Objectives / Expected Results

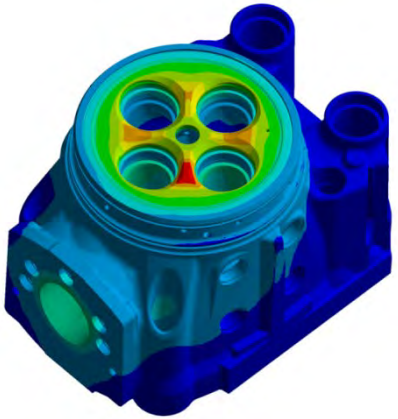
WP Leader: Dr. Rayk Thumser
Deputy: Santiago Uhlenbrock

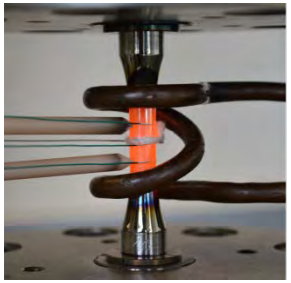
WP 4.1 New materials and design for cylinder heads

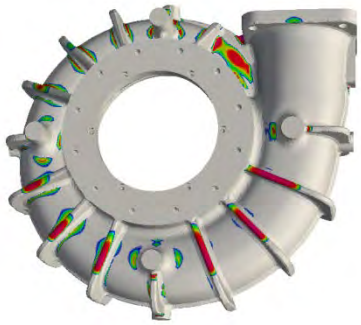
- Improvement of thermomechanical cycle resistance of factor 2 under increased temperature of 50 K
- decreased weight of cylinder head of 20%

WP 4.2 New materials for the turbocharger turbine casing

- Improvement of thermomechanical cycle resistance under increased temperature of 70 K under corrosion environment







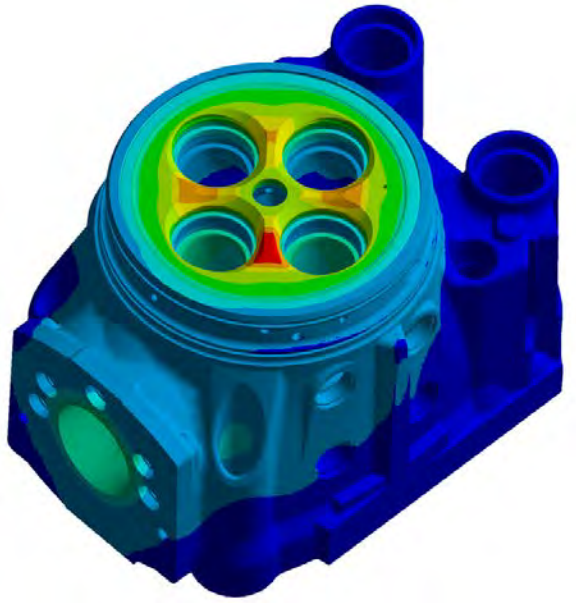
Partners:

Fraunhofer IWM
Hochschule Offenburg University of Applied Sciences
Fraunhofer ICT
BAM Bundesanstalt für Materialforschung und -prüfung

Structure: Subprojects, Activities

WP 4.1 New materials and design for cylinder heads

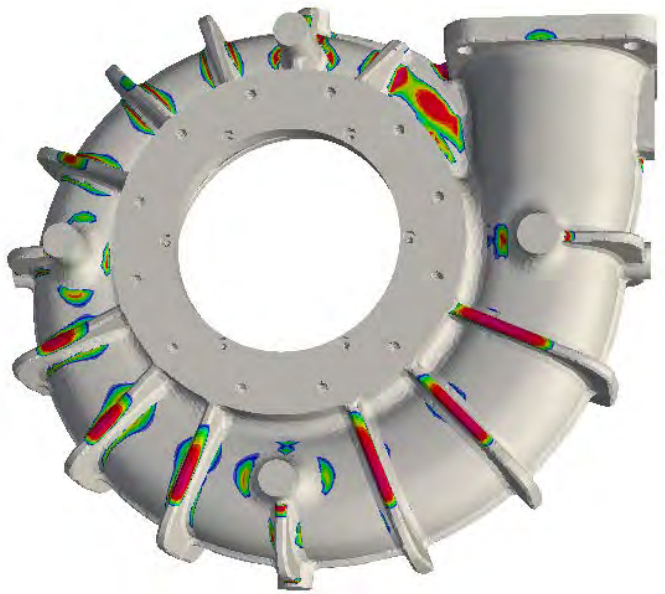
- Pilot study
- Selection of appropriate material
- Intensive investigation on thermomechanical fatigue
- Development of models for TMF life prediction
- Design and construction of component test rig
- Validation of the models
- Optimization of cylinder head



Structure: Subprojects, Activities

WP 4.2 New materials for the turbocharger turbine casing

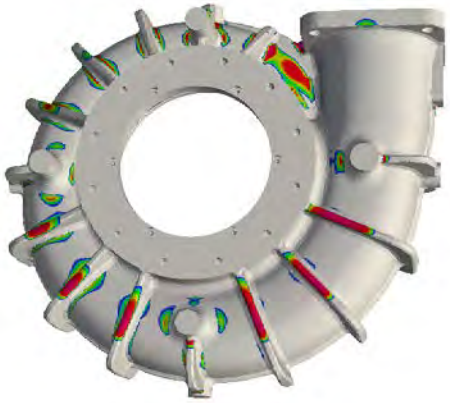
- Selection of appropriate materials for future turbocharger applications
- Material characterization / tests for material model development
- Model development & validation, for the TMF/creep, Influence of oxidation / environment



Structure: Partners, roles

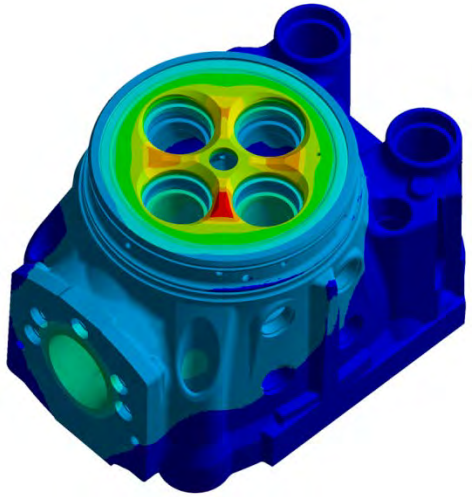
BAM

- Materials testing (TMF) under realistic load condition; material models life time prediction for iron and nickel k casting materials



FG

- Materials testing (LCF and TMF) and establishing the model concept for TMF life prediction (IWM)
- Establishing the concept for validation of the developed models for TMF life prediction on the basis of TMF loaded samples with component-like features and for performing validation tests. (ICT)



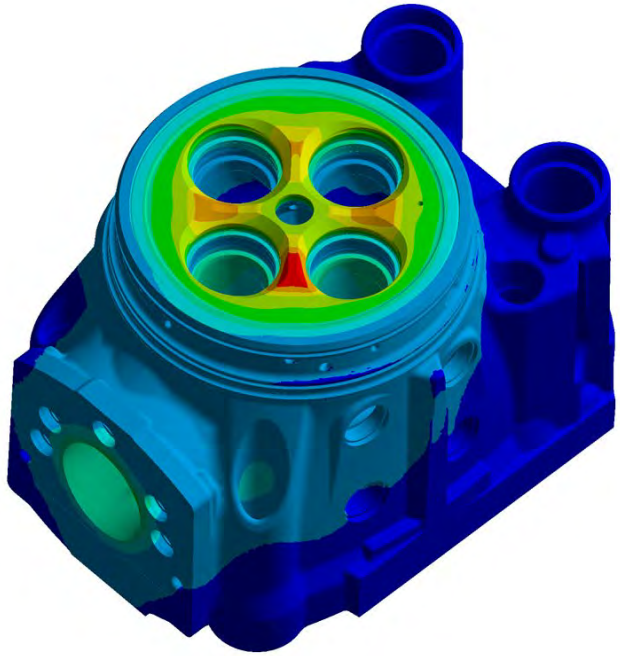
Structure: Partners, roles

HSO

- Development of model concept to assess the TMF life of cylinder head in finite-element calculations

MDT-AUG

- Selection of suitable materials and material treatment processes, providing components for material tests.



Progress update

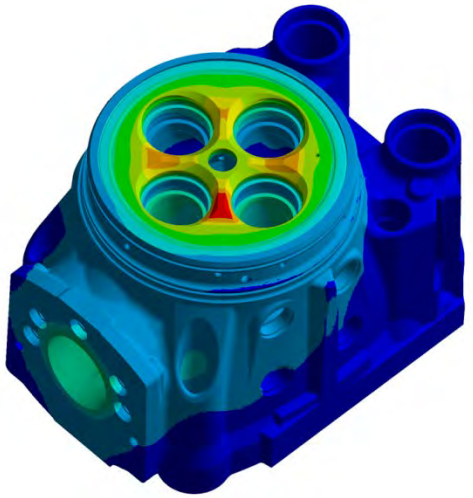
WP4.1

Finished

- 4.1.1 Selection of appropriate materials for pilot study

On Work

- 4.1.2 Casting of the selected materials for pilot study
- 4.1.3 Basic characterization of different cast irons



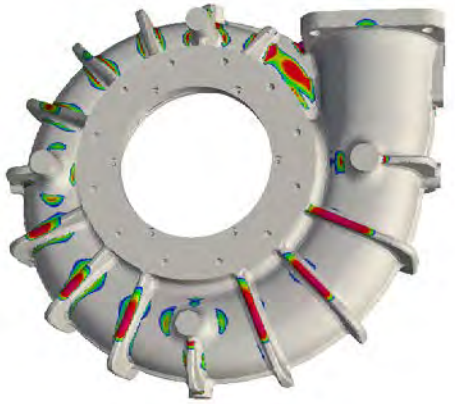
WP 4.2

Finished

- 4.2.1 Selection of appropriate material

On Work

- 4.2.2 Fabrication of test specimens (short delay)
- 4.2.3 LCF-Tests



Future Work within 1st project year

WP 4.1

- Basic characterization of different cast irons
- Selection of appropriate material

WP 4.2

- LCF-Tests
- TMF-Tests
- Creep-Tests
- Beginning Material model development