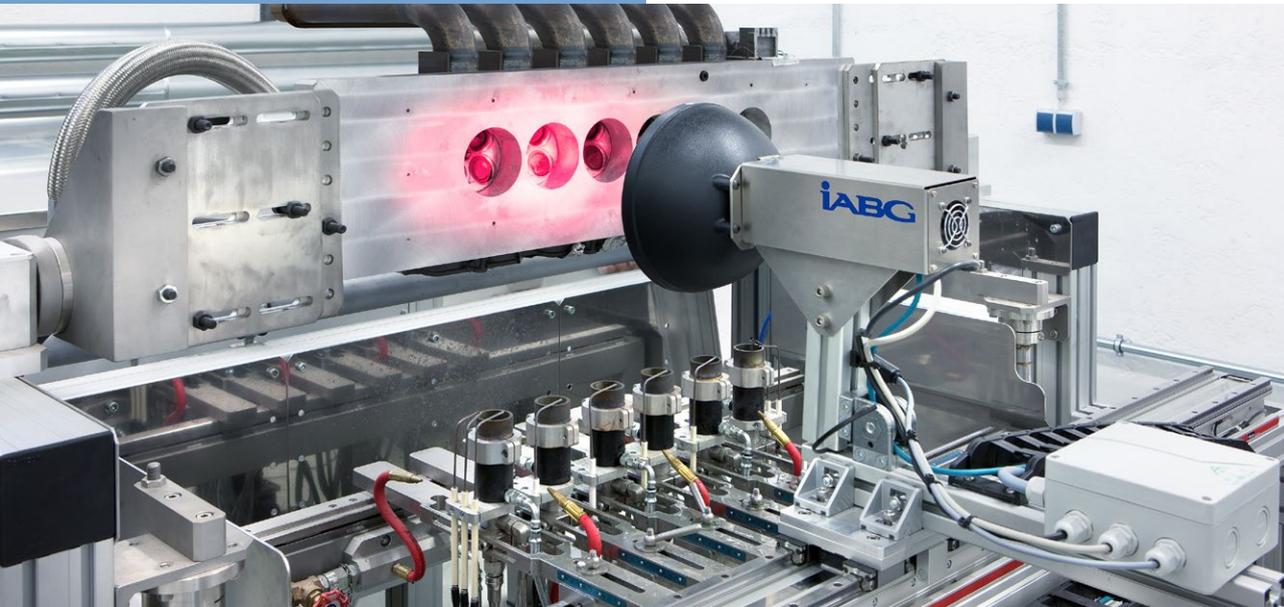


Intelligent Testing



Cylinder head test stand

Simulating the thermo-mechanical fatigue of cylinder heads



The time and cost-saving alternative for the engine test stand

Task

Our cylinder head test benches can be used to perform time-lapse simulations of the thermo-mechanical fatigue (TMF) cycles for cylinder heads in the lab in order to verify the TMF strength of test items.

Test stand

The test facilities employ burner units which run on a propane-oxygen mixture. Each one contains six separately adjustable burners on which cylinder heads of various dimensions can be continuously tested at a high performance level.

The test item is mounted on a dummy crankcase, which has been designed and optimised using computational fluid dynamics (CFD) to create flow conditions in the cooling channels of the cylinder head identical to those which exist in the running engine.

The test items can be quickly brought to operating temperature and be cooled using tempered glycol-water mixtures in user-defined and selectable cycles. There are two separate coolant circuits, each set to a different inlet temperature so that the cooling curves can be adapted to the required conditions. All facility components are designed for automated, continuous operation.

The open structure permits inspection during continuous tests with interruptions of just minutes. A digital camera system is also employed to detect and document fractures. The test bench can be controlled automatically via a user interface. The test chamber is connected to a control room, a separate assembly zone and a storage room.

IAGB provides these testing services, including the design and CFD-optimisation of adaptation parts for clients in the automotive, power engineering and shipbuilding industries.

Benefits

The cylinder heads can be tested at very early stages of development without the need for the entire engine.

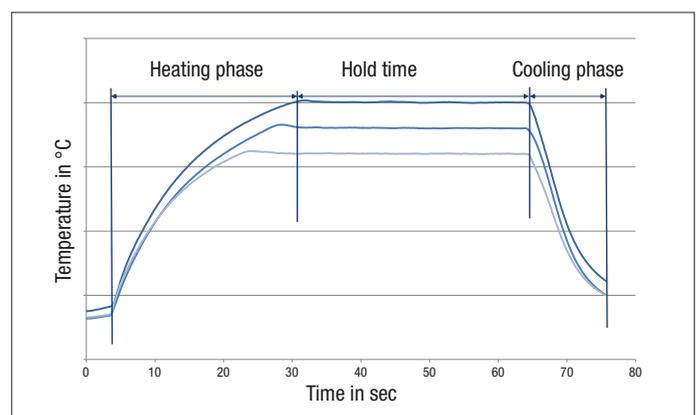
Both the duration as well as the costs of the tests are significantly lower than those for tests using common engine test benches.

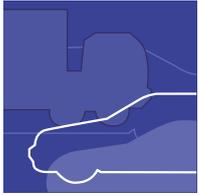
During the test phase, an automated digital camera system can be used to detect and document cracks and fracture development. This leads to faster and more precise test results with regard to service life and fracture development, allows for multiple tests with different parameters and provides statistical proof of test results based on a high number of test runs. This opens up new options for validation and optimization of mathematical methods.

The test stands may be used for passenger car and commercial vehicle engines, ship engines or heavy-duty gas engines used in the power generation industry.

IAGB's innovative test methodology can help shorten development cycles and significantly reduce the amount of time and cost intensive engine endurance tests. Using the new quasi continuous crack inspection, simulation models can be validated and optimised significantly. So, the quality of both simulation and test results can be improved significantly. This gets more and more important as the power output per liter increases.

Example of a test cycle





AUTOMOTIVE

About IABG

IABG is a leading European technology enterprise. We focus on trend-setting high technology and science applications. We plan, implement and operate. With approx. 1,000 experienced and committed employees we provide our customers with solutions in the sectors Automotive • InfoCom • Mobility, Energy & Environment • Aeronautics • Space • Defence & Security.



INFOCOM

About IABG Automotive

- Simulation, computation and optimisation of strength, crash, vibration, acoustic and flow properties
- CAD and component optimisation
- Vehicle dynamics simulation
- Experimental testing for
 - Vibrations
 - Environmental simulation, EMV
 - Function, service life and materials
- Automation and testing systems for fatigue and function, mechatronics
- Operation of test facilities



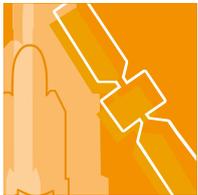
MOBILITY, ENERGY & ENVIRONMENT

As a development partner of the automotive industry we provide quality control and quality assurance services and develop solutions in the areas of functional efficiency, quality, design, and materials. We offer a broad spectrum of products and services, ranging from numerical analysis to experimental testing and consulting to the realisation of turnkey, customised test systems that we operate for the customer.



AERONAUTICS

We support our customers with combined services in the development of components or complex mechatronic systems, optionally with hardware-in-the-loop (HIL) simulations.



SPACE

For further information please contact
 Phone: +49 89 6088-4454
 Fax: +49 89 6088-4066
automotive@iabg.de
www.iabg.de



DEFENCE & SECURITY

IABG
 Einsteinstrasse 20
 85521 Ottobrunn
 Germany
 Phone +49 89 6088-2030
 Fax +49 89 6088-4000
info@iabg.de
www.iabg.de