

WP Group II - New Materials

WP4 - New Materials for Higher Engine Efficiency



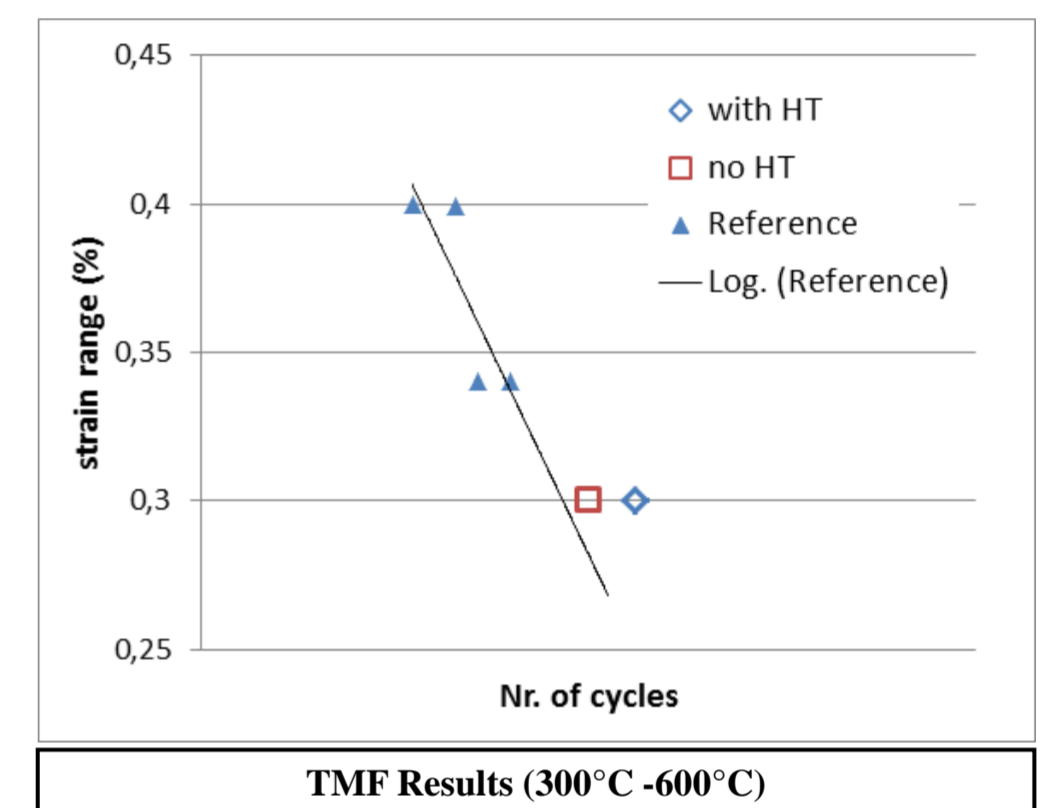
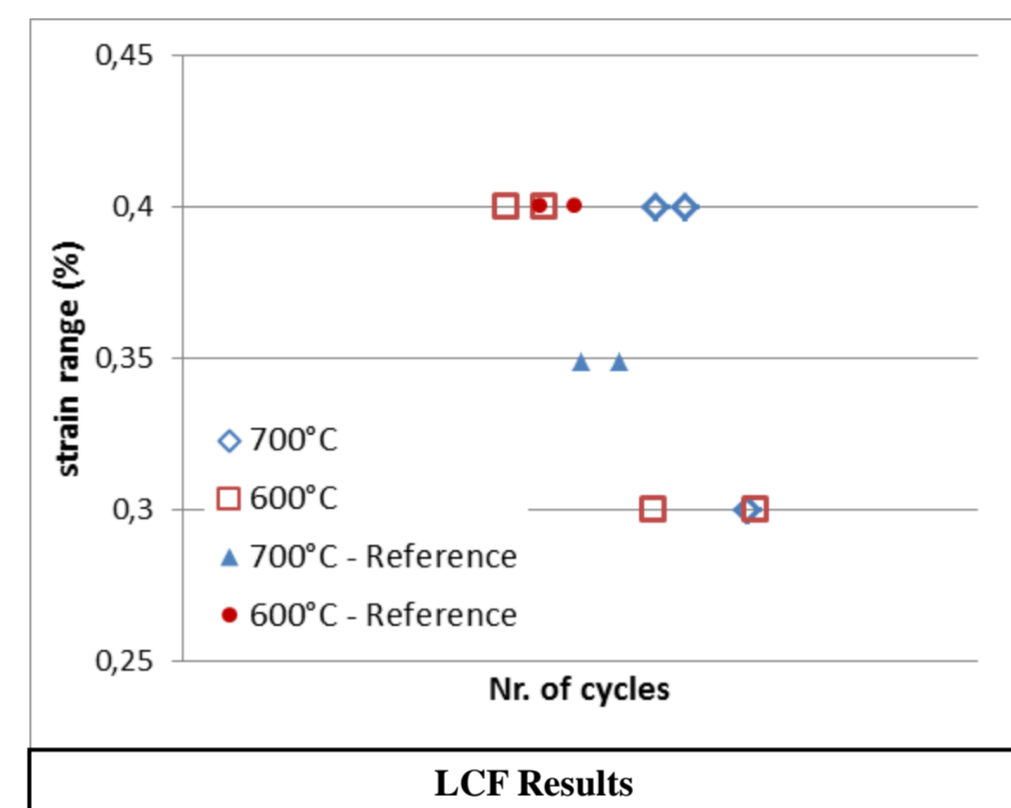
WP OBJECTIVES

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

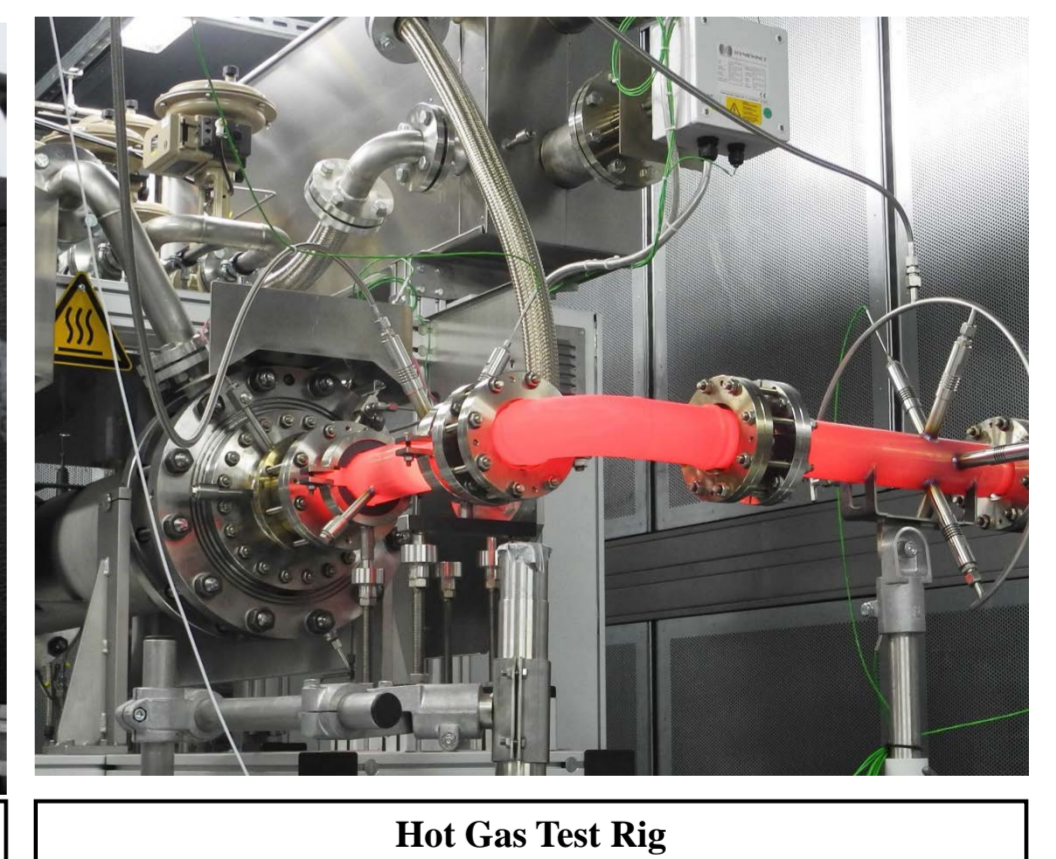
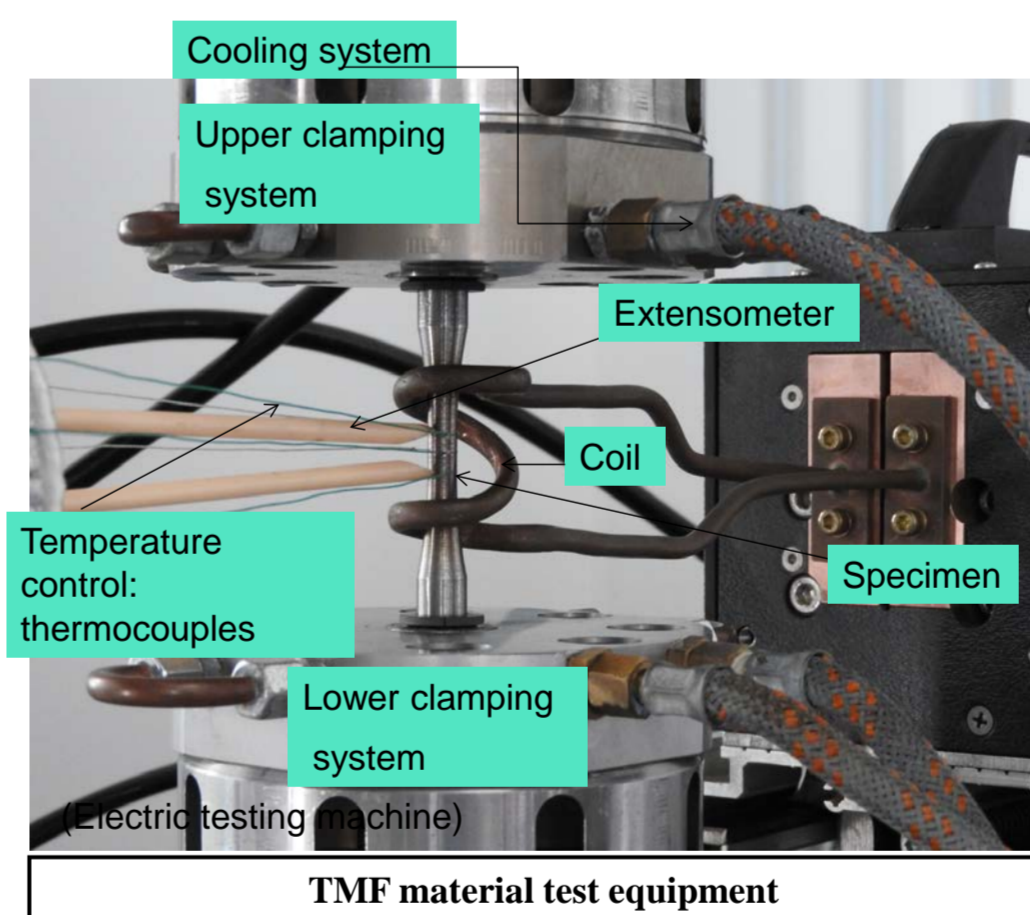
EXPECTED OUTCOME

- Quantification of the TMF characteristics of cylinder head and the turbocharger turbine casting materials.
- TMF material model for the lifetime computation of turbine casting and of cylinder head.
- Design and construction of test rig for cylinder head equivalent specimen component and simulation of thermal boundary condition.
- Verification of TMF material model with test results.



PROGRESS AND PLANS

- Technological material tests
- Thermo-mechanical fatigue test rig for component
- Material model for turbine casing assessment
- Thermo-mechanical fatigue model for new cylinder head
- Cylinder head optimization



WP PARTICIPANTS

MAN Diesel & Turbo 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.

