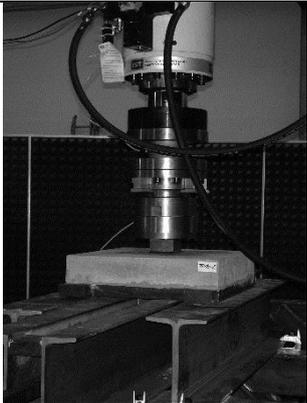
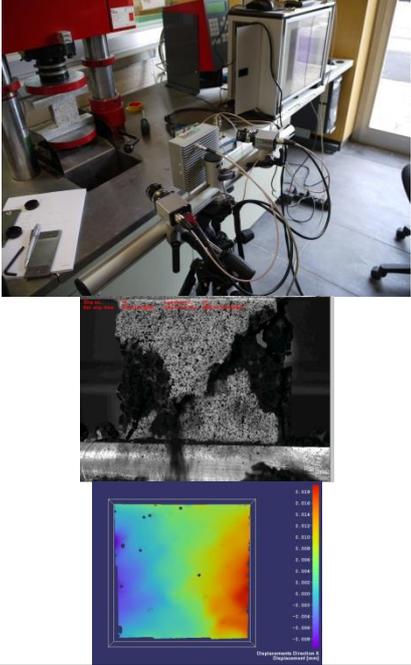


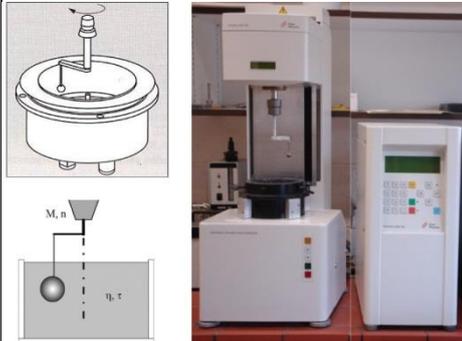
## LIST OF EQUIPMENTS

<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Hydraulic presses</b></p>		<ul style="list-style-type: none"> <li>- Hydraulic Presses from (10 kN up to 1 MN)</li> </ul>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Climatic test cell</b></p>		<p>Climatic test cell to simulate environmental influences from the company Feutron Klimasimulation GmbH with the following technical parameters:</p> <ul style="list-style-type: none"> <li>- Test room volume: 18 m<sup>3</sup></li> <li>- Test room dimensions: 2 x 4 x 2,25 m (LxBxH)</li> <li>- Temperature range: -20...80 °C</li> <li>- Climatization range: 10...80 °C</li> <li>- Humidity range: 10...95 %</li> <li>- Feed openings: 2 x Ø 75 mm</li> </ul>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Climatic test chamber</b></p>		<p>Climatic test chamber to simulate environmental influences from the company Feutron Klimasimulation GmbH with the following technical parameters:</p> <ul style="list-style-type: none"> <li>- Test room volume: 0,6 m<sup>3</sup></li> <li>- Test room dimensions: 1,12 x 0,77 x 1 m (LxBxH)</li> <li>- Temperature range: -20...100 °C</li> <li>- Climatization range: 10...95 °C</li> <li>- Humidity range: 10...95 %</li> <li>- Feed openings: 2 x Ø 75 mm</li> </ul>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Concrete mixer</b></p>		<p>Zyklos enforcement mixer ZK 150 HE from the company Pemat Mischtechnik GmbH to mix concrete with the following technical parameters:</p> <ul style="list-style-type: none"> <li>- Mixing volume (net): 150 liter</li> <li>- Max. material (dry): 170 liter / 240 kg</li> <li>- Diameter mixing drum: 900 mm</li> <li>- Height mixing drum: 392 mm</li> <li>- Mixing drum and mixing transmission hydraulic moveable</li> <li>- Variable rotation speed</li> </ul>

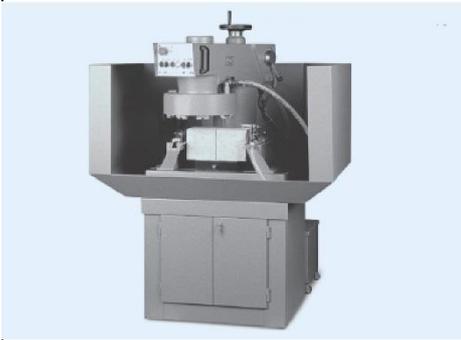
<b>Mortar mixer</b>		<p>Planetary mixer HSM20 from the company Hobart GmbH to mix lime and mortar with the following technical parameters:</p> <ul style="list-style-type: none"> <li>- Mixing volume (net): 10 liter</li> <li>- Mixing volume (gross): 20 liter</li> <li>- 3 different rotation speeds</li> <li>- 3 different agitators</li> <li>- Electrically interlocked bowl support and guard</li> </ul>
<b>Laboratory mortar mixer</b>		<p>Planetary mortar mixer (Model: 1.0206) from the company Testing Bluhm &amp; Feuerherdt GmbH to mix lime and mortar with the following technical parameters:</p> <ul style="list-style-type: none"> <li>- Electromechanical feed system for standard sand</li> <li>- 5 automatic mixing programs</li> <li>- Water-dosing system</li> <li>- 2 different rotation speeds</li> <li>- Mixing volume (net): 1,5 liter</li> <li>- Mixing volume (gross): 5,0 liter</li> </ul>
<b>Impedance tube</b>		<p>Impedance tube (model 4206 and 4206-T) from the company Brüel &amp; Kaer for acoustic analysis</p> <p>The acoustic noise is generated by a sender and encountered normal to the material specimen. On the one hand the sound- absorbed and sound- reflected characteristics are presented and on the other hand sound- transmitted characteristics can be determined. The frequency range is eligible from 50Hz to 1600Hz.</p>
<b>Hydraulic jack</b>		<p>Hydraulic jack - INSTRON</p> <ul style="list-style-type: none"> <li>- range -50 to 50 mm</li> <li>- maximal force 630 kN</li> <li>- compression and tension loading possible</li> <li>- dynamic loading</li> </ul>

<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Poissons ratio</b></p>		<p>The Poisson's Ratio for a material is a dimensionless constant representing the ratio of the lateral strain to the axial strain. The Poisson's Ratio can be measured with the following two different systems:</p> <ul style="list-style-type: none"> <li>- The strains will be measured by strain gauges, which are glued at the surface of the specimen in the two directions</li> <li>- The strains will be measured by an electronic deformation double transducer (length) and by an electronic precise expansion double transducer (lateral)</li> </ul>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>creeping</b></p>		<p>For the determining of materials creeping behavior a beam specimen is fixed in the vertical direction and compressed. The corresponding displacements are measured on two parallel sides. The testing time range depends on the requirements but leastwise 28 days.</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Thermal conductivity</b></p>		<p>TLP 900 Z from Taurus Instruments for the determination of the thermal conductivity</p> <p>The specimen's surface area is limited in a range of 50 x 50 cm. The most relevant temperature range is framed from 10C° to 30C°. The measurement principle is based on the steady state heat flow rate in vertical direction.</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Hydraulic power engine</b></p>		<p>Mobile hydraulic power engine – BIERI Hydraulics (AZB Hydraulik)</p> <ul style="list-style-type: none"> <li>- 8 different hydraulic jacks</li> <li>- compression loading</li> <li>- max. force 300 kN per cylinder</li> </ul>

<p><b>Mobil hydraulic power engine</b></p>		<p>The AZB mobile hydraulic unit enables in situ mechanical loading (up to 200 kN) of e.g. concrete slabs in buildings. Two double-acting cylinders, connected in parallel, are fed by a hydraulic pump at a pressure of 10 to 200 bar, manually adjustable by a pressure control valve. Moreover, a 4/3 direction control valve and a stop valve are part of the hydraulic circuit.</p>
<p><b>Optical deformation measurement</b></p>		<p>The Dantec Q-400 is an optical system for non-contact, three-dimensional measurement of displacements and strains. First, a stochastic black-and-white pattern is applied onto the test object. The prepared surface is recorded during the loading of the test object by two CCD camera sensors. The resulting deformations and strains are calculated afterwards by means of digital image correlation. Depending on the measuring conditions, the measuring sensitivity is approximately 1/100000 of the field of view. For example, a field of view of 100 mm results in a sensitivity of 1 µm. The measuring area can vary from a few cm<sup>2</sup> to nearly 1 m<sup>2</sup>.</p>
<p><b>Mortar test stand</b></p>		<p>Hydraulic bending and compression test machine from the company Toni Technik Baustoffprüfsysteme GmbH to measure specimens of lime and mortar with the following technical parameters:</p> <ul style="list-style-type: none"> <li>- Bending - max. load: 10 kN</li> <li>- Compression - max. load: 200 kN</li> <li>- Testing of beams: (40 x 40 x 160) mm</li> <li>- Calibrate class: 1</li> </ul>

<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Concrete test stand</b></p>		<p>Hydraulic bending and compression test machine from the company Toni Technik Baustoffprüfsysteme GmbH to measure specimens of concrete with the following technical parameters:</p> <ul style="list-style-type: none"> <li>- Bending - max. load: 100 kN</li> <li>- Compression - max. load: 3000 kN</li> <li>- Testing of beams: (150 x 150 x 700) mm</li> <li>- Testing of cubes: (150 x 150 x 150) mm</li> <li>- Testing of cylinders: (150/300) mm</li> <li>- Calibrate class: 1</li> <li>- Compression strength</li> <li>- Modulus of elasticity</li> <li>- Poisson's Ratio</li> <li>- Splitting tensile strength</li> </ul>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Shrinkage drain</b></p>		<p>The Shrinkage Drain is made of a 1m long u-shaped stainless steel profile which contains the specimen. To avoid wall friction the drain is covered with a removable Neopren-sheet. On one side a removable anchor is fixed. On the other side this anchor is movable and sliding on three wheels. The motion of this anchor is registered by a high sensitive digital displacement transducer.</p> <p>Up to 9 shrinkage drains may be connected over a digital bus system. A synchronous registration of temperature and humidity is possible.</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Test equipment for SCC</b></p>		<p>Self-Compacting Concrete (SCC) is a special High Performance Concrete which has a very high flowability without any bleeding and segregation. The concrete can compact without any vibration. With the following test equipment you can measure the properties of the fresh SCC:</p> <ul style="list-style-type: none"> <li>- Slump-Flow-Test (with and without J-Ring)</li> <li>- Funnel-Test (mortar) / V-Funnel Test (Concrete)</li> <li>- Test of the segregation (Flush-Out-Test)</li> <li>- Rheological parameters (concrete Rheometer BT2)</li> <li>- Air entrainment meter (EN 12350-7)</li> </ul>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Rheometer (ball measuring system)</b></p>		<p>This method permits an evaluation of the rheological material parameters, since an eccentrically rotating ball develops a displacement flow, which initiates a forced shear strain of the analyzed sample. The approach for the computation of the rheological material parameters out of the measured variables number of revolution and speed torque act on the assumption of a laminar flow field. The conversion of the measured speed torque into a shear stress and the number of revolutions into a shear rate takes place by means of a device constant that can be determined as a function of the test geometry.</p>

**Grinding machine**



Used to grind and polish concrete specimens, natural stones, ceramic materials etc. The cubes and cylinders can be easily locked on the table. The grinding head can be radially moved either manually or automatically in both directions. The technical parameters are:

- Table dimensions: 680 x 300 mm
- Grinding head diam.: 330 mm
- Max. specimen size: up to 300 mm cubes  
cylinders up to 360 mm height
- Grinding wheel speed: 1400 rpm
- Special fixing device for cylinder and 3 cubes