



Building on knowledge

Xella Technology and Research Centre



Our Product and Process Research division is now located in Brück.
In the background: the Ytong plant

XELLA – the right place for research.

Xella International is one of the leading suppliers of white wall building materials in Europe. Xella’s stated aim is to revolutionize the building materials market and revive it through innovation. The claim “Neues Bauen” (New Way of Building) documents this. For XELLA, this means redesigning building so that it is more efficient, more reasonably priced and more modern by providing innovative techniques, products and services.

XELLA is one of the few German companies to run its own technology and research centre near Potsdam. The centre is responsible for fundamental research and product development, and it is from here that the company is acting as a catalyst for innovation that promotes the development of products and efficient building processes and technologies.

Breaking into regional and international markets

Cross-border EU trade, competition and continually reducing development time for new products and systems present new challenges as far as research is concerned. The latest environmental protection and healthy living regulations are also XELLA’s main priority. XELLA sees the successful handling of these issues as a prerequisite if the company is to conquer new markets both regionally and globally. Research and development is therefore an important component for XELLA when it comes to increasing its ability to compete and future sustainability.

The pillars of research

At XELLA, research activities are focused upon market demands. Building physics, applications research, and product and process research form the three disciplines that underpin this research. At the centre of XELLA’s research activities are:

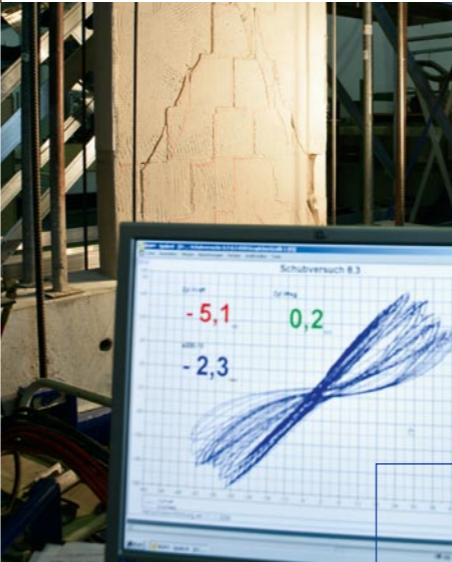
- Forschung und Entwicklung im Werkstoff- und Produktbereich
- Optimierung von Rezepturen und bauphysikalischen Eigenschaften
- Entwicklung kostengünstiger und wirtschaftlicher Bausysteme, Qualitätssicherung und Qualitätssteigerung
- Verbesserung der Anwendungssicherheit von Produkten
- Interessenvertretung in nationalen und internationalen Normungsgremien sowie Betreuung von bauaufsichtlichen Zulassungsverfahren im Rahmen der Zusammenarbeit mit dem Deutschen Institut für Bautechnik (DIBt) und anderen europäischen Zulassungsstellen

- Bearbeitung von Patentangelegenheiten
- Mitarbeit in Verbänden
- Bauberatung, Anwendungstechnik und technologische Schulung
- Übernahme von Dienstleistungen für alle strategischen Geschäftseinheiten des Unternehmens und Durchführung entsprechender Forschungs- und Entwicklungsprojekte
- gutachterliche Stellungnahmen

This brochure gives an initial overview of the XELLA’s main areas of research.

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Earthquake simulation



Determination of pressure resistance



In this division, components and construction systems are developed and checked. Suitability checks are carried out on plasters, mortars and composite thermal insulation systems. Moreover, national and European initial registration processes for building

products and building forms are effected. A further area of activity is the technical representation of interests on national and international standardisation committees and in specialist associations. This includes the appraisal of damage to buildings.

Testing of components in partition walls

Testing of components/development of components

Areas of focus

Load-bearing tests

- Simulation tests for wind- and earth pressure
- Determination of masonry bearing capacity
- Bearing- and deformation behavior from roof- and floor components
- Testing for on the job safety
- Earthquake simulation
- Impact testing for walls (fire walls, non loadbearing walls)
- Cyclic loading on thermal insulation material according to ETAG 006
- Long-term behavior of structural members and materials

Development of components and composite systems

- Combined structural materials construction systems development (overall solution for buildings and structures)
- Development of anchor- and assembling systems
- Consulting and instruction for new construction systems

Equipment

Test stands

- Bending test ring: Simulation of distributed load up to 4 kN/m²
- Structural member test facility max. vertical load 2.500 kN max. height 3 m
- Shear wall test rig with vertical and cyclic horizontal loading
- Slab testing facility: Area 6 m x 6 m max. vertical load 630 kN
- Test rig for impact testing

- All purpose test rig for horizontal and vertical loadbearing tests
- Testing machine for compression and tensile testing up to 250 kN
- Testing Equipment for long term tests of structural members and building materials

Measurement and testing devices

- Measuring device and online datalogging of forces and deformations



Flexural tension testing on wall components



Testing of new building systems

Suitability checks on plasters, mortars and composite thermal insulation systems

Areas of focus

Suitability testing of plasters and coatings

- climate simulations at test walls
- continuous visual control of the test wall
- determination of the adhesion between plaster and surface of the test wall
- determination of the moisture distribution in the test wall
- determination of the properties of plaster/coating

EOTA tests on composite thermal insulation systems

- test cycle regarding to ETAG 004
- recording of measured data at the surface and inside the test wall
- determination of the adhesion between plaster, thermal insulation and wall
- determination of the moisture distribution in the test wall
- determination of the properties of plaster/coating

Mortar tests in accordance with EN 998

- [quality assurance](#)
 - [suitability tests](#)
 - [research and development](#)
- properties of fresh mortars
- consistency
 - water retention
 - density
 - air void contents
 - correction time
 - workability
- properties of hardened mortars
- compressive strength, dry density, flexural strength
 - modulus of elasticity
 - capillary water absorption
 - permeability to vapour
 - adhesion
 - thermal conductivity
 - resistance against sulfate
 - swelling property

Equipment

Plaster test stand

- wall with lamps for creating temperatures at the surface of the test walls up to 80°C
- apparatus for creating artificial rain to cool the test walls down very fast
- logger for online-measuring of the process of temperature and humidity in the test wall



Climatic chamber

EOTA test stand (climatic chamber)

- temperatures from –40 to 80 °C
- relative humidity: 0 up to 100 %
- sprinkling of the walls with defined amount of water



Sample mixtures



Mortar laboratory

Measurement and testing devices

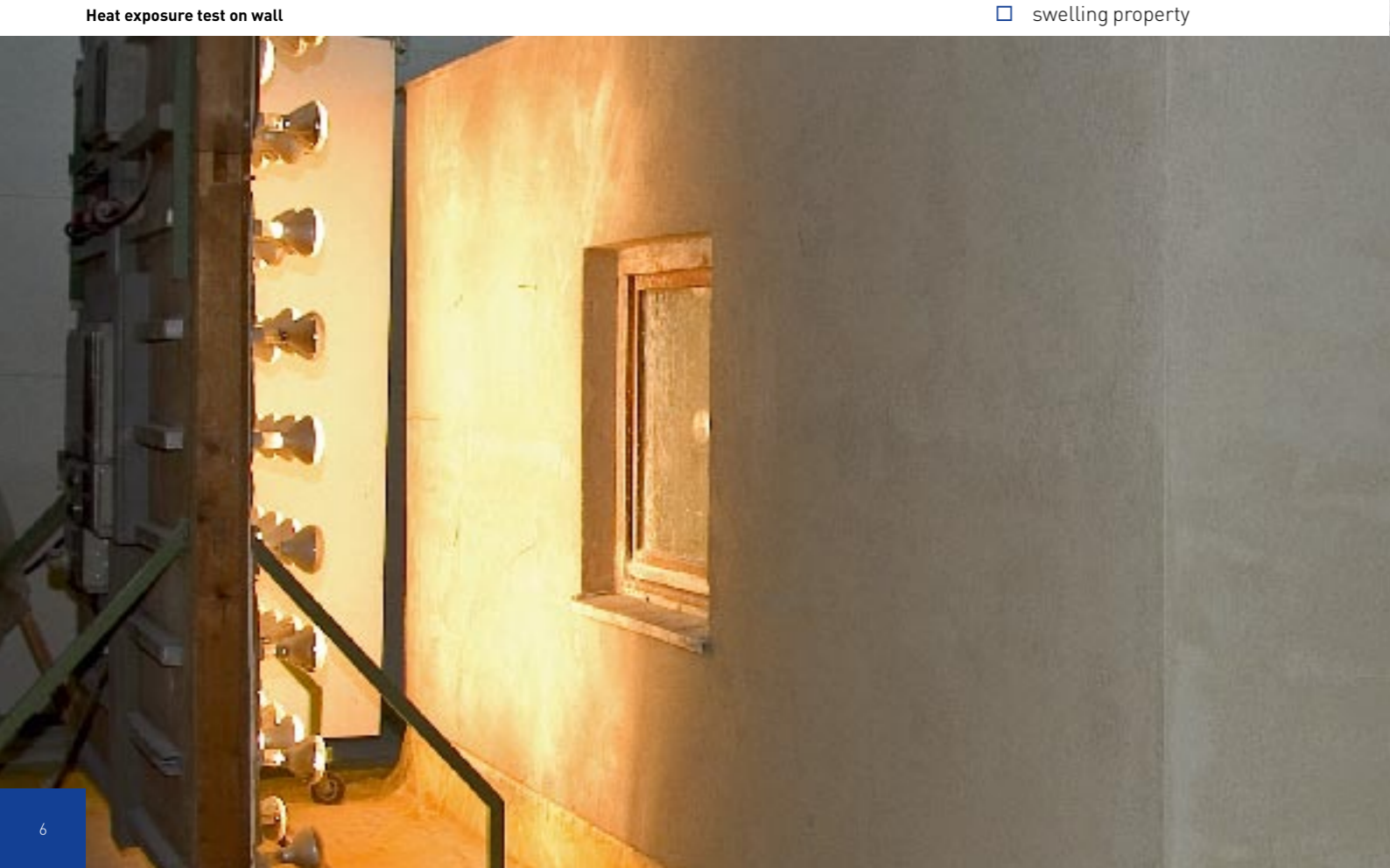
- measuring instruments
- hydraulic press
- air-jet sieve analyser
- vibrator
- laboratory mixer
- measuring instruments for shrinkage
- logger for online-measuring of the process of temperature and humidity
- instrument to measure the adhesion

Outdoor testing site

- long-term tests with roof and wall systems under exposed conditions
- continuous visual control
- measuring and recording of the weather data



Outdoor testing site



Heat exposure test on wall



Measurement data from a climatic simulation

The division specialises in hygrothermal building physics and noise and fire protection. The division is working on the development of new solutions in the field of building physics, through the provision of building advice relating to building physics issues, and aspects of building design. All of these initiatives are experiment-based. The key factors in this research are saving energy, the use of alternative forms of energy, noise protection, damp protection and the avoidance of mould. In addition, work is being carried out on new solutions in the field of healthy building and living, the interior climate and the use of daylight.

The results of the research are used directly in product optimisation and are passed on to the market. Planners and customers receive competent advice and support through the development of modern software and measuring technology.

Hygrothermal building physics

Areas of focus

- ☐ Enquiries concerning thermal, moisture and fire protection
- ☐ Dimensioning of buildings
- ☐ German Energy Saving Regulation
- ☐ Thermal building simulation
- ☐ Two and three-dimensional calculation of thermal bridges according to EN ISO 10211
- ☐ Condensate/moisture calculations with climatic simulation
- ☐ Standardisation / approvals

Equipment

Temperature and moisture measuring device

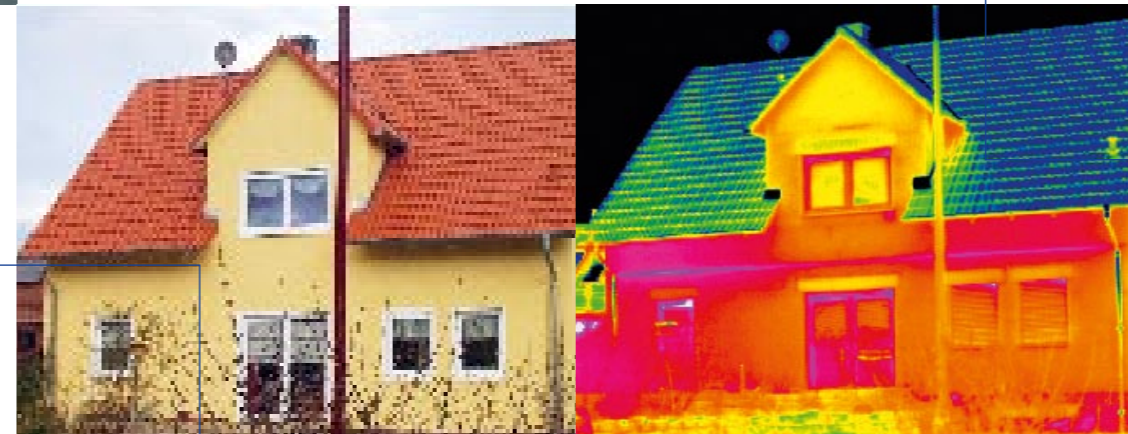
- ☐ Determination of moisture content in building materials on building sites
- ☐ Measurement/record of inside temperature, surface temperature, relative humidity (mould infestation)

Thermographic camera

- ☐ Verification of thermal bridge free new details and constructions
- ☐ Locating air leakages of the building envelope

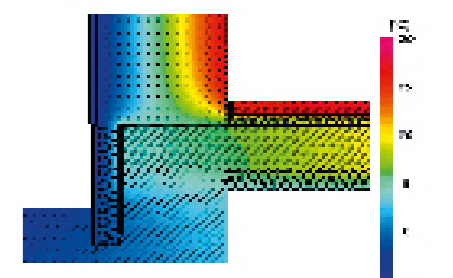
Blower door

- ☐ Certification of air tightness of buildings
- ☐ Locating air leakages of the building envelope
- ☐ Measurement of air tightness as customer service:
 - Certification according to the German Energy Saving Regulation
 - Certification of energy-saving buildings



Thermographic image

- ☐ Verification of thermal bridge free construction of new buildings as customer service for architects / building contractors / developers
- ☐ Verification of thermal bridge calculations
- ☐ Locating moisture penetration of building components
- ☐ Locating leakages in water pipes



Calculation of thermal bridges

Noise protection/acoustics

Areas of focus

Measurements in the noise test stand

- sound reduction index of single-leaf and double-leaf walls as well as components like doors, windows, roller shutter housings, traffic noise barriers
- junction insulation index
- loss factor
- impact sound
- transfer function (modal analysis)

Measurements in buildings and other measurements carried out in the laboratory

- sound reduction index measured on sites e.g. walls, ceilings, outside components as well as doors, windows or facades
- standard impact sound pressure level of ceilings and floor constructions
- sound absorption measured in impedanz tube or in reverberation chamber
- measuring and improvement of junction insulation index
- loss factor
- impact sound
- transfer function (modal analysis)

Other

- collaboration in divers committees, e.g. standardization
- participation in conferences and tutorials for continuous training
- realization of own workshops and courses
- update of voluminous own databases and documentation of measurements and studies
- inspection of material and installation quality
- support of incoming questions of customers

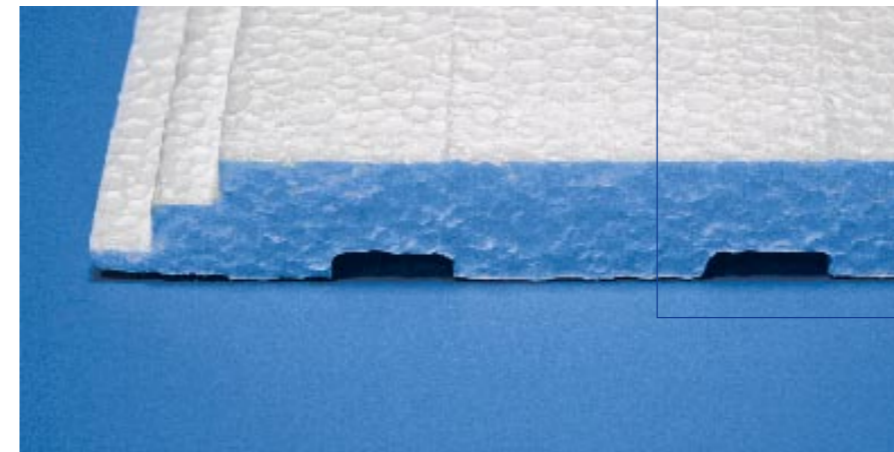
View of the studio
Measurement of sound insulation of a wall structure in the noise test stand



Equipment

Noise protection test stand for walls

- Sound laboratory complying with the requirements of ISO 140-1 for single- and double-leaf walls (massive or plaster board constructions)

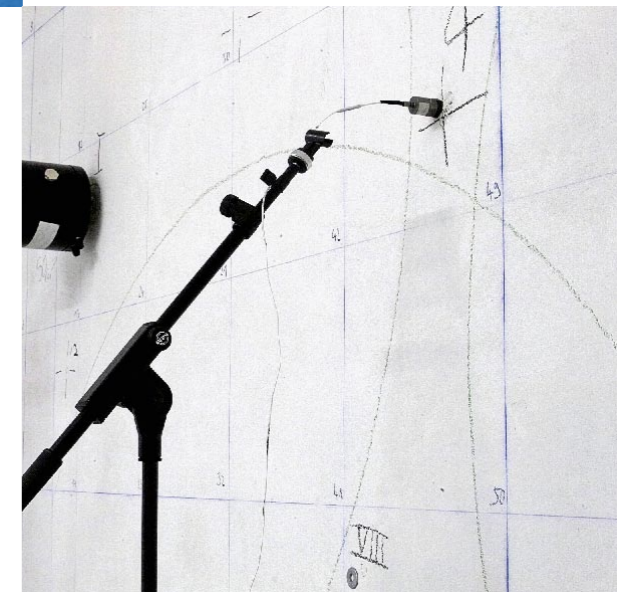


XELLA decoupling profile for non load-bearing walls

- laboratory with "suppressed flanking sound transmission", i.e. sound reduction index R_w will be measured only for the separative construction
- accredited by Physikalisch-Technische Bundesanstalt (PTB)
- disconnection of sending- and receiving-room up to topsoil; massive environmental walls made of lime sand stone with free standing inside gypsum board facing; doors with a high sound reduction index
- utilization in principle for measurements within own projects of Xella; sporadically rented to external firms

Measuring instruments

- calibrated 2 channel real-time analyzer (class 1) including microphones and accessories
- acoustic-calibrator for microphones
- moving microphone
- test-loudspeaker („dodecahedron")
- standardized tapping machine for floors; „Gösele-mini-tapping-machine"
- PA-loudspeaker for tests of outside components
- laser-vibrometer
- accelerometers
- impedance tube
- wide range of further divers measurement instruments used for extensive research on products



Measurement of the oscillation properties of a solid wall



Thermal conductivity checks

This division carries out fundamental research, which is taken as a basis for producing new, innovative products for the market. Other topics cover new and alternative technologies and processes. The physical and chemical characteristics of raw materials and products are measured and verified here. An additional point of emphasis is quality control and quality assurance.

The benefits for the company result from the ability to transfer large-scale tests to the subsequent production process with relative ease. Plant testing processes are becoming less costly and less time-consuming in this way, which finally results in shorter development lead times until products can be launched on the market.

Analytics

Areas of focus

- Suitability tests of raw and auxiliary materials for production of calcium silicate bricks, AAC and mineral based thermal insulating boards
- Quality check of raw materials and auxiliary materials
- Quality check of oil binder and cat litter
- Determination of the phase composition of calcium silicate bricks, AAC and mineral based thermal insulating boards
- Detection of the correlations between properties of raw material, process parameters and material properties

Equipment

- X-Ray diffractometer
- X-Ray Fluorescence Spectroscope
- Carbon/Sulfur - analyzer
- Photo Spectroscop

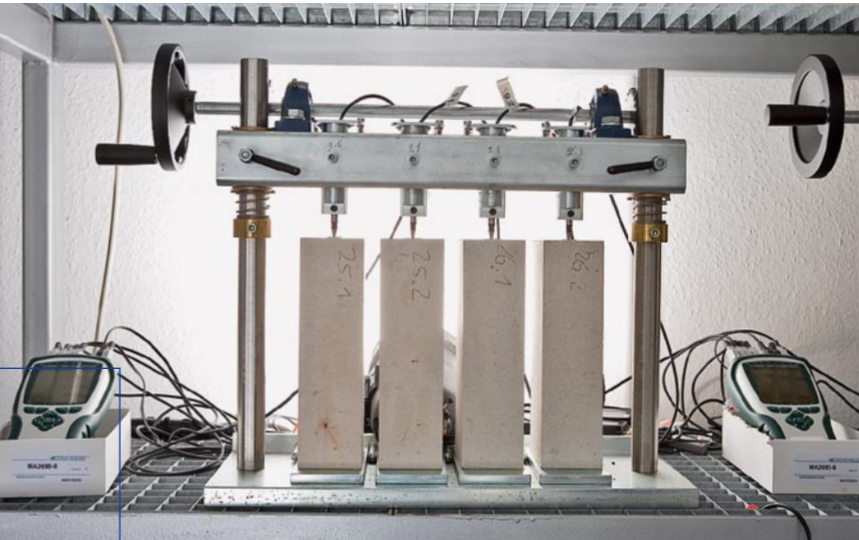
Testing of building materials

Areas of focus

Determination of product characteristic variables for calcium silicate blocks, aerated concrete and mineral insulation panels

- compressive strength
- dry density
- young's modulus
- flexural strength
- thermal conductivity
- hygroscopic sorption
- shrinkage
- water absorption

Shrinkage behaviour tests



- freeze-thaw-resistance
- testing of the corrosion protection of reinforcement in AAC

Equipment

- diamond saws
- wet grinder
- universal testing machines with forces from 20 up to 6000 kN
- conditioning cabinets
- guarded hot plate device for the measurement of thermal conductivity
- measurement devices for shrinkage
- devices for testing the freeze thaw resistance



Fusion machine

- Difference scanning calorimeter
- Stereo microscope
- Laser - Granulometer
- Sieving machines
- Device for specific surface (Blaine)
- Vicat indenting device
- Device for the determination of hydrogen formation by aluminium powder and – paste

Technology

Areas of focus

- ☐ technical processing of research and development projects
- ☐ casting of AAC by order of the factories
- ☐ initial testing of various sand and lime types for the production of calcium silicate bricks
- ☐ development of start-up recipes for production in new plants
- ☐ non-destructive determination of cracks and bubbles in AAC
- ☐ drying of the material to a defined content of moisture
- ☐ drying of sand and granules
- ☐ dry milling of sand to various grain sizes

Equipment

- ☐ various mills for dry and wet milling (up to 175 l)
- ☐ ball mill system for dry grinding with a classifier
- ☐ sieving machines
- ☐ jaw crushers in various sizes
- ☐ various mixing devices for AAC and calcium silicate bricks
- ☐ press for calcium silicate bricks with formats NF, DF and 2 DF
- ☐ Laboratory autoclave up to 18 bars excess pressure
- ☐ Pilot plant station with silos, production mixer, moulds (5,4 m³)
- ☐ Heating chamber/drying device for 3 AAC moulds
- ☐ Drying device
- ☐ X-Ray device for large building materials

Ball mills



Process technology

Areas of focus

- ☐ Consulting and support of plants for
 - Selection of raw material
 - Development and optimizing of recipes
 - Quality improvement
 - commissioning of new plants
- ☐ Solutions for material and technical problems
- ☐ Transfer of research results into production processes
- ☐ Qualifications and trainings for the leaders of production control

Aerated concrete block in front of the saw blade



Equipment

Measurement devices for:

- ☐ residual air in the steam at the autoclaving process
- ☐ temperature development during the autoclaving process
- ☐ hardening process of green AAC blocks
- ☐ rising process
- ☐ viscosity

Environment/patents

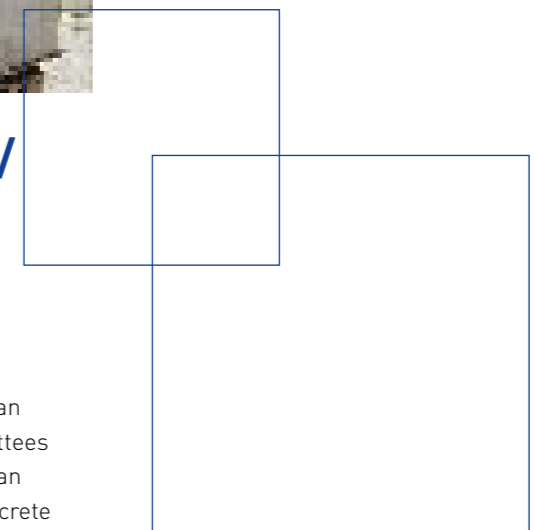
Areas of focus

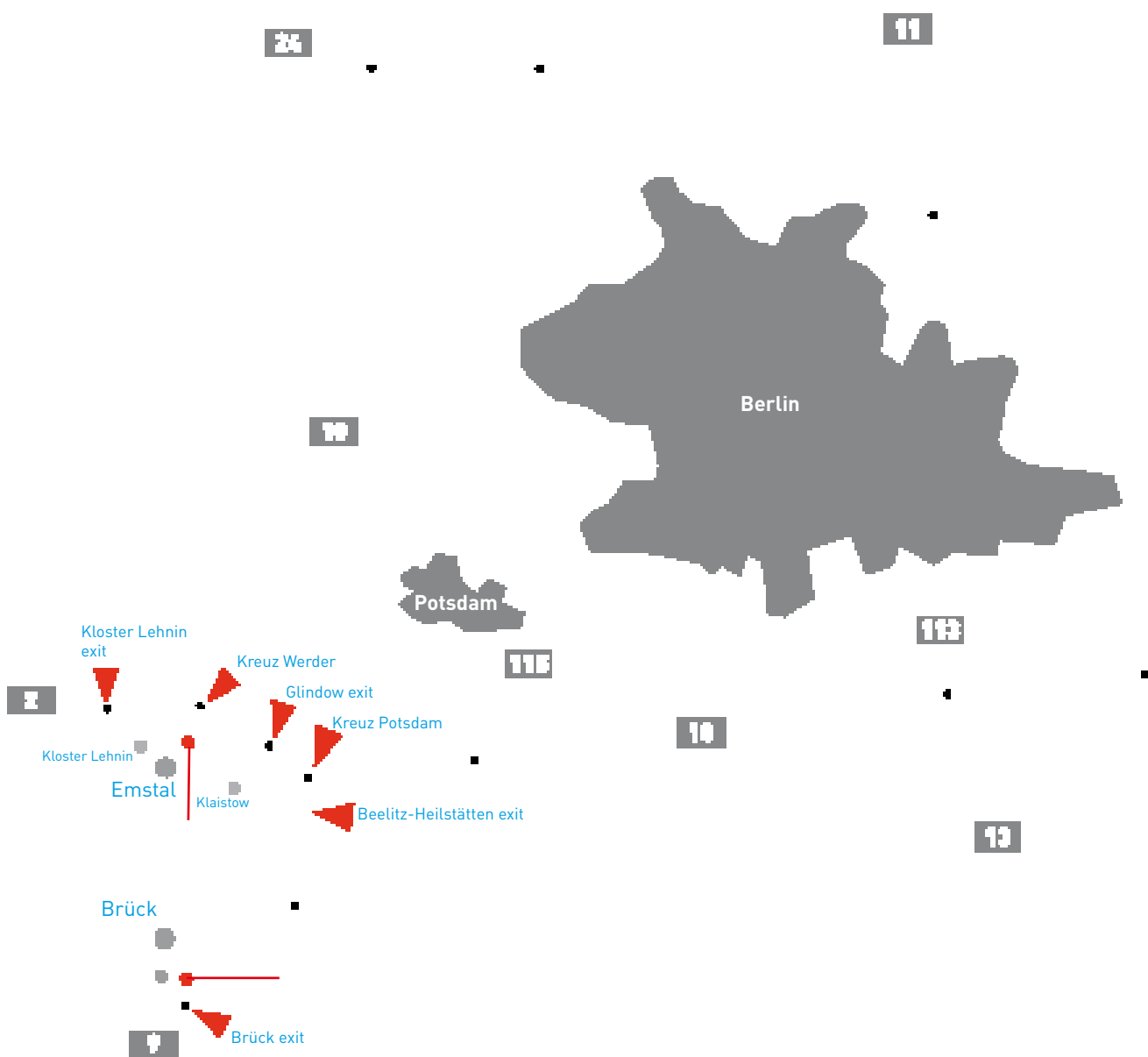
- ☐ Participation in European standardization committees on behalf of the European autoclaved aerated concrete association
- ☐ Participation in related national mirror committees
- ☐ Preparation of Environmental Product Declarations
- ☐ Patent search
- ☐ Patent management for both Xella Baustoffe and Xella Trockenbau-Systeme

Sand storage sites

Areas of focus

- ☐ Safeguarding of the capital assets by warranting raw materials for the production
- ☐ Continuous supply of the production plants with low cost sand with constant quality
- ☐ Support of search for new production places
- ☐ Supplier assessment
- ☐ Potential analysis of sand deposits
- ☐ Development of mining systems
- ☐ Avoidance of losses
- ☐ Equalisation
- ☐ Consideration of re-cultivation
- ☐ Mineralogical characterisation of sand
- ☐ Documentation of the raw material quality in sand deposits





**Xella Technologie- und
Forschungsgesellschaft mbH
[Xella Technology and Research
Centre mbH]**

Emstal, Hohes Steinfeld 1
14797 Kloster Lehnin

Manager

Dipl.-Ing. Torsten Schoch
Telephone +49 (0)3382 7060-112
Fax +49 (0)3382 7060-110

Building physics division

Dipl.-Ing. Torsten Schoch
Telephone +49 (0)3382 7060-112
Fax +49 (0)3382 7060-110

Applications research division

Dr.-Ing. Peter Langer
Telephone +49 (0)3382 7060-121
Fax +49 (0)3382 7060-120

Product and process research division

Dr.-Ing. Berit Straube
Telephone +49 (0)33844 752-112
Fax +49 (0)33844 752-110
Büro: Gregor-von-Brück-Ring 9A
14822 Brück