Prüfmaschinen

Testing Machines

40 years of experience

Perfect solutions for:
- Static materials testing
- Dynamic materials testing
- Component testing
- Customized solutions
- Modernisation, Service

Alexandr Dolgikh
Branch deputy director
Electromechanical Universal Testing Machine \textbf{LFM-S 0.2 kN}

Tensile-compressive miniature testing machine \pm 0.2kN dedicated for static and cyclic loading tests on cylindrical and flat samples at X-ray and neutron beams.

**Synchrotron Radiation Facility ANKA**
Karlsruhe Institute of Technology (KIT), Germany

**ANKA Synchrotron Radiation Facility for national and international user operation.**

**Powder Diffractometer (PDIFF beamline)** is dedicated for in-situ phase, strain and microstructure analysis on bulk polycrystalline materials.
Customized Testing Machines for Beamlines

Electromechanical Universal Testing Machine **LFM-S 10 kN**

Tensile-compressive miniature testing machine ±10kN in combination with inductive furnace 900°C for static and cyclic loading tests at X-ray beamline.

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Servohydraulic Dynamic Testing Machine LFV-S 20 kN

Photon Source BESSY II
Hahn-Meitner-Institut, Berlin, Germany

Tensile-compressive testing machine ±20 kN used in combination with furnace up to 1100°C for dynamic tensile and cyclic loading tests at radiation beamlines.

Energy Dispersive Diffraction (EDDI) beamline.

Machine at the EDDI beamline for in-situ mechanical experiment.
Electromechanical testing machine ±200 kN is designed for in-situ deformation tests in combination with rotatable furnace up to 1800°C temperature and a cryostat.

The machine is surrounded by detector at POWTEX beamline for in-situ deformation and texture analysis experiments.

Deformation machine with horizontal spindle drive and a triaxial cell between the pistons.

Technical University of Munich & FRM II Neutron Facility, Garching, Germany
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for application on Synchrotron Beamlines

University of Science and Technology (USTB) in Beijing & Shanghai Synchrotron Radiation Facility (SSRF), China

SSRF is the China’s largest synchrotron research facility, and at the same time one of the advanced third generation light sources in the world.

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Mechanical components

- upper drive unit
- machine frame
- electrical isolation
- chamber inert gas
- pyrometer
- videoextensometer
- mount. brackets; area electrical resistance heating
- lower drive unit
- high accuracy XYZ translation table

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Machine Frame

- drive unit
- high accuracy tension device
- high accuracy torsion device
- alignment device
Machine Frame

load introduction

collet ER32
force introduction

load cell torsion load

Load cell tension load
Sample Environment

- Inert gas chamber (water cooled)
- High accuracy move table xyz (floor stand)
- Electrical resistance heating

Videoextensometer and Pyrometer
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Current Project with DLS

• Static Deformation Machine
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**LFM-10-T**

for DIAD and JEEP beamlines at DLS

Diamond Light Source (or Diamond) is the UK’s national synchrotron light source science facility located at the Harwell Science and Innovation Campus (Oxfordshire).

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# Customized Testing Machines for Beamlines

## Overview of testing machine

<table>
<thead>
<tr>
<th>Electromechanical Testing Machine LFM-10-T</th>
<th></th>
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<tbody>
<tr>
<td>Force max.</td>
<td>±10 kN</td>
</tr>
<tr>
<td>Torque max.</td>
<td>0 N (measurement 10 Nm)</td>
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<tr>
<td>Force measurement accuracy according to EN ISO 7500-1</td>
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<tr>
<td>0.5 – 1% rated range</td>
<td>Grade 1</td>
</tr>
<tr>
<td>1 – 100 rated range</td>
<td>Grade 0.5</td>
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<tr>
<td>Testing height between grips</td>
<td>200 mm</td>
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<tr>
<td>Distance between columns</td>
<td>460 mm</td>
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<tr>
<td>Dimensions WxDxH</td>
<td>602 x 457 x 1655 mm</td>
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<td>Weight</td>
<td>450 kg</td>
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<td>Nominal voltage</td>
<td>230V + N + PE</td>
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<td>Current</td>
<td>16A</td>
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<table>
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<tr>
<td>Weight</td>
<td>43.6 kg</td>
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<tr>
<td>Nominal voltage</td>
<td>230 V</td>
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<td>Current</td>
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Customized Testing Machines for Beamlines

Overview of machine

Upper housing
Load frame (cpl.)
Lower housing
Concentricity measurement unit
Remote control
DLS base stage

Add. load cell 20N
Monitor
PC
4xPCS8000
Rack 25HE (H=1215 mm)
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Load frame

- Upper inner frame
- Removable slip ring
- Columns
- Hydraulic chuck grips
- Lower inner frame
- Safety clamps
- Frame base
- Sample
- Piezo drives system

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Inner components

- Drive torsional
- Spindle 20x3 stroke 38 mm
- Crosshead fix
- Crosshead movable incl. high accuracy guide rails
- Mechanical end switch
- Load cells
- Gear belts
- Axial drive
- Hydraulic chuck grips
- Mechanical stops of movable crosshead

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Axial spindle system

- centered motor Kollmorgen with double synchronous belts up to 10kN
- high accuracy pre-tightened guide rail
- roller screw spindle up to 7.5kN (2x)
- optical position measurement with 1:1 belt transfer to SSI
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Torsion system

- center axis torsion motor Kollmorgen (max 1Nm)
- mechanical disconnected from axial load
- high acc. angle encoder with 1:1 belt transfer to TTL
- Torsional load cell up to 10Nm
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Sample clamping system

- hydraulic chuck grips
- minimum effort on sample alignment

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Optical alignment system

- LED optical measurement system (removable)
- ultra stiff mounting bracket for optical alignment system
- spring pre-loaded setup modus
- ultrafine piezo drives <1nm / 300N
- encoder system with resolution 0.2μm
- translation in X, Z and angle
- mini guide rails included
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Construction of housing
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Control system design

- 4 x (input) digital Boolean - End switch
- 2 x (input) TTL (+5 V) - Encoder piezo angle
- 2 x (input) TTL (+5 V) - Encoder piezo Z
- 2 x (input) TTL (+5 V) - Encoder piezo X
- 2 x (input) SSI - Encoder axial
- 2 x (input) TTL (+5 V) - Encoder torsion
- 2 x (output) RS485 – Piezo angle
- 2 x (output) RS485 – Piezo Z
- 2 x (output) RS485 – Piezo X
- 1 x (input) ±10 V - 10 Nm torque sensor
- 1 x (input) 4 mV/V - 5 kN load cell
- 1 x (input) 4 mV/V - 5 kN load cell
- 1 x (input) 2 mV/V - 20 N load cell
- 20 m cable – Remote control
- 30 m cable – Optical system

DLS Beamline

Length?

(input/output) Ethernet

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Mechanical interface to DLS

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