

Textile tensile test set-up

Service Offering

The HTL offers services and R&D in the field of mechanical materials testing. Orders are carried out by experienced specialist personnel in a timely manner and in accordance with standards. The testing equipment used is regularly calibrated. The LabMaster operating software, which was specially developed for use in materials and component testing, guarantees optimum measurement data acquisition.

In close coordination with the customer, the test sequences are defined and, if necessary, optimal test conditions for customer-specific requirements are set via pretests. The test results are made available to the customer in the form of standardized test reports. An interpretation of the measurement data can be provided on request.

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Fraunhofer Center HTL is certified
acc. to ISO 9001:2015 (Certificate
registration number 507805 QM15).



Center for High Temperature Materials and
Design HTL

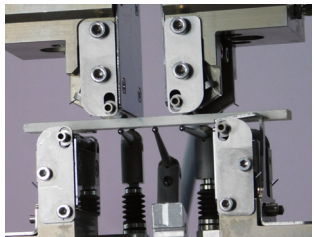
Mechanical Testing

Mechanical Testing

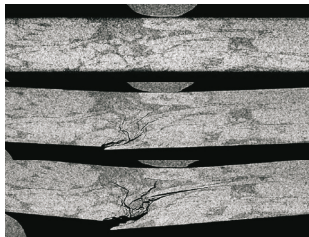
The mechanical properties of materials are decisive for the design of components made from them. They significantly determine the service life of the components in use. Depending on the application, very different mechanical properties must be determined in accordance with standards:

- Flexural strength
- Tensile / compressive strength
- Stress intensity factor / fracture energy
- Weibull modulus
- Stiffness
- Storage modulus / loss modulus / internal damping
- Fatigue strength
- Shear strength
- Shear strength of joints

In addition to a representative number of specimens, knowledge of microstructural properties, such as structural anisotropy, grain size distribution and microstructural defects of any kind, is also important for evaluating the characteristic values obtained. At Fraunhofer Center HTL, these can be additionally recorded by density and porosity measurements, computed tomography (CT) examinations or other test methods accompanying mechanical testing.



Flexural testing set-up



CT-view of flexural testing
(cross-section)

Testing Methods

Standardized testing of test specimens

- Tensile tests (e.g. DIN EN 658-1*, ASTM C1359*, RT up to 1,300°)
- 3-point and 4-point flexural tests (e.g. DIN EN 658-3*, DIN ISO 843-1*, ASTM C1341*, RT up to 1,500°)
- Compression tests
- Interlaminar shear strength (e.g. DIN EN 658-5*)
- Compliance measurements
- Strain measurements with strain gauges
- Shear tests (e.g. Iosipescu, Double-Notch according to ASTM C1392)
- Transverse contraction measurements to determine Poisson's ratio

Component-specific testings

- Single point tensile failure
- Area compression failure
- Flexural test on large components (< 2 m, < 1,200 °C)

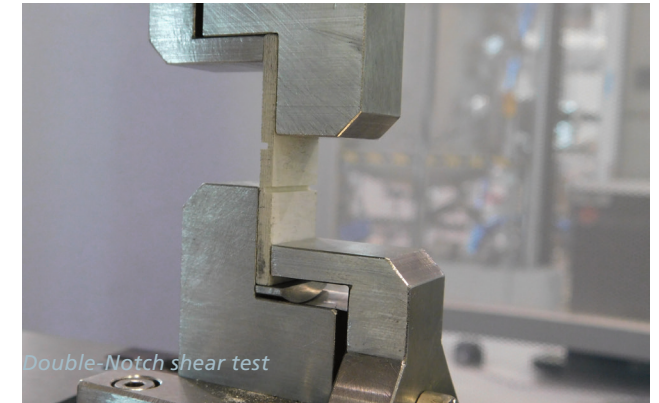
3D in-situ material imaging under load

- 3D CT investigation of materials as well as failure mechanisms and crack propagation under load
- 3D investigation by means of a specially developed X-Ray transparent 3-point flexural test set-up for CT

Dynamic mechanical thermal analysis up to 1,500 °C

- Tensile tests (RT up to 500 °C)
- Compression tests (RT up to 500 °C)
- Symmetrical and asymmetric 3- and 4-point flexural tests (RT up to 1,500 °C)
- Fatigue strength (RT up to 1,500 °C)

* Testing laboratory accredited by DAkkS according to ISO/IEC 17025. The accreditation is only valid for the scope of accreditation PL-11140-30 listed in the certificate annex.



Measuring Devices

Multiple universal testing machines

- Max. static force 3 N to 100 kN
- Test speed 0.005 to 1,000 mm/min
- Displacement-, force- or strain controlled
- Testing of test specimens or components made of plastics, ceramics, glass, metal and composite materials
- Testing of textiles, single fibers and fiber bundles

Dynamic mechanical thermal analysis

- Max. static force 5,000 N
- Max. dynamic force 1,500 N
- Frequency range 0.01 to 300 Hz
- RT up to 1,500 °C
- Test types: pure static, temperature or frequency sweep and combinations
- Mechanical testing of ceramics, glass and metal