MATERIALS CENTER LEOBEN
FORSCHUNG GMBH

We innovate Materials

# mechanical materials testing

- hardness testing
- static materials testing - tension/compression/bending
- cyclic materials testing -Low Cycle Fatigue (LCF)
- cyclic materials testing -High Cycle Fatigue (HCF)
- fracture mechanics

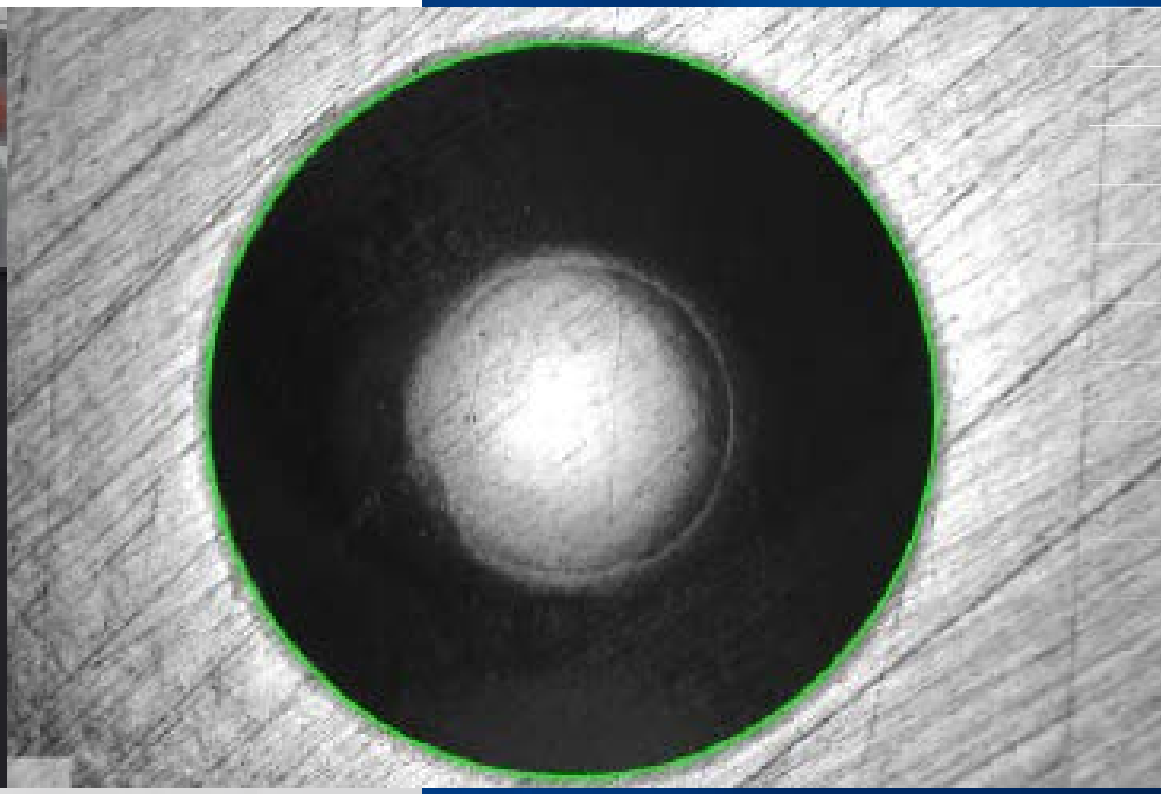
COMPETENCE & RELIABILITY

ISO 9001 CERTIFIED ISO 9001

Akkreditierung Austria A 0421 ISO/IEC 17025 T

Accredited testing laboratory acc. to EN ISO 17025

# hardness testing



performance of hardness tests (Vickers HV, Brinell HB, Rockwell HRC) within the scope of accreditation according to EN ISO 17025.

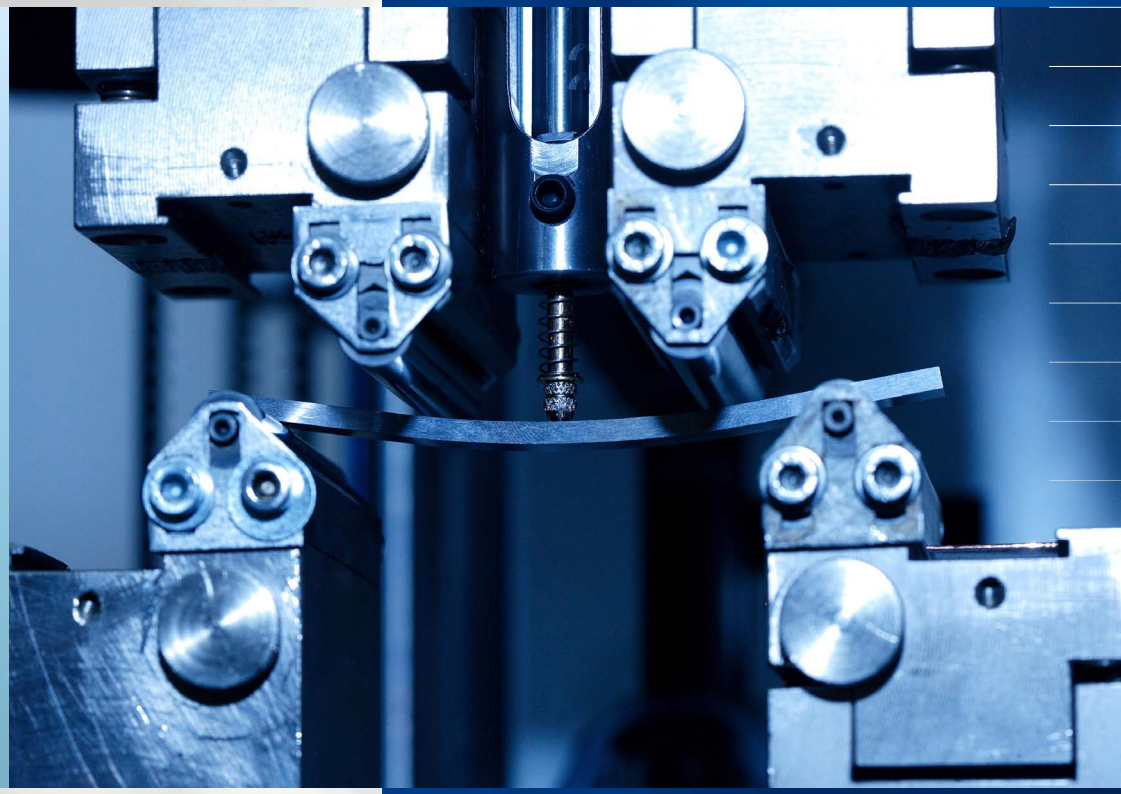
**our focus / competences**

- determination of core hardness HV, HRC, HB in the accredited lab
  - EN ISO 6506-1 (HB)
  - EN ISO 6507-1 (HV)
  - EN ISO 6508-1 (HRC)
- measurement of hardness profiles
- hardness measurement of metallic and ceramic materials

**contact**

Ing. Robert Peissl
P +43-3842-45922 - 38

# static materials testing - tension/compression/bending



determination of mechanical material parameters for low- to high-strength materials under tension, compression and bending

*(partly within the scope of accreditation according to EN ISO 17025)*

**contact**

Dr. Stefan Marsoner
P +43-3842-45922-0

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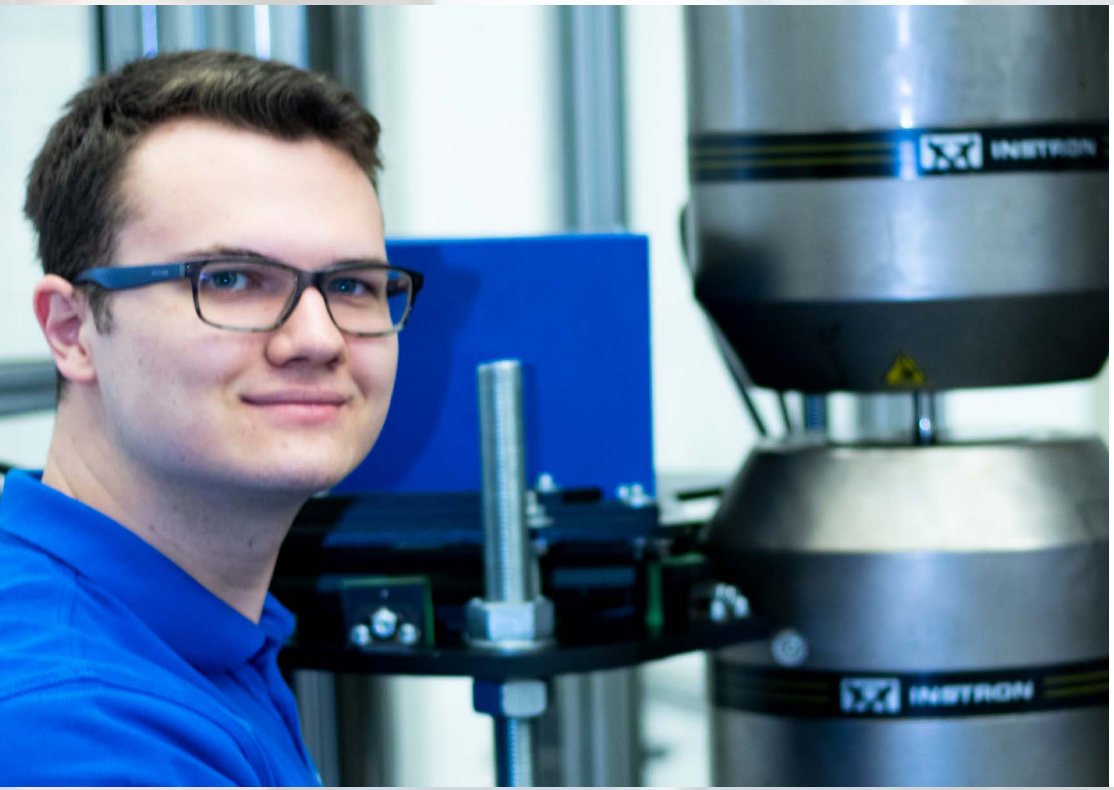
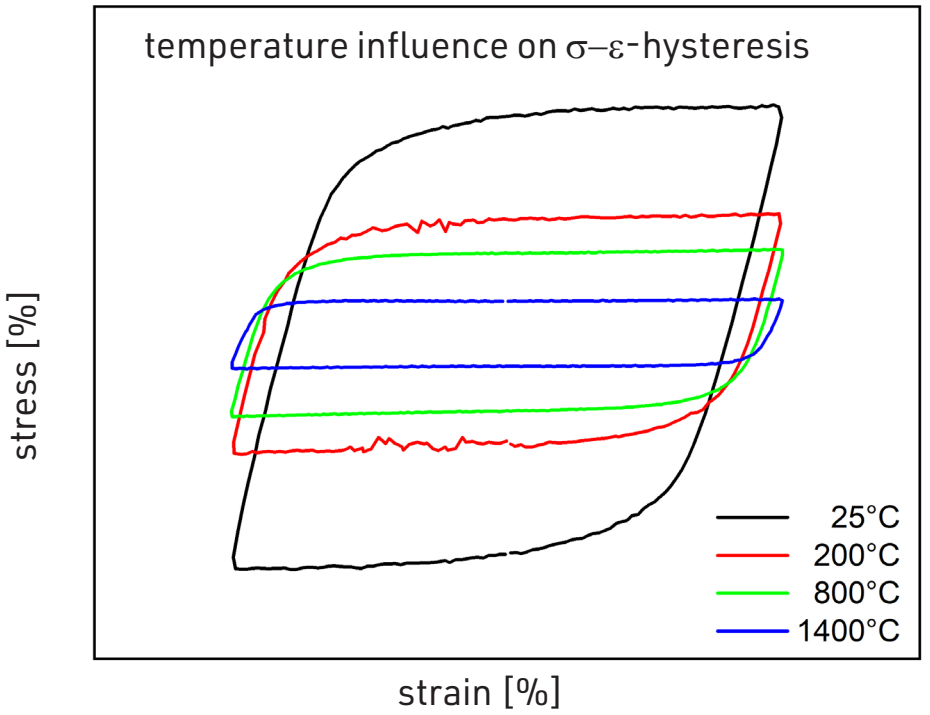
**our focus / competences**

- tensile test acc. to EN ISO and ASTM standards (partly within the scope of accreditation)
- compression test acc. to ASTM E9 and DIN 50106
- 3-point and 4-point bending test
- temperature range from -150°C to 1400°C
- combination with local deformation analysis (Aramis)
- specimen fabrication and testing of various specimen geometries and dimensions

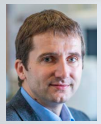
# cyclic materials testing - Low Cycle Fatigue (LCF)




determination of cyclic material properties (strain creep curves, cyclic creep,...)

**contact**



Dr. Stefan Marsoner
P +43-3842-45922-0

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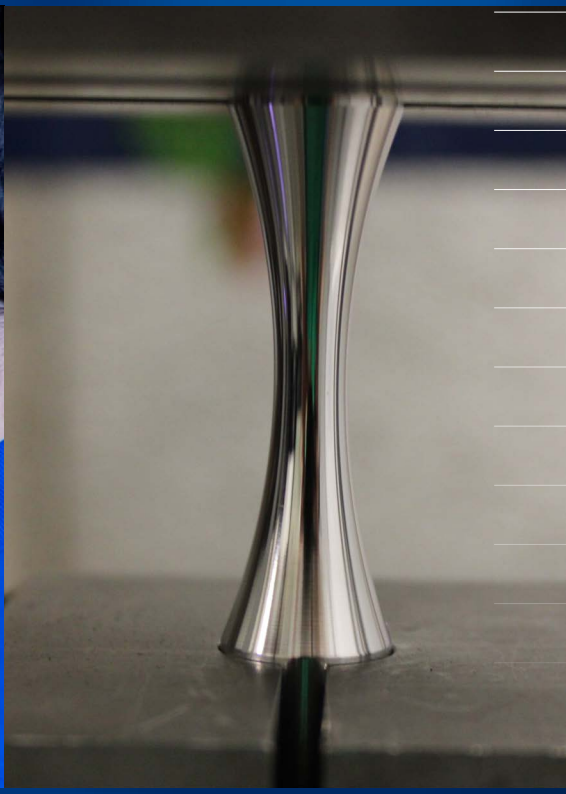
**our focus / competences**

- strain camber curves (ASTM E606, ISO 12106)
- cyclic flow curves
- cyclic creep
- tension/compression ± 250 kN from -150°C to 1400°C
- high precision laser strain measurement
- vacuum / air / inert gas
- Individual load block programs
- Special tests: coupling heating / cooling with mech. loading (e.g. properties of metastable phases)

# cyclic materials testing - High Cycle Fatigue (HCF)

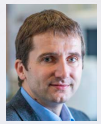
determination of cyclic material properties (Wöhler curve, fatigue strength) at room temperature and elevated temperatures

*(partly within the scope of accreditation according to EN ISO 17025)*

**our focus / competences**

- High Cycle Fatigue tests (HCF) within the scope of accreditation acc. to EN ISO 17025 (DIN 50100, ASTM E466, ISO 1099)
- test frequency up to 180 Hz
- temperature: -150°C ($N_2$) to 900°C (air)
- statistical evaluation temporal strength / fatigue strength
- tensile-compression, torsion, bending (3PB, 4PB, 8PB)
- different atmospheres (air/protective gas/vacuum)

**contact**



Dr. Stefan Marsoner
P +43-3842-45922-0

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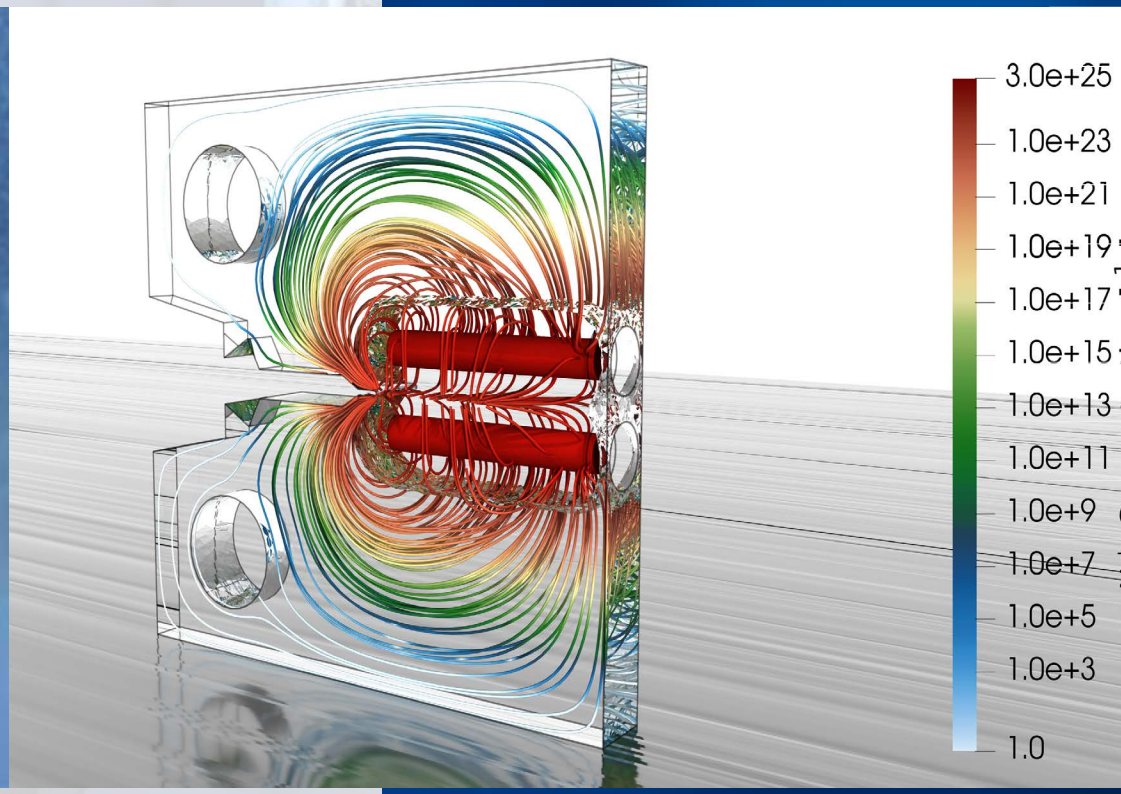
# fracture mechanics




performance of static and cyclic fracture mechanics tests

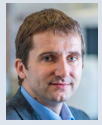
*(partly within the scope of accreditation according to EN ISO 17025)*

**our focus / competences**

- static fracture mechanics:
  - KIC, JIC, JΔa-curve, CTOD
- cyclic fracture mechanics:
  - da/dN-curves
  - threshold value determination
  - crack resistance curves
- different test arrangements
  - CT, SE(B), SE(T)
- temperatures between -150°C and 800°C

Akkreditierung Austria A 0421 ISO/IEC 17025

**contact**



Dr. Stefan Maronser
P +43-3842-45922

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# Service offer

**hardness testing**

- Determination of core hardness and hardness profiles HV, HRC, HB

**Static material testing**

- Uniaxial tensile test (-150°C to 1400°C)
- Uniaxial compression test or cylinder crush test according to ASTM E9 or DIN 50106 (-150°C to 1400°C)
- 3-point and 4-point bending test
- further technological tests with special setups acc. to customer requirements

**cyclic material testing**

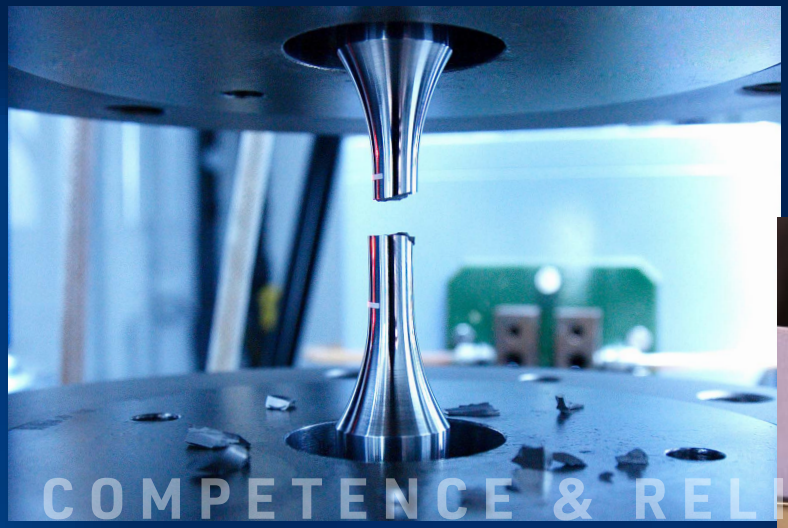
- LCF Low Cycle Fatigue tests (-150°C to 1400° C) (strain camber curves, cycl. stress-strain curve, ratchetting, strep-incemental-test, ...). (ASTM E 606, ISO 12106)
- Multiaxial tension-compression-torsion test (RT up to 900°C)
- HCF high cylce fatigue tests (-150°C to 850°C) (stress creep curves statistically validated, tension-compression, bending, torsion)

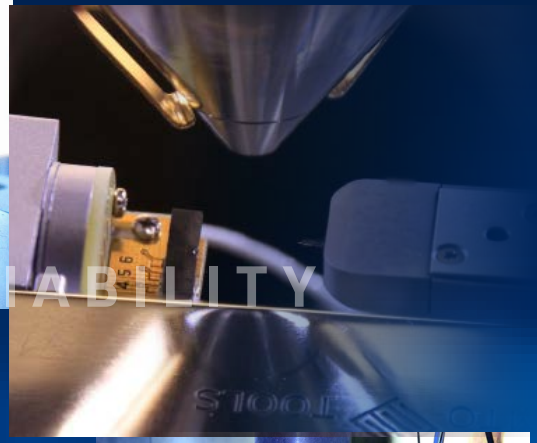
**fracture mechanic investigation**

- Static fracture toughness test (KIC, JIC, JDa, CTOD) (-150°C to 800°C) acc. to ASTM E 1820, ISO 12135, EN ISO 15563
- cyclic fracture toughness test (da/dN curves, DKth, Paris range, ...) acc. to ASTM E 647, ISO 12108

**Test procedures within the scope of accreditation acc. to ISO IEC 17025**

- determination of core hardness HV, HRC, HB acc. to EN ISO 6506-1 (HB), EN ISO 6507-1 (HV), EN ISO 6508-1 (HRC)
- tensile tests on metallic materials at room temperature acc. to EN ISO 6892-1, ASTM E8 / E8M, ASTM 370
- tensile tests on metallic materials at low temperatures acc. to EN ISO 6892-3
- hot tensile tests on metallic materials acc. to EN ISO 6892-2, ASTM E21
- cyclic tests on specimens acc. to DIN50100, ASTM E466, ISO 1099
- cyclic tests on fasteners acc. to DIN969
- fracture toughness test KIC according to ASTM E 399



# equipment

- hardness tester Emco Test DV30G5 and QNess Q10A+
- Zwick universal testing machine Z250 (max. 250 kN)
- Zwick universal testing machine Z150 (max. 150 kN) with high temperature furnace up to 900°C
- Instron Hydropulser 8803 (max. 250 kN) mit vacuum chamber, inductive heating and high precise Laserextensometer Fiedler P50
- Instron tension-compression torsion pulsator 8854 (max. 250kN / 2000Nm) with inductive heating / compressed air cooling and high-precision Laserextensometer Fiedler P50
- Instron Hydropulser 8802 (max. 250kN) with temperature chamber (-150°C to 600°C) and high precise Laserextensometer Fiedler P50
- Schenk Hydropulser PS100 (with modernized Instron-elektronic) (max. 100kN)
- 4 x Russenberger-resonance testing machines Testronic 100 / 150 with HT-oven (up to 900°C) and temperature chamber (up to 300°C) and various setups
- 1x Russenberger resonance testing machine Mikrotron-20
- 4x DCPD-potential probes and 1x ACPD-Potential probe from Matelect and 2x high presice DCPD-measurement system (self-made) (for in-situ crack length measurement)
- variable measurement system for optical 3D displacement and deformation measurement by Aramis

MATERIALS CENTER LEOBEN
FORSCHUNG GMBH


**Materials Center Leoben Forschung GmbH**
Department Services
Roseggerstraße 12 | A-8700 Leoben
T +43-3842-45922 | F +43-3842-45922-500
services@mcl.at | **www.mcl.at**