

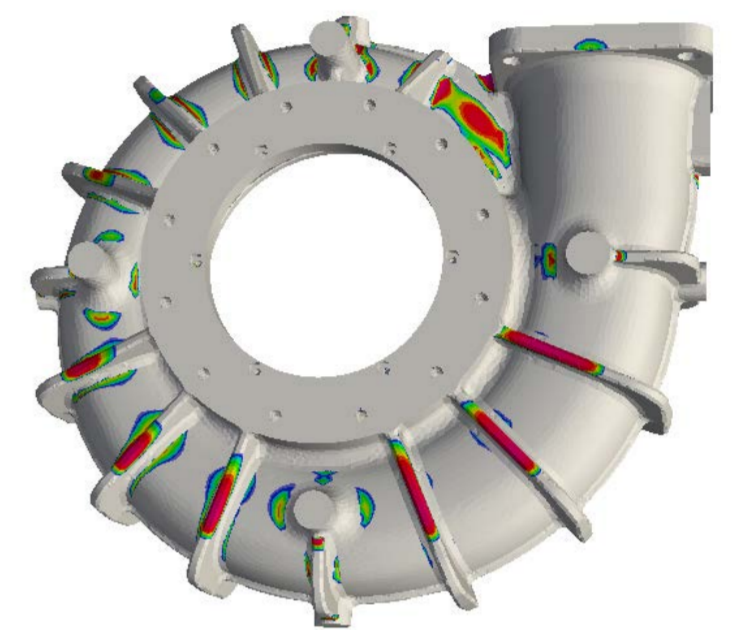
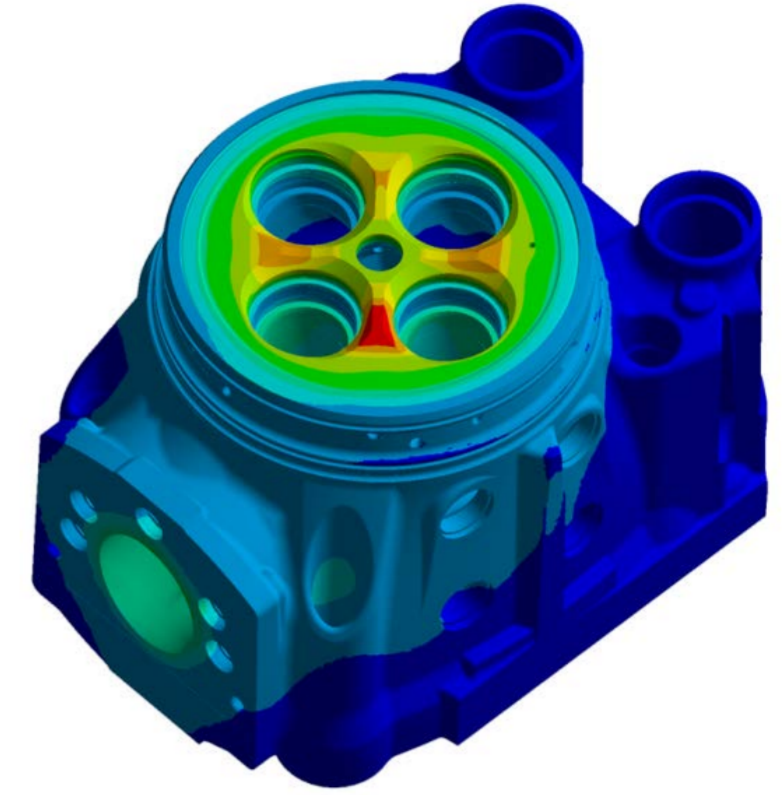
WP4 - New Materials for Higher Engine Efficiency



WP OBJECTIVES

The majority of concepts for emission reduction in internal combustion engines go along with higher component temperatures and mechanical loads. Thus, the thermo-mechanic fatigue (TMF) of engine components comes more into focus. The objective of this Work Package is to develop the use of appropriate material for optimized combustion engines focusing on the cylinder head and the turbocharger turbine casting.

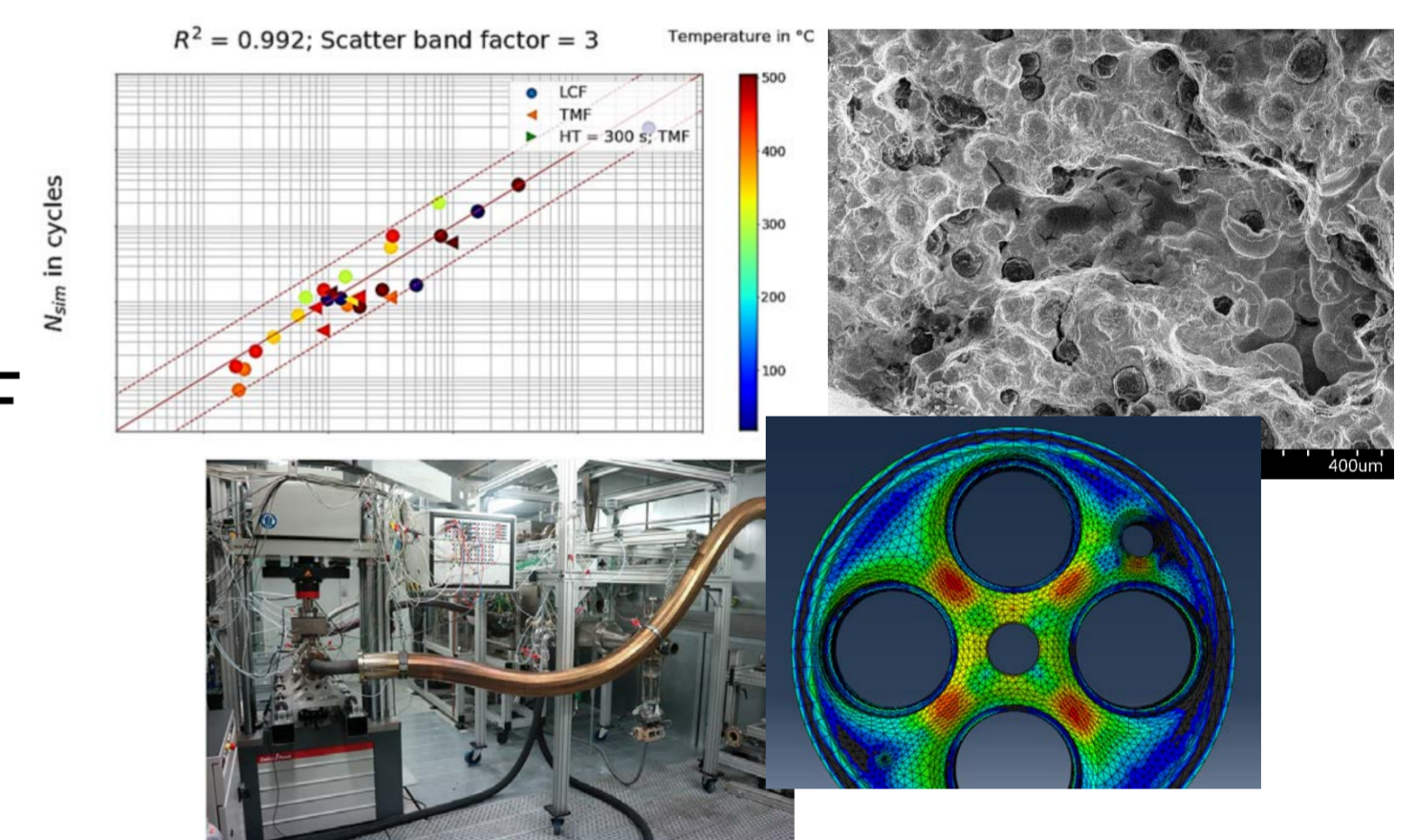
- Improvement of thermo-mechanical cycle resistance of factor 2 under increased temperature of 50 K
- Decreased weight of cylinder head of 20%
- Improvement of thermo-mechanical cycle resistance under increased temperature of 70 K under corrosion environment



ACHIEVEMENTS & FINAL RESULTS

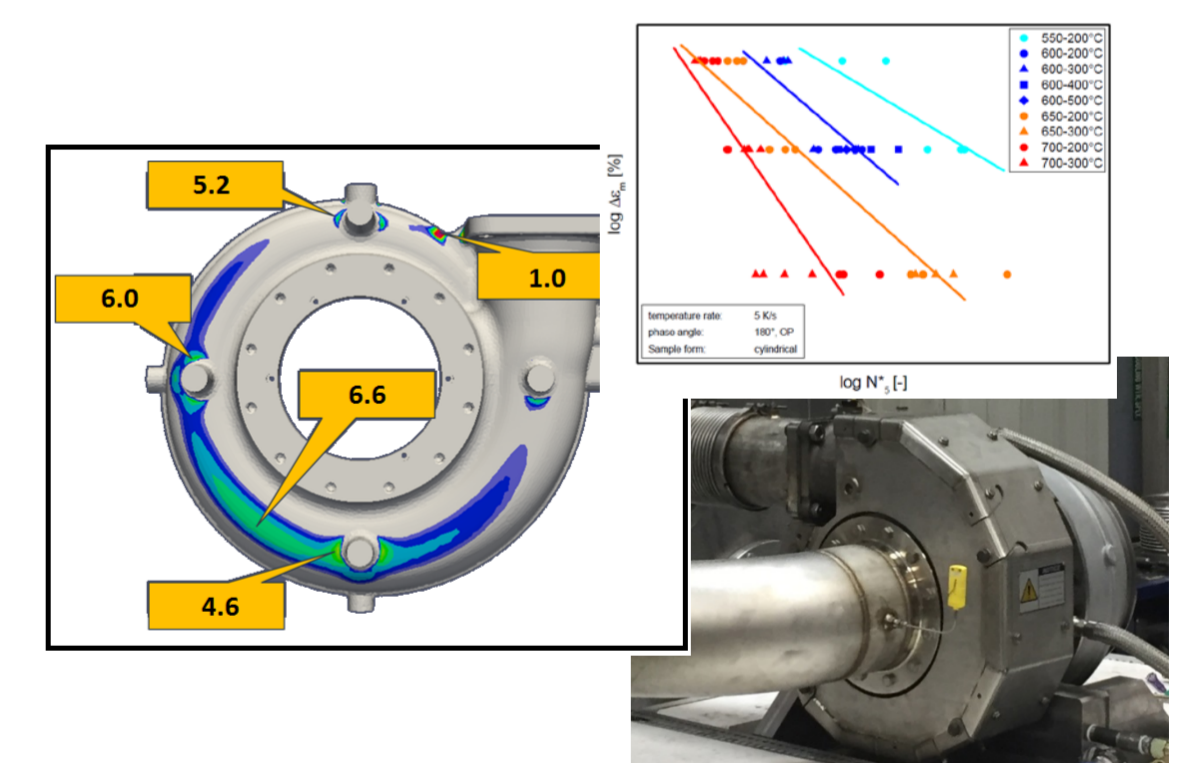
WP 4.1 New materials and design for cylinder heads

- evaluation the selected material in detail (isothermal complex LCF tests, TMF, metallographic investigations)
- New material model development
- Optimization of Cylinder Head



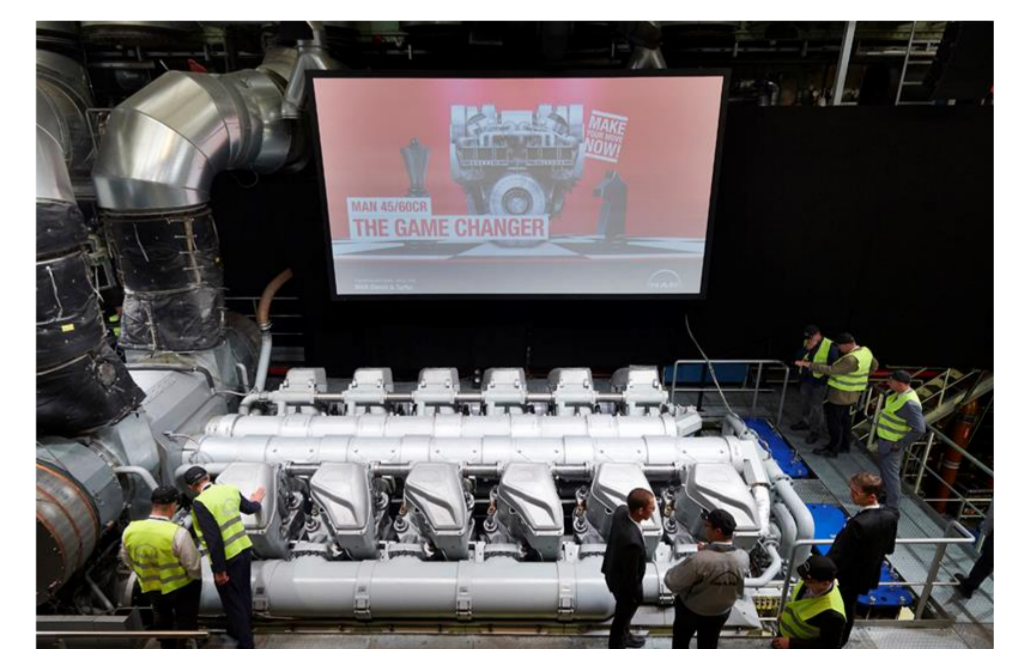
WP 4.2 New materials for the turbocharger turbine casing

- material model development for fatigue and creep
- validation of developed material model within application on TC inlet casing on hot burner test rig: deviation of max. 23% of predicted life



Exploitation:

- Results from WP4 implemented into newest design of cylinder head of 45/60, first engines in field in 2019
- Turbocharger successful tested and design is proofed
- Method for design established for future product development



WP PARTICIPANTS

MAN Energy Solutions SE is a leading supplier of diesel and gas engines for maritime and stationary applications

BAM is the Federal Institute for Materials Research and Testing of the Federal Republic of Germany.

FG Fraunhofer is Europe's largest application-oriented research organization.

HSO The cornerstones of Offenburg University are applied research, innovation and technology transfer sciences.

