Laboraty and IT-Infrastructure

Numerical and experimental laboratory and computer architecture is available at Fraunhofer LBF:

- Fatigue testing machines from 5 to 2500 kN for force-, displacement- and strain-controlled tests under constant or variable amplitudes
- Resonance testing rig from 20 kN to 600 kN
- Small load test rgs from 1 N

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- Investigation of specimens and components ranging in size from a few millimeters to several meters in length
- Computer-aided simulation of loads: Finite element analyses, multi-body simulations
- Metallographic examinations and equipment: microstructure, hardness, fracture surface analysis, roughness and contour measurement; light microscope, hardness tester, tensile testing machine, SEM and EDX, 3D Scanner

Corrosive media can lead

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Fraunhofer LBF Bartingstraße 47 64289 Darmstadt www.lbf.fraunhofer.de Materials interacting with corrosive media

Environmental simulation

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Quasi-static and cyclic qualification and evaluation of materials in interaction with corrosive media



Lightweight materials research

For decades, Fraunhofer LBF has been conducting research into the factors influencing the structural durability of lightweight materials and compatible materials for the mobility of the future.

Lightweight materials in the stress test

Renewable energies, reduction of pollutant emissions and electromobility are the challenges of the future. This also increases the demands on materials and components, especially if they are exposed to corrosive environmental conditions such as hydrogen, seawater, salt, biogenic or synthetic fuels. Lightweight materials, e. g. aluminum and magnesium alloys, play a very important role in resource-saving material use. Their suitability for use in corrosive environmental conditions must be evaluated on the basis of experimental investigations, depending on the material-media interaction especially for cyclically loaded components.

Corrosion effects

Corrosive ambient media can lead to a strong reduction of the fatigue strength both in the low-cycle and high-cycle fatigue regime. Individual and variable experimental concepts are available at Fraunhofer LBF to evaluate the influences of different material-media interactions under mechanical loads. The analysis includes the determination of the cyclic material behavior under constant and variable load amplitudes of material samples as well as components, also under realistic environmental conditions. On the basis of these investigations, mechanisms are determined, which are subsequently incorporated into concepts for the consideration of strength-reducing environmental conditions.



Investigations under corrosive media

- under compressed hydrogen
 - Pressure range 10 bar to 50 bar
 - Temperatures from -40 °C to 130 °C
 - Tensile and fatigue tests
 - Reference tests under nitrogen at a pressure of 10 bar
- under electrochemical loading
 - Pre-loaded, in-situ tensile and fatigue tests
- in aqueous media
 - salt solutions, artificial seawater, individual test conditions
 - spray, sprinkling in flow-through, immersed
- in media containing hydrocarbons
 - biogenic, synthetic or conventional fuels
 - coolants, oils, brake fluids
- under temperatures from -40 °C to 1000 °C
 - force and strain controlled

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