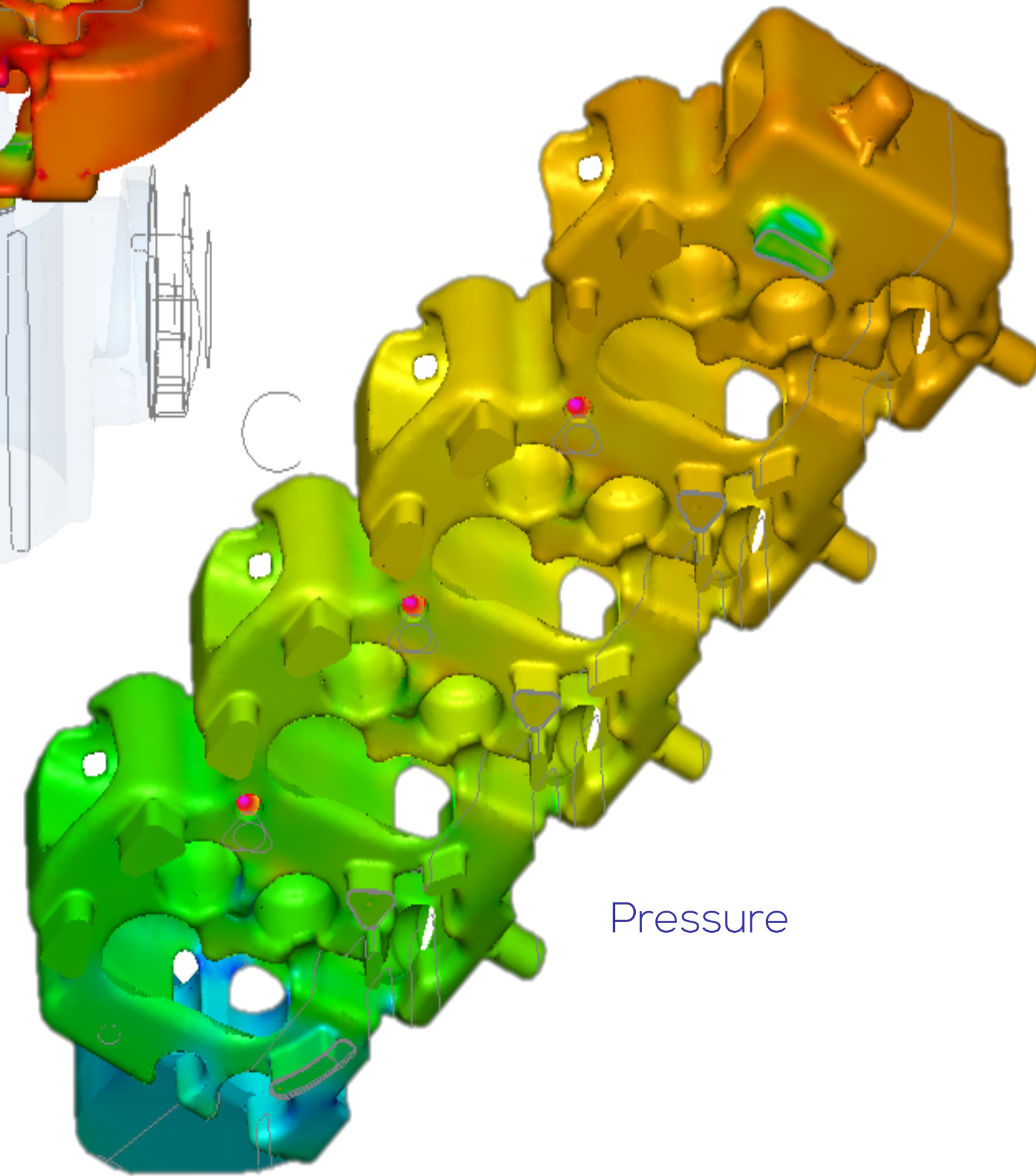
Streamlines



Total Temperature



Pressure





# Project Schedule

Schedule	
Mesh generation	20 minutes
Model Set up	10 minutes
Run Time	30 minutes
Type of analysis	Steady State
Ram requested	700 Mb



The analysis run on a Intel Quad-Core i7 PC, 2.8GHz, 8Gb RAM, on Windows7 64bit.

# Conclusions

- SimericsMP can easily handle the analysis of cooling systems and circuits.
- Ease of use and fast turn around time allow SimericsMP users to implement CFD simulation in the engineering development process.
- SimericsMP builds the most efficient mesh for the specific topology thanks to its proprietary CAB Mesher.
- The mesher can scale down cell size to microns, allowing to easily model small ducts and gaps
- The set up of the problem is easy and flexible to fulfill different needs.
- Transient and Steady State analyses converge require very short computational time on “everyday” machines.
- Results are accurate and provide both qualitative and quantitative output.