

G.tecz Engineering GmbH

specialist for cement bonded high-tech materials



CONCRETE AS A SERVICE

INNOVATE  MATERIAL  PRODUCT  MACHINE

PORTFOLIO

CONCRETE C15 - C100
Optimization & Development

VMPA - official Material Test Lab

Beton Bau Qualität / BBQ

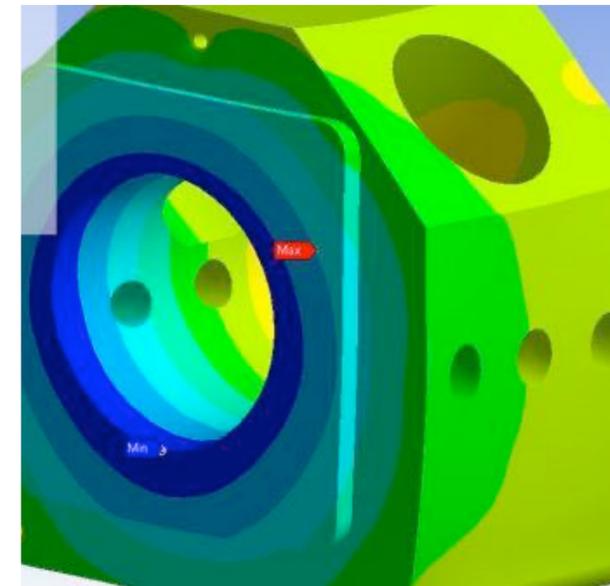
**Recycling
Concrete**
Development

**Geopolymer
Concrete**
Development

UHPC
*Optimization
Development*

Tailored Concrete
Development

Consultancy
*Product
Production*



PORTFOLIO

- Concrete Optimization C15 - C300
- Concrete Development C15 - C300 with local raw-materials
- Recycling Concrete
- Special/Tailored Concrete Developments
- CO2 reduction
- Knowledge and technology transfer
- Material feasibility studies
- Improvement for existing concrete production

- Advise on production optimization
- Independent advice for production and products
- Development of product and production process
- Feasibility business studies for production lines - UHPC facade production

- Concrete Testing Laboratory Services
- Raw-Material Test Laboratory Services
- Tests and certifications for concretes (VMPA)
- Trainings

G.TECZ IN NUMBERS

>120

CONCRETE OPTIMIZATION
PRECAST PLANTS

>3200

CONCRETE RECIPES

>4

MIXER WET LAB
PHYSICAL LABORATORY
TESTING LABORATORY
PRODUCTION SIMULATION
... AUTOMATION

>170

UHPC DEVELOPMENTS

>7500

RAW MATERIAL ANALYSES

>24

WIR HABEN PROJEKTE IN ...
DEUTSCHLAND,
ÖSTERREICH, SCHWEIZ,
NIEDERLANDE, POLEN,
FRANKREICH, VEREINIGTE
STAATEN VON AMERIKA,
AUSTRALIEN, NEUSEELAND,
CHINA, KOREA, INDIEN

>15

RESEARCH PROJECTS

>320

PROJECTS

>22

PUBLICATIONS

THE FOUNDERS



Dr. Ing. **Thomas Teichmann** made his degree as Dipl. Ing. At the University of Weimar, specialized on building materials. He graduated 2007 at the University of Kassel as Dr. Ing. with concrete optimization and packing density for concrete and uhpc. Thomas played a leading role in the development of the Gärtnerplatz Bridge in Kassel and patenting the material - the first UHPC bridge in Europe. In 2006/7 G.tecz Engineering was founded with Gregor Zimmermann.



Dr. Ing. **Gregor Zimmermann** made his degree as Dipl. Ing. at the University of Karlsruhe (KIT), specialized on FEM calculations. He worked 1998 for formTL, a company specialized for textile light weight constructions. Gregor graduated 2006 at the University of Kassel as Dr. Ing. with UHPC concrete grid shells and patent for the same. In 2006/7 G.tecz Engineering was founded with Thomas Teichmann. He was a visiting professor of digital design techniques at the University of Kassel for 3 semesters.

THE MANAGEMENT TEAM



Dipl. Ing. **Tino Sablotny**,
Project-manager and since
2007 Team member.
Management, concrete
development, innovation
partner

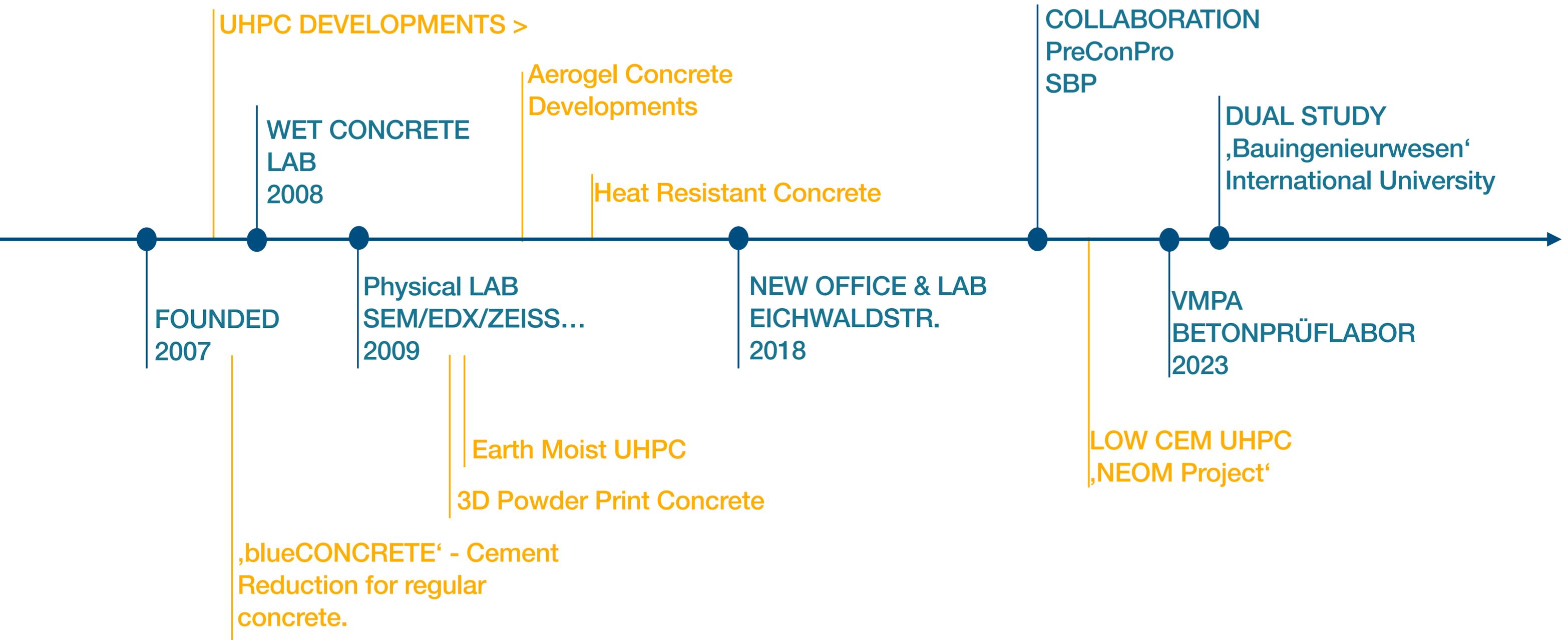


Mrs. **Sarah Krauß**,
Finance-manager and
finance coordinator for
funded R&D projects.

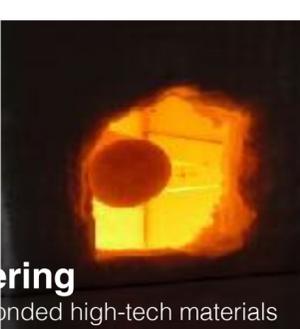
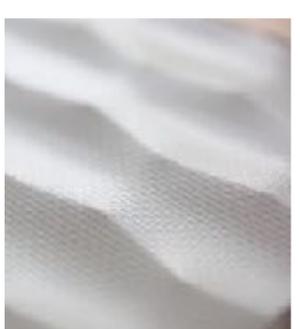
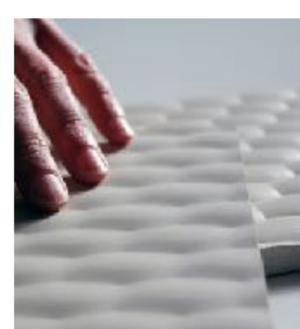
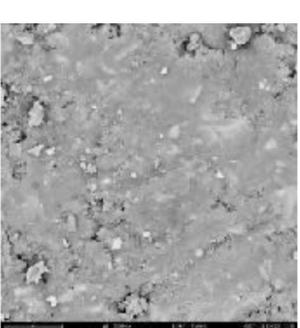
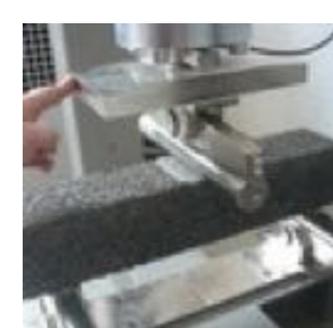
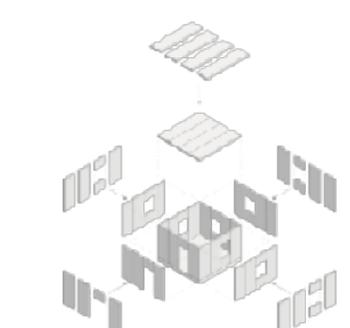
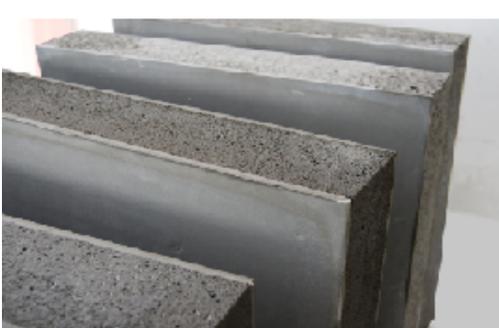
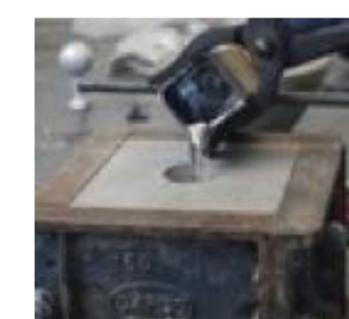
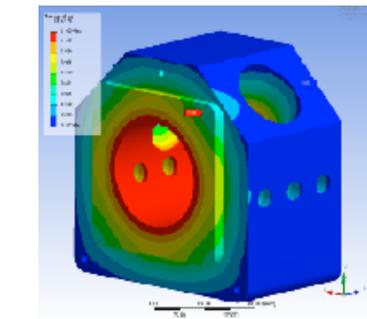
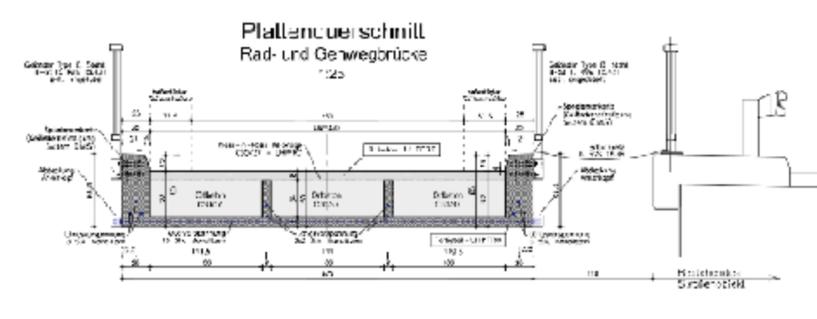


Dipl. Ing. **Susanne Freisinger**,
Physical and MPA
Laboratory-manager.
Raw-material analysis ,
concrete optimization -
development.

Since 2007 ...



PROJECT OVERVIEW



REFERENCES

UNI KASSEL
VERSITÄT

structo

he bö
MASCHINENFABRIK

bulthaupt

TAKTL

UNStudio

ROMEIN BETON
Masters in Kunstwerken

PHILADELPHIA
UNIVERSITY

SCHÖCK

BRENER

haitsma
BETON

ROVALMA
THE STEEL INNOVATOR

microbeton

romein

STERK BETON

S
BETON

ACO

TALFON

TAKTL

Gosh
PROJECT LTD

niko
illuminating ideas.

csdeluxe

CEMENTO
DESIGN
CONCRETE FOR CONSTRUCTIONS

ZAHA HADID ARCHITECTS

HLU
Hürner Luft- und Umwelttechnik

Dyckerhoff

VW

FCN
BETONELEMENTE

FEHR

八大处科技集团
BADACHU TECHNOLOGY GROUP

OAT

RIEDEL

SW
Umwelttechnik

Styl-Comp Group

SW Umwelttechnik
STOISER & WOLSCHNER AG

Fraunhofer
ISE

FORMS+SURFACES®

LINTEL
GRUPPE

HERING®

Hf
Hürner
funken

format
professional quality

אקדשטיין
מסורת של חדשנות

he bö
MASCHINENFABRIK

Schaub Backofenplatten + Betonsteine

H

tu technische universität
dortmund

WORLDWIDE



OUR MISSION

Your Leadership

Achieve a technological leadership by the improvement and extension of your products and fabrication facilities. Invest in your company's future and gain latest innovations by our technology transfer. Obtain decreasing the production costs and primary energy by maximizing your profit margin. Decrease your cost of labour by establishing optimized fabrication processes. Position your company with a head start of new innovations at the top of the market.

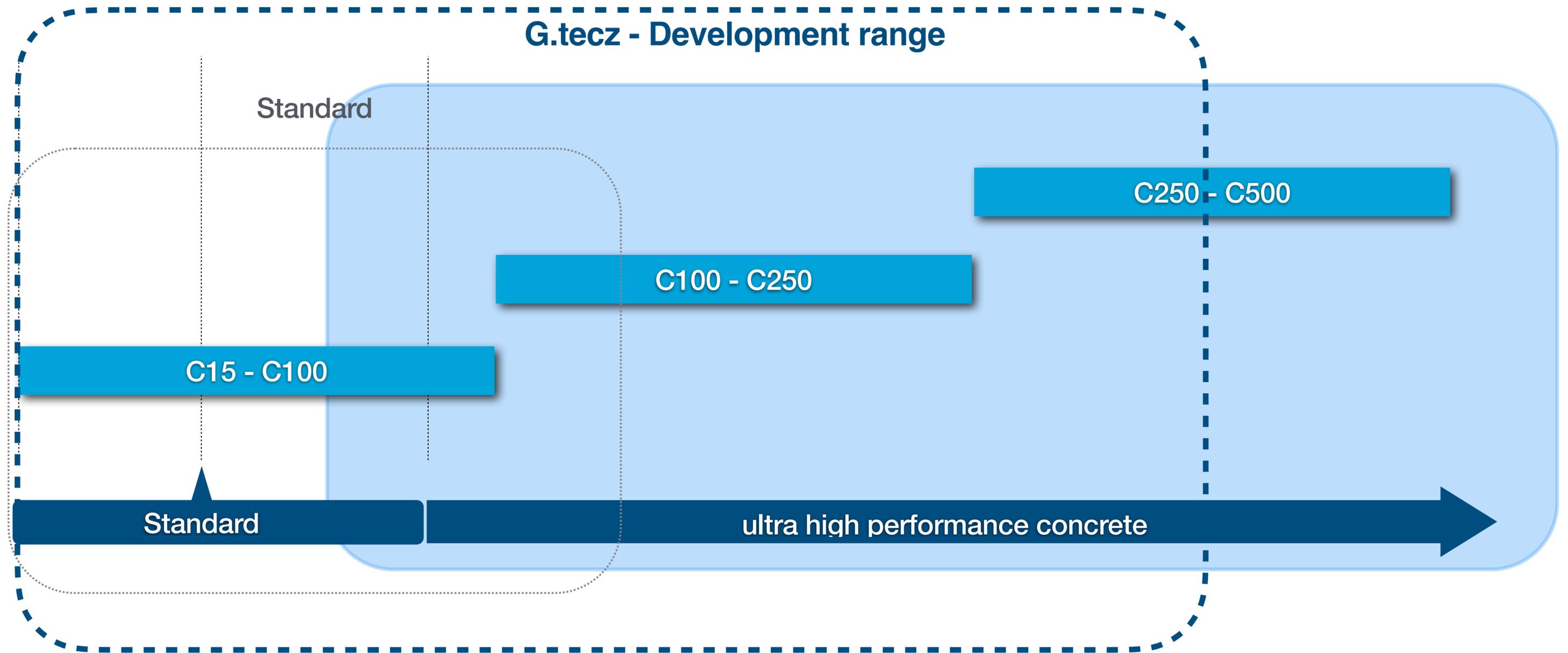
Your Innovation-coverage

Reach innovation strength by using our expert's knowledge and network. Due to a continuous information-flow regarding latest scientific material- and construction technologies you will stay tuned to the state of the art. As a lateral thinker and multidisciplinary problem solver we will develop your innovations, streamline and optimize production processes. Simultaneous engineering will reduce development time and costs. Gtecz offers you to act as your innovation driver and problem solver.

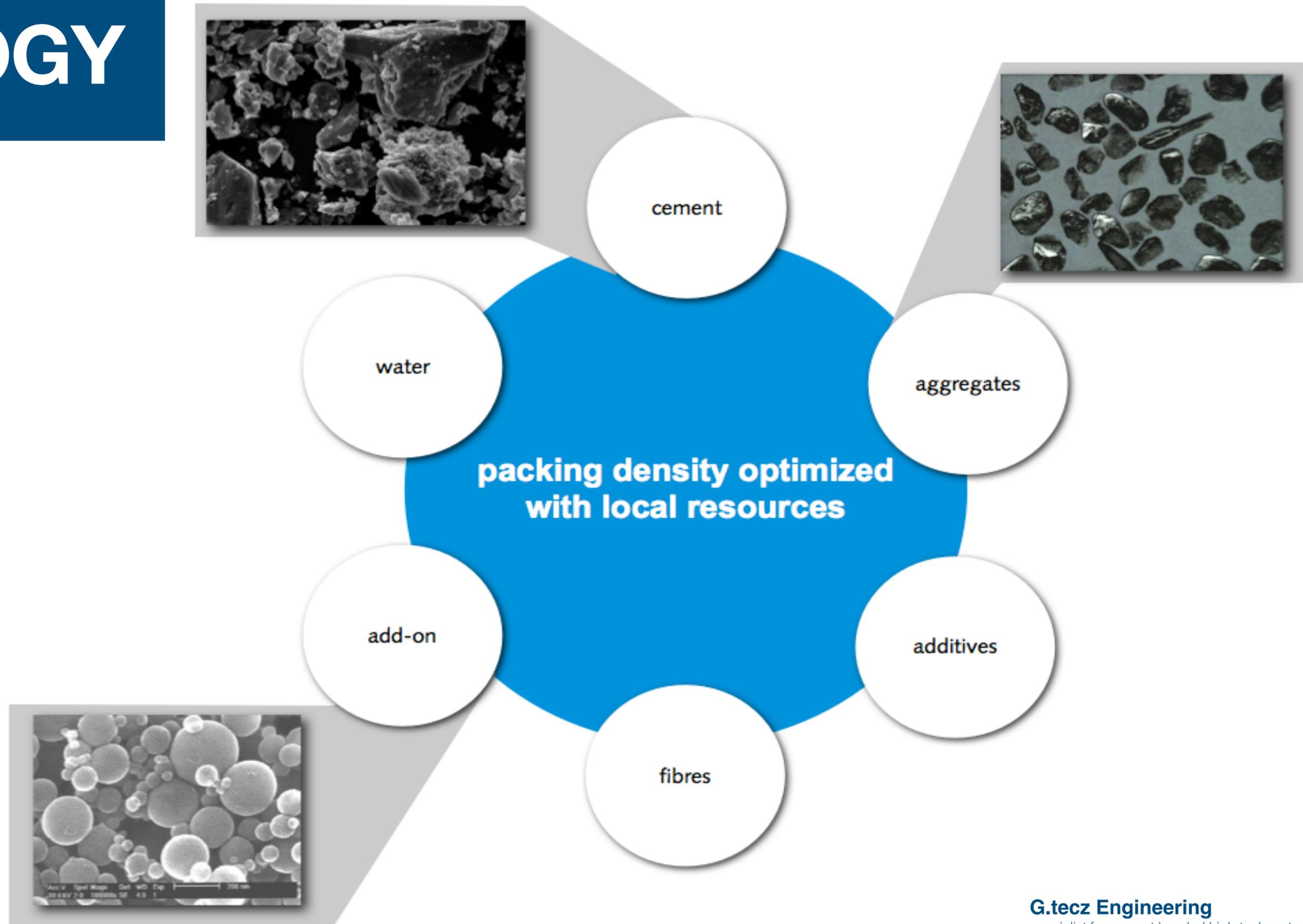
Quantz[®]

TECHNOLOGY

Concrete Range



TECHNOLOGY

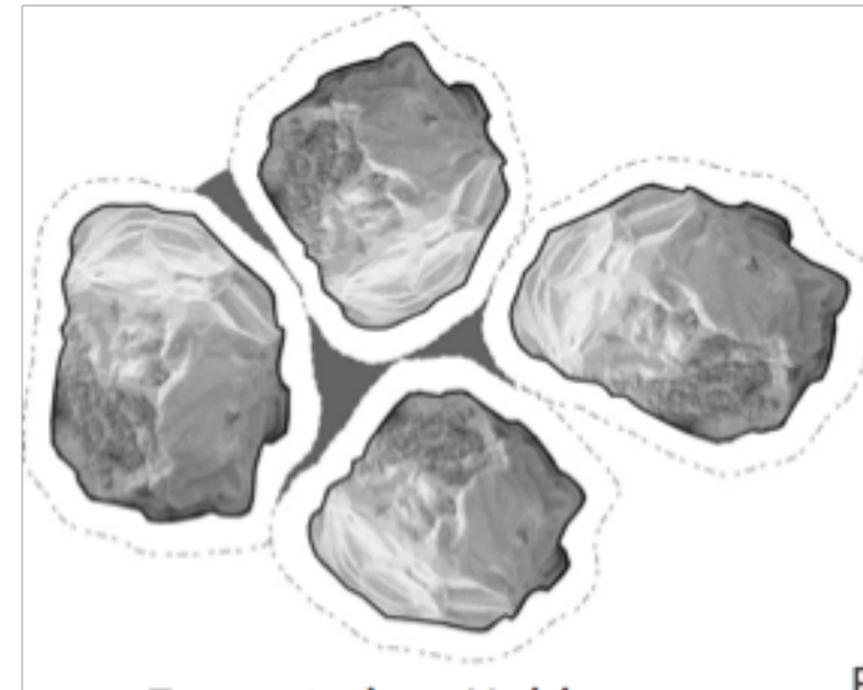


TECHNOLOGY

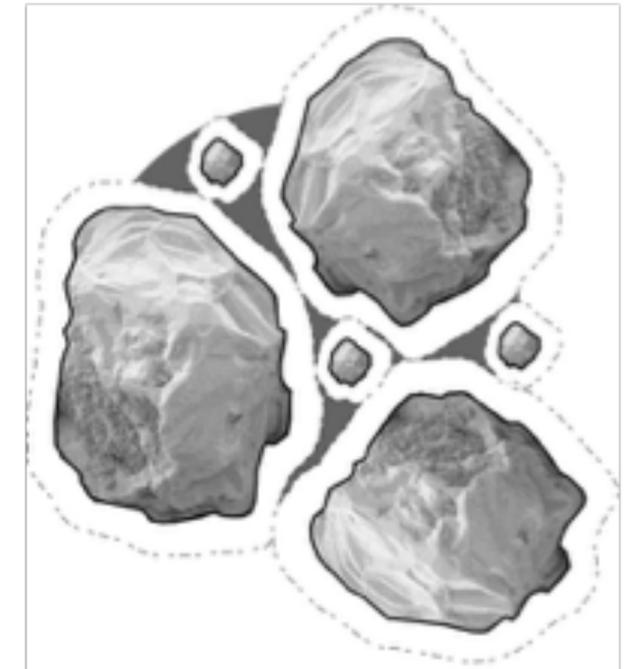
ADVANTAGE

Replacing cement by fine particles and optimized sieve lines.

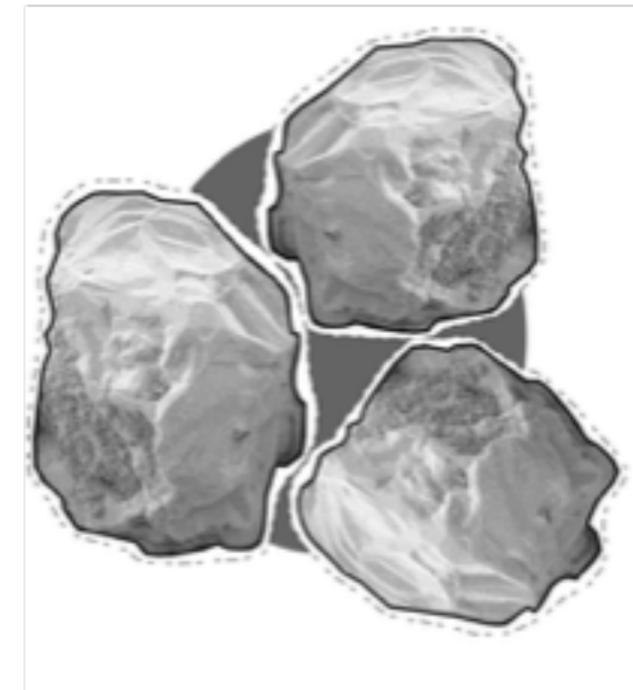
- Gaps will be filled
- Dense matrix
- Water reduction
- Better workability
- Higher concrete quality
- Cost reduction possible



Zement ohne Hohlraum
füllende Zusatzstoffe



Ersatz des Zements durch Hohlraum
füllende Zusatzstoffe



Wassergehalt reduziert



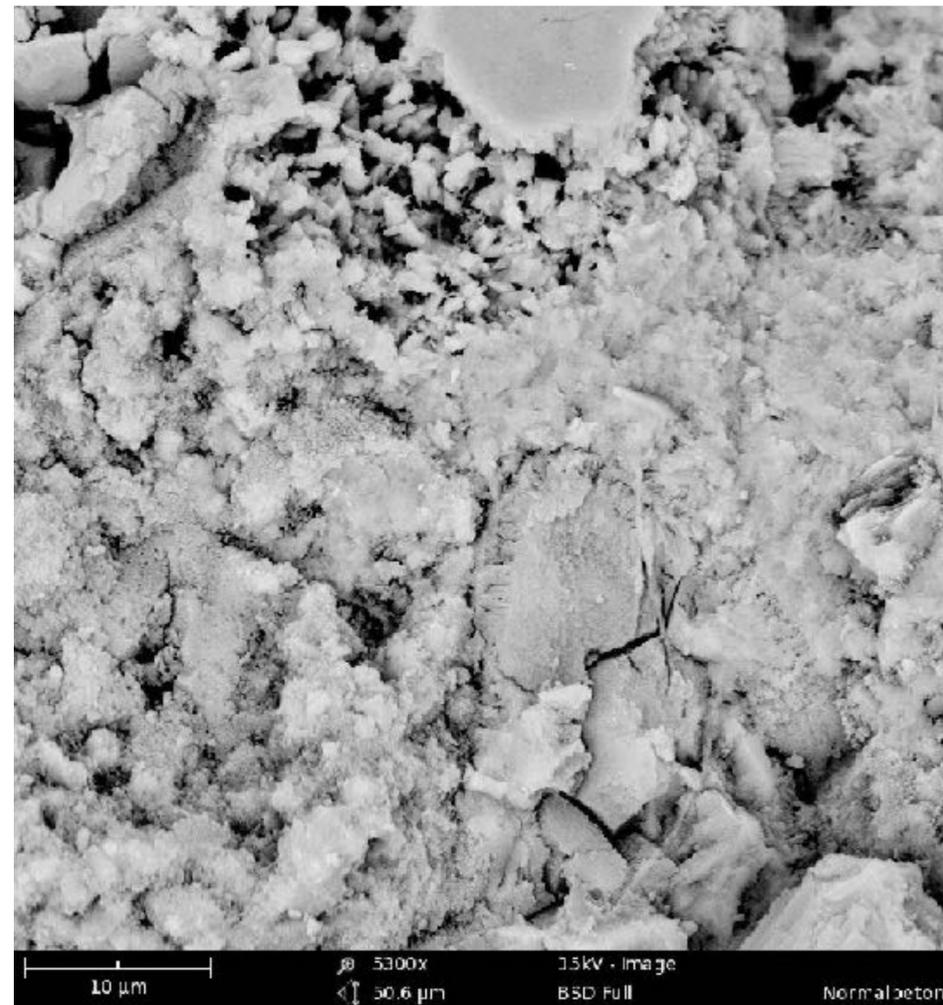
Wassergehalt reduziert,
Hohlraumfüllung

PACKING DENSITY

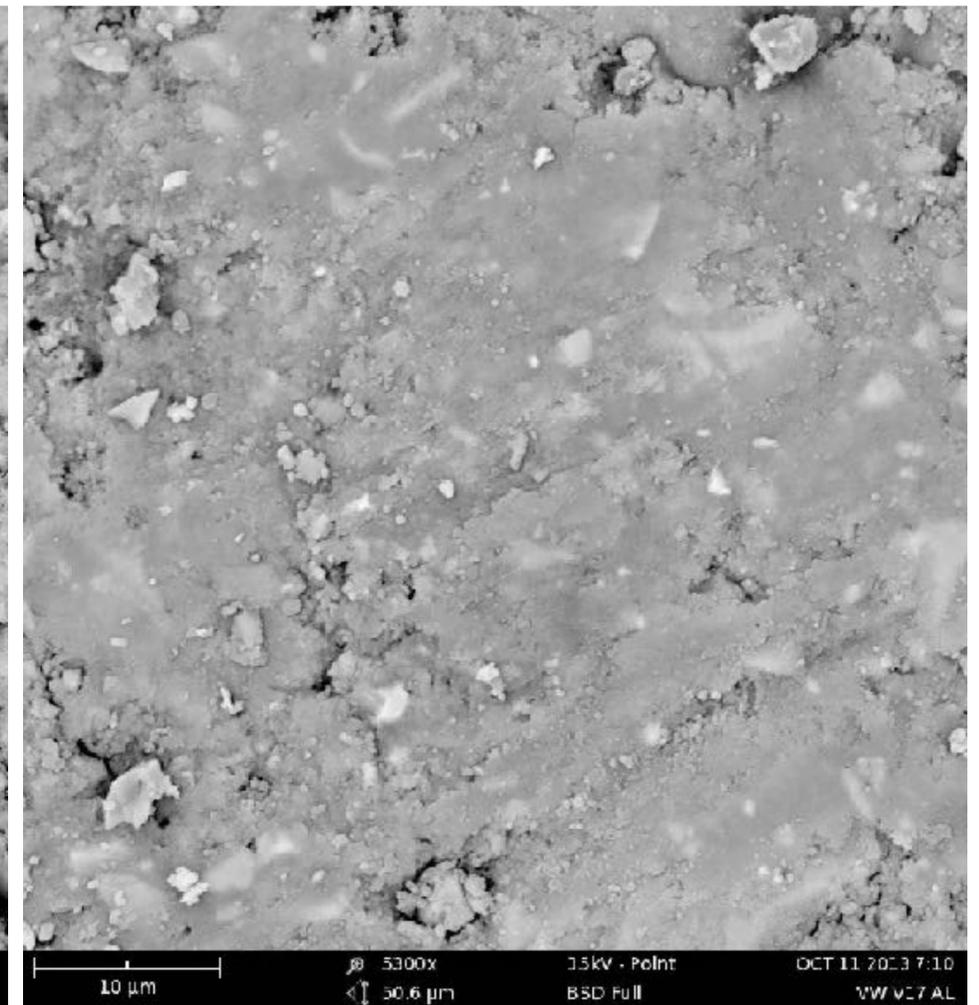
ADVANTAGE

Regular concrete vs. optimized Ultra High Performance Concrete (UHPC). Visible difference in Density

- No capillary pores
- Water & Gas proof
- Resistant surface
- High strength
- Frost resistant
- Salt water insensitive

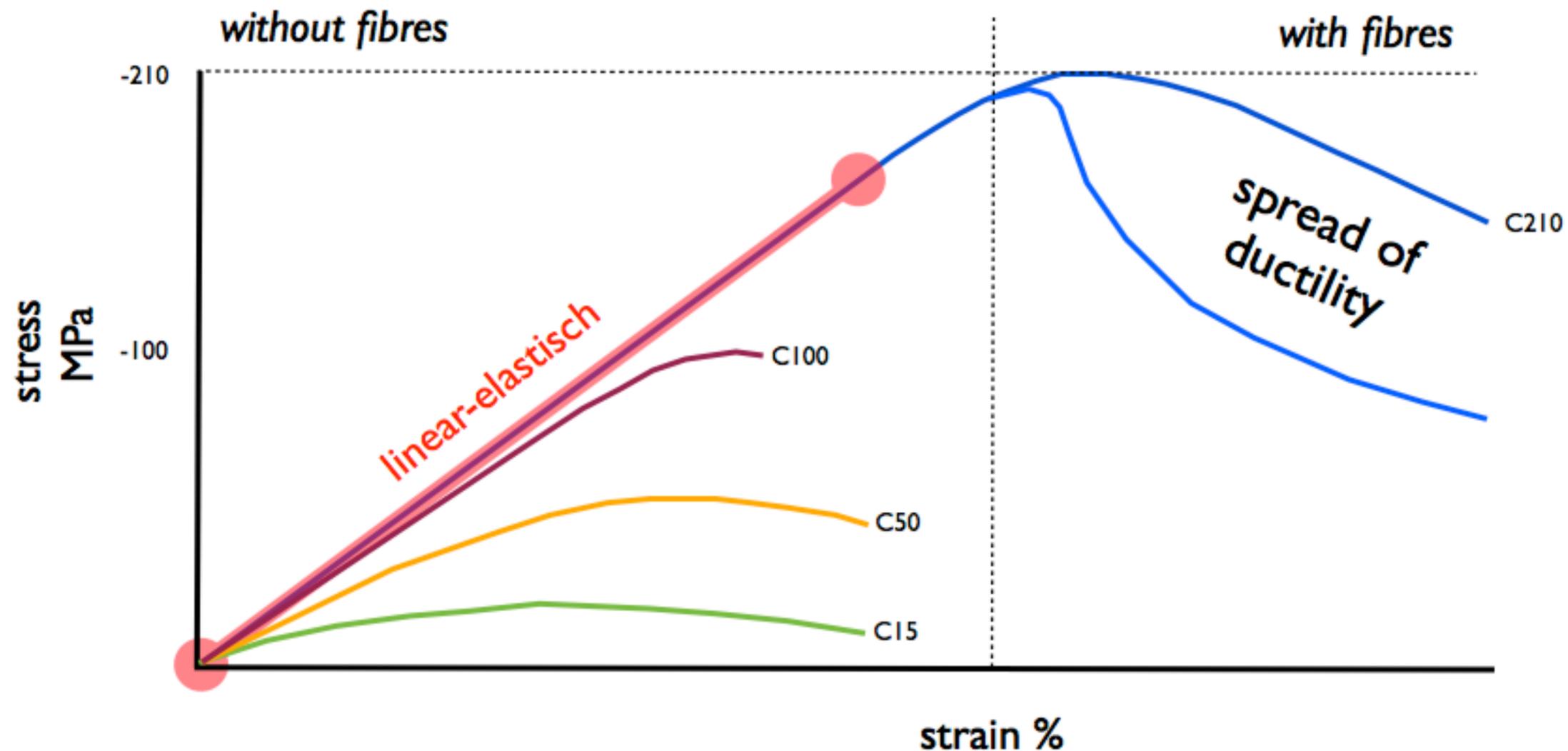


Ordinary
Concrete C35



UHPC C230

STRENGTH OF UHPC



ADVANTAGE

UHPC does have a high linear elastic behavior - good for slim and filigree structures. Failure behavior can be controlled by fibers and reinforcement.

- High compressive strength
- High flexural strength
- Linear elastic behavior
- UHPC can also take tensile strength

TAILORED UHPC TECHNOLOGY

Our Concrete respective UHPC formulations are tailored and developed to meet the requirements of the concrete, the available raw materials and the future application:

- compressive strength: 80 – 500 MPa
- tensile strength: 3 – 20 MPa
- flexural strength (matrix): 3 – 30 MPa
- flexural strength (reinforced): 5 – 75 MPa

- fracture energy: 50 - 90 kN/m
- possible unit thickness: > 2 mm
- carbonating: 1.5 mm after 3 years
- chloride-diffusion: not measurable
- water resistance: not measurable
- frost-resistance: < 100 g/m²
- dispersion: up to 80 cm
- shrinkage: 1 - 1.5 ‰
- crack width: << 0.1 mm
- weight: 1.5 - 2.7 t/m³

TAILORED CONCRETE TECHNOLOGY

- **Regular Concrete: C15 - C100**
- **Fast hardening concrete:
De-molding between 40min ... 4 hours possible**
- **Recycling Concrete: 25% up to 100% recycling content**
- **Aerogel & Foam Concrete: High insulation**
- **Ultra High Performance Concrete: up to 300 MPa**
- **Ultra High Geopolymer Concrete: up to 200 MPa**
- **Carbon Concrete: CO2 reduction with Carbon Black**
- **Dry-Mix Development: C50 up to C250**
- ...

We developed based on:

**LOCAL RAW-MATERIALS
LOCAL PRODUCTION UNITS**

- > **Cost Reduction**
- > **Co2 Reduction**
- > **Fast Development**

> **Raw-Material simulation for
Development**

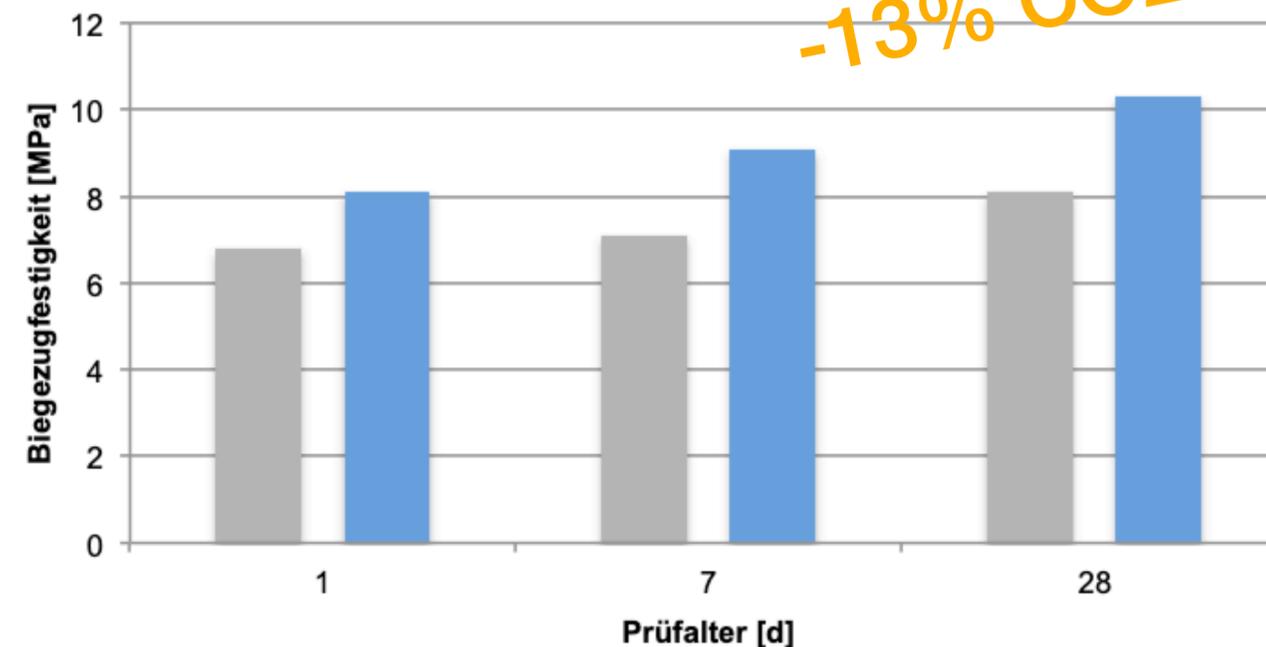
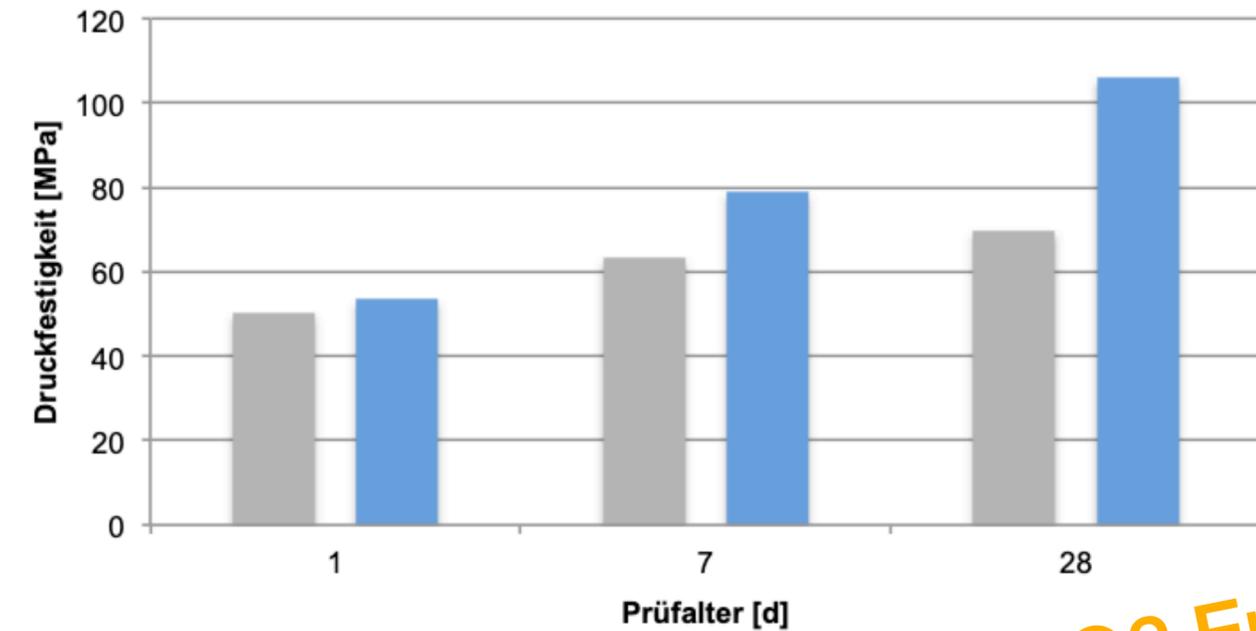
> **Prediction AI Tools**

„REGULAR“ CONCRETE OPTIMIZATION

CONCRETE OPTIMIZATION

White Carrara Dust meets Concrete Replace and Improve:

- Increase in compressive strength +20%
- Increase of flexural strength +20%
- Limitation of shrinkage
- improvement of CO2 footprint
- self-compacting concrete properties
- preset mixer
- specified aggregate
- pore-free surface
- reduction of efflorescence potential



-13% CO2 Emission

■ Referenzmischung ■ optimierte Mischung

CONCRETE & UHPC

replace and improve



UPGRADE FOR CONCRETE

Application example from the precast industry

Upgrading of a C50/60 fluid concrete to an SCC C80/95 HPC (HIGH PERFORMANCE CONCRETE

Location: Precast plant in Austria

- Avoidance of cost-intensive silica dust
- Optimization of the coarse grain composition
- Reduction of the cement content
- Optimization of the fine-grain packing density
- Optimization of the water film thickness
- Increasing the robustness of the concrete
- Retention of the strength

BEFORE

Self-compacting C55

420 kg/m³ Cement + 20 kg/m³ Silica Fume

Costs: 87 Euro/m³

AFTER

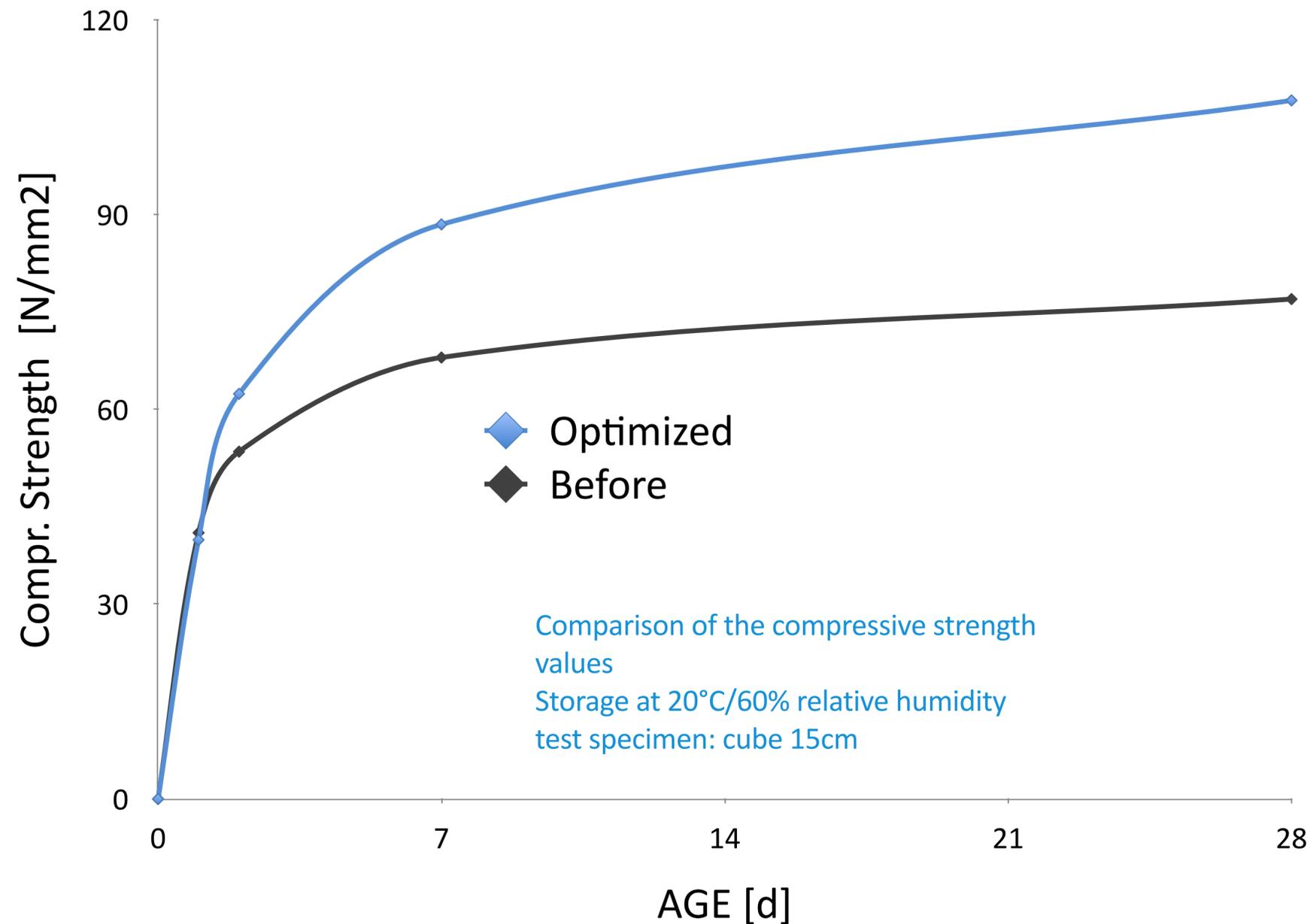
SSC C90

360 kg/m³ Cement

Costs: 69 Euro/m³

Cost reduction of 30%

UPGRADE FOR CONCRETE



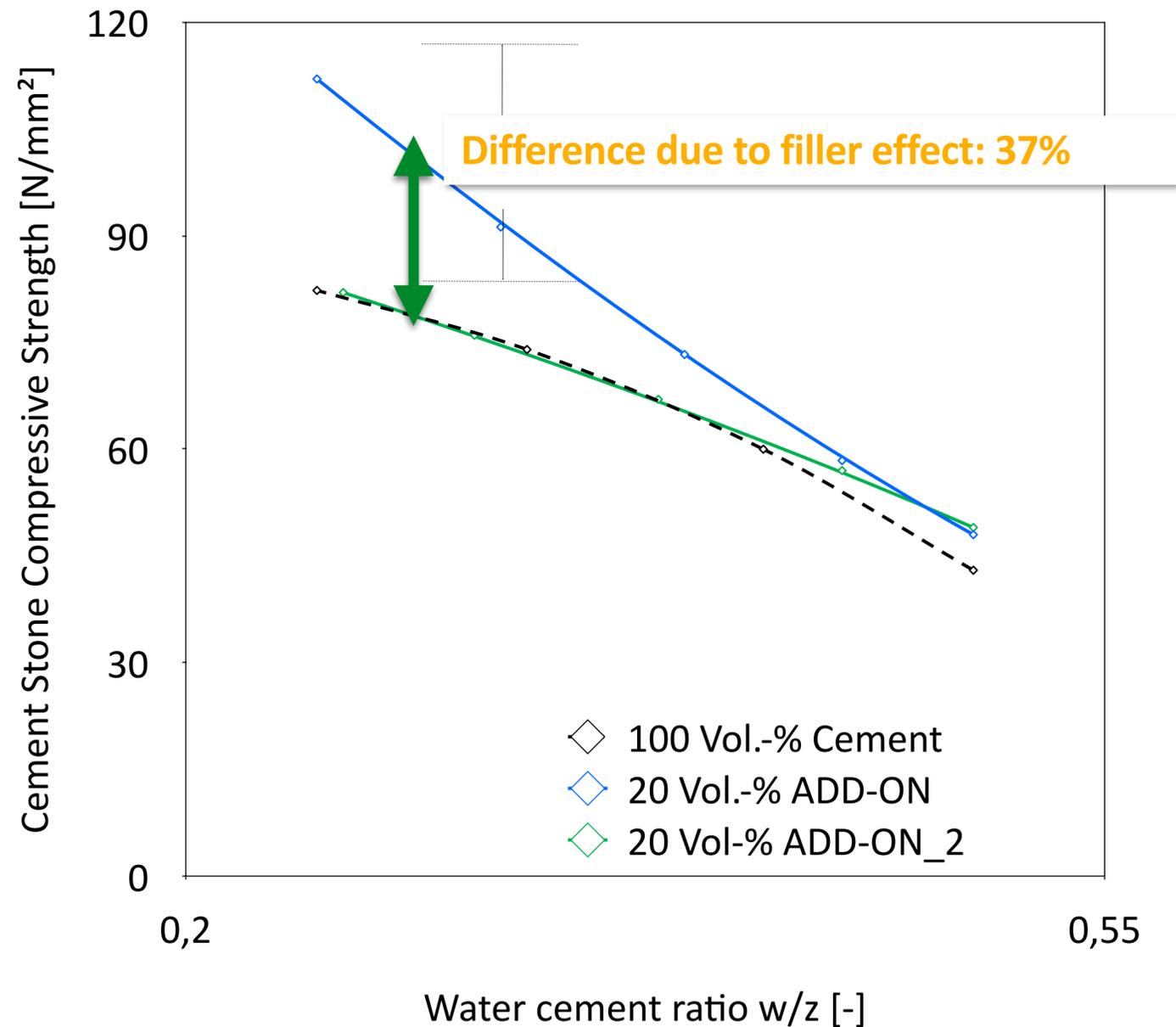
Application example from the precast industry:

Upgrading of a C50/60 fluid concrete to an SCC C80/95

Location:

Precast plant in Austria

UPGRADE FOR CONCRETE



Relationship between water-cement ratio and compressive strength.

Calculation of efficacy factors (k-values)



Cement without void-filling additives



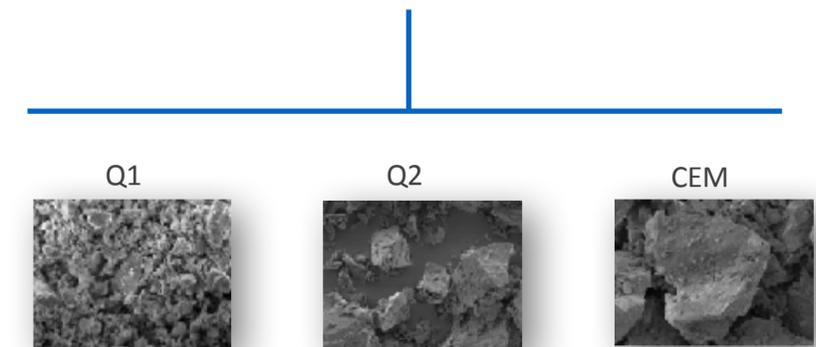
Water content reduced



Replacement of the cement by void-filling additives



Water content reduced, cavity filling



Our ADD-ON is individually optimized for your raw-materials.

G.tecz Engineering

specialist for cement bonded high-tech materials



UPGRADE FOR CONCRETE

3 EASY STEPS FOR OUR CLIENTS:

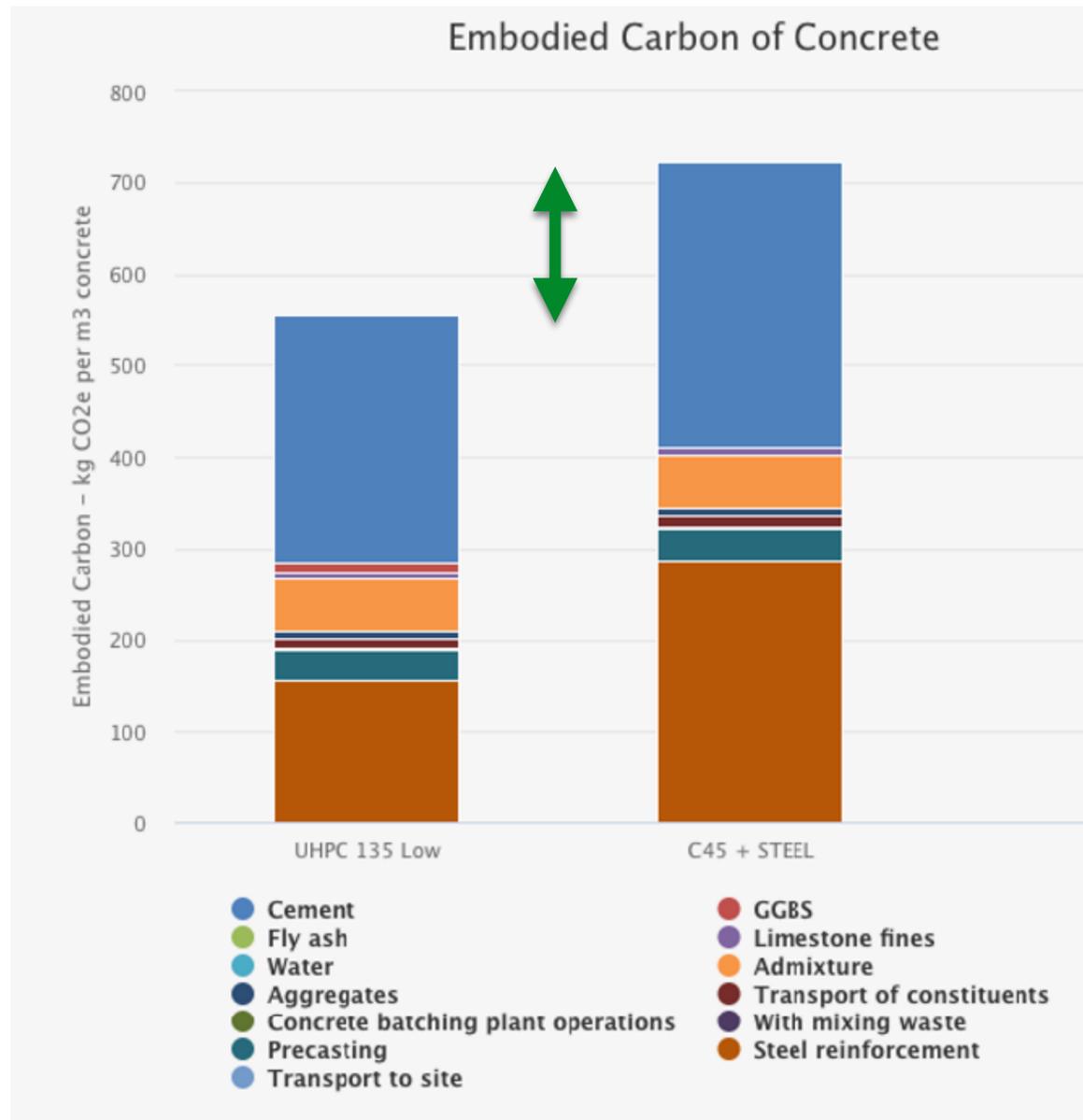
1. Send us a list of your raw-materials that you are already using.
Include Data-Sheet and price if available.
2. We do calculate the optimal formulation and amount of ADD-ON you need including a cost calculation.
3. You will receive an offer for our UPGRADE technologies.

YOU DECIDE.

CARBON FOOTPRINT

UHPC vs C45

Compare: UHPC vs. C45 with steel per m3



ADVANTAGE

Carbon Footprint of UHPC with fibres is 22% less than C45 with rebar.

- Cement and steel can be reduced.
- Manpower can be reduced
- Transportation can be reduced
- Material Volume [m3] can be reduced.

Total costs per m3 will be reduced.

Approx. 22% less
kg eCO₂ per m³
with UHPC

Carbon Footprint in
Kg CO₂e/m³:

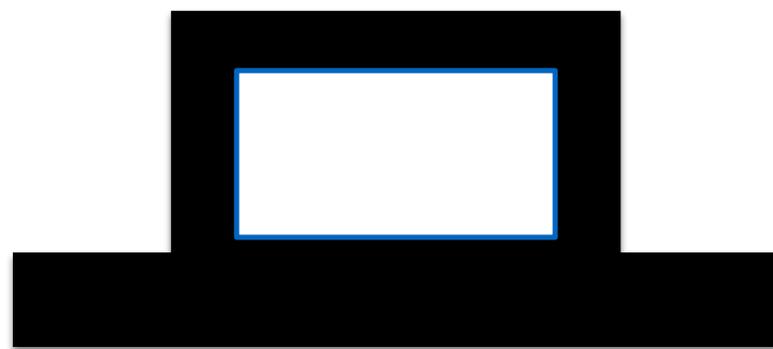
UHPC: 555

C45 & Steel: 714

COMPARE: UHPC VS. C45 WITH STEEL PER M3

NEOM - THE SPINE

Example - CONCRETE VOLUME REDUCTION by usage of UHPC instead of reinforced concrete:



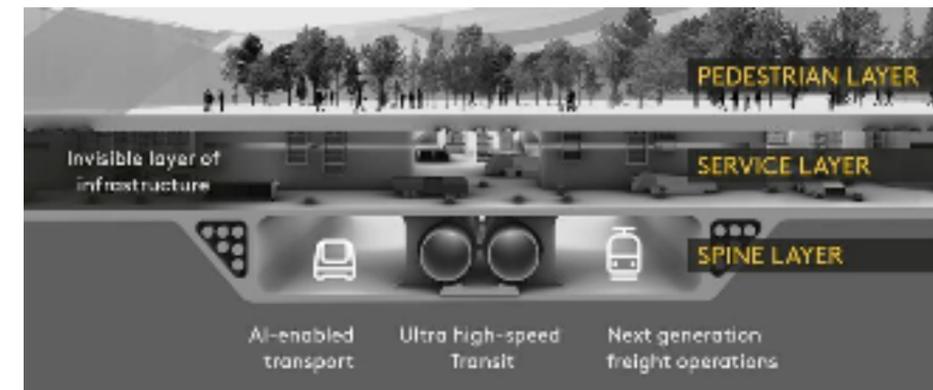
C45 & Steel: 100%



UHPC

Approx. 60% less concrete Volume

PROJECT NEOM:
THE SPINE OPTIMIZATION
PreConPro, SBP, G.tecz



OUR PARTNER:



COMPARE: UHPC VS. C45 WITH STEEL PER M3

NEOM - THE SPINE

CONCRETE VOLUME REDUCTION:

TYPE	Section m2	Length m	Volume m3	%	CO2e / m3	ton Co2e	%	CO2 Saving %
C45 & Steel	50	5000	250.000,00	100	714	178.500,00	100	0
UHPC & Fibre	22	5000	110.000,00	44	555	61.050,00	34	66

TYPE	Cost €/m3 *)	Cost Concrete & Steel	CO2 Cost/ton	CO2 cost
C45 & Steel	315,00 €	78.750.000,00 €	50,00 €	8.925.000,00 €
UHPC & Fibre	530,00 €	58.300.000,00 €	50,00 €	3.052.500,00 €

- *) Not included:
- Transportation costs
 - Site construction costs
 - Site production costs
 - Staff costs

With UHPC:
 66% kg eCO2 savings
 25% cost savings (material only)

Bridge Design



De-molding after 1 day
Compr. Strength 90MPa after 1 day. Steel fibers only.



Goosenbridge, Utrecht by ROMEIN





Goosenbridge, Utrecht by ROMEIN

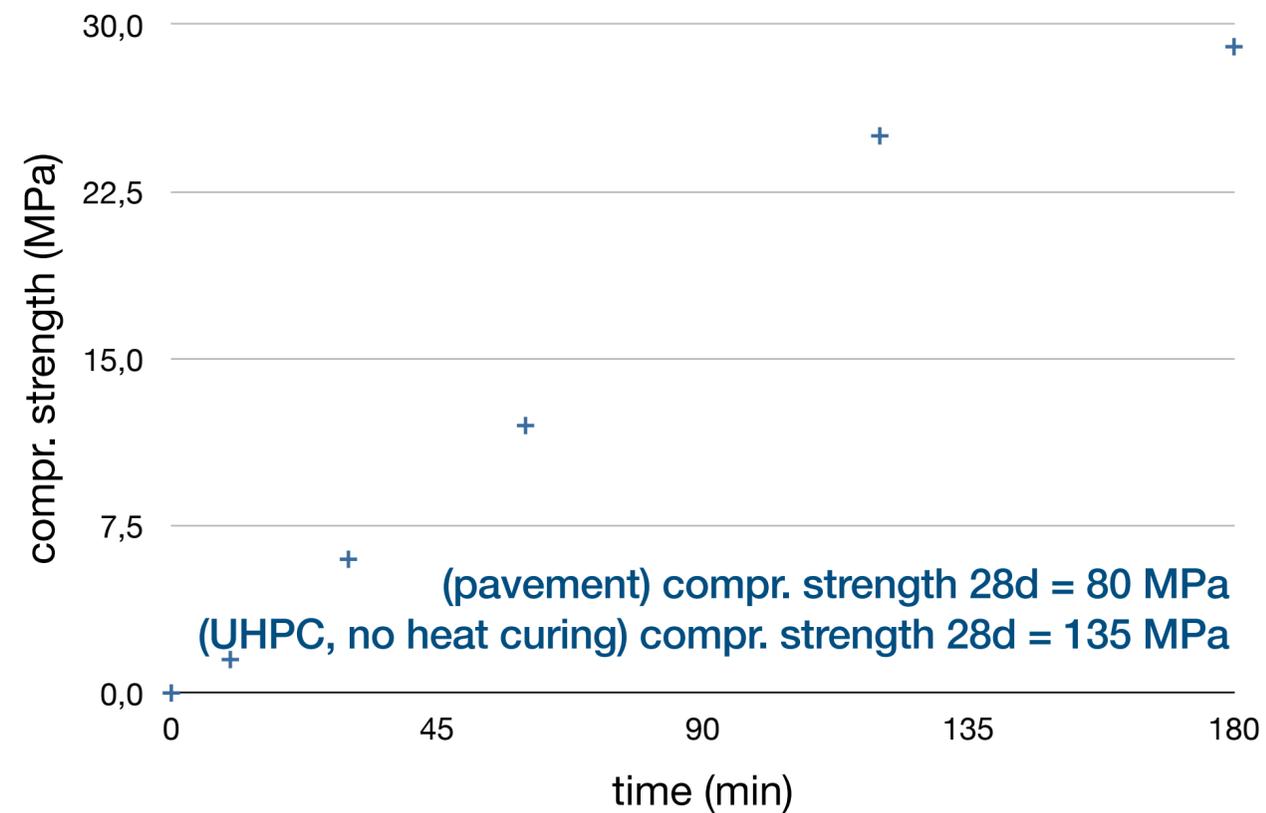
Fast hardening

In-Situ FAST HARDENING CONCRETE

ADVANTAGE

FAST HARDENING concrete, continuously mixed with mixing station on the truck.

Compr. strength after 30 minutes: 6MPa



Movie © G.tecz Engineering GmbH



REPAIR OF CONCRETE HIGHWAY after 2 hours traffic able

REPAIR OF CONCRETE HIGHWAY after 2 hours traffic able



Earth moist UHPC. PRODUCTION METHOD

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Earth moist UHPC. 10 min. After production

Drainage + Acoustics

DRAINAGE CONCRETE



Basalt
2 – 3 mm



Basalt
1 – 3 mm



Basalt
1 – 2 mm



Basalt
2 – 5 mm



Calcit
0,3 – 1,5 mm

DRAINAGE CONCRETE

ADVANTAGE

„Earth Moist“ concrete for drainage applied with standard machines:

UHPC Matrix & Aggregates

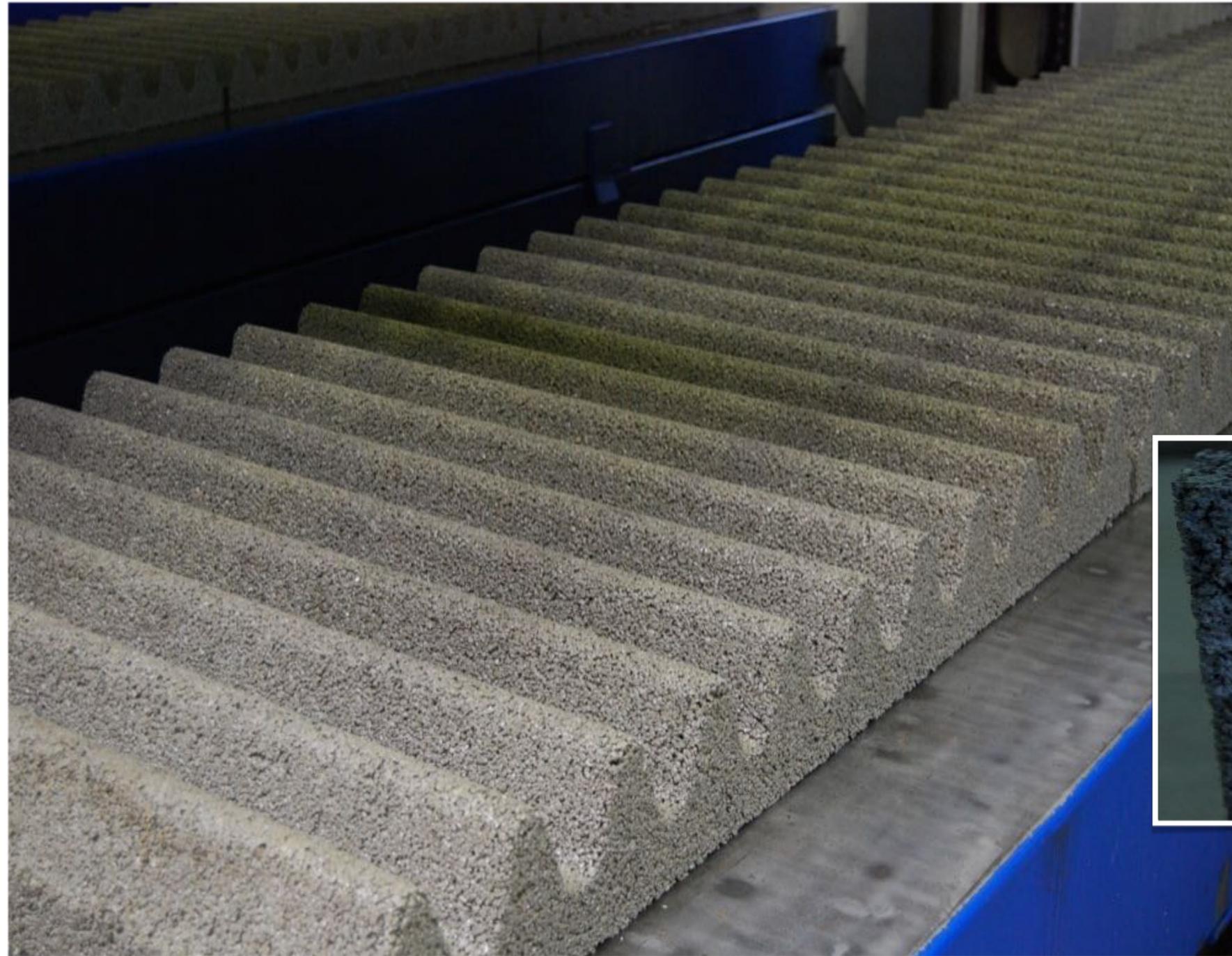
Project:

Parking Space

By OAT and G.tecz



ACOUSTIC CONCRETE

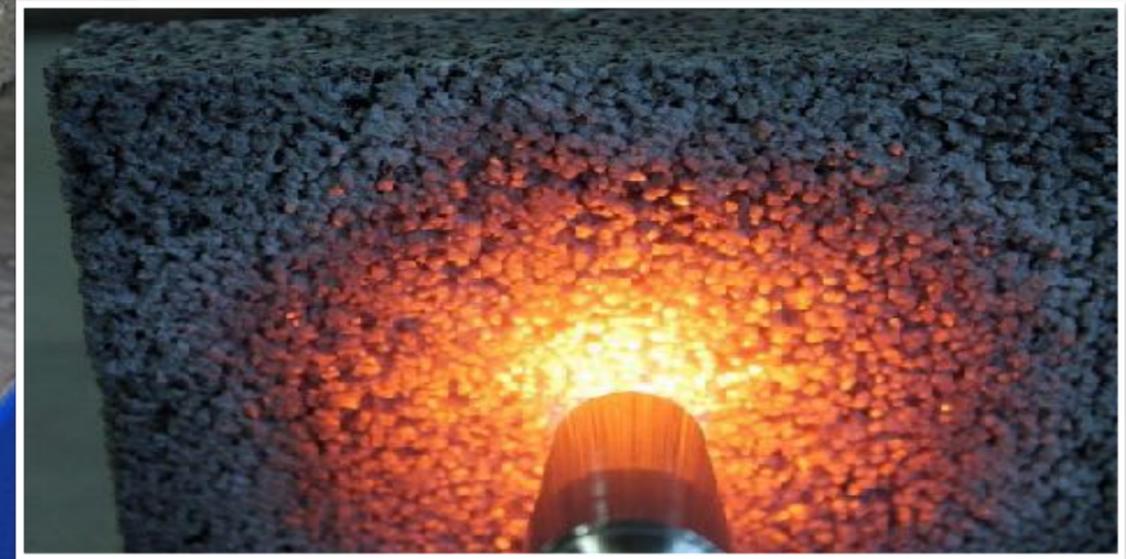


ADVANTAGE

„Earth Moist“ concrete for drainage or acoustic concrete applications:

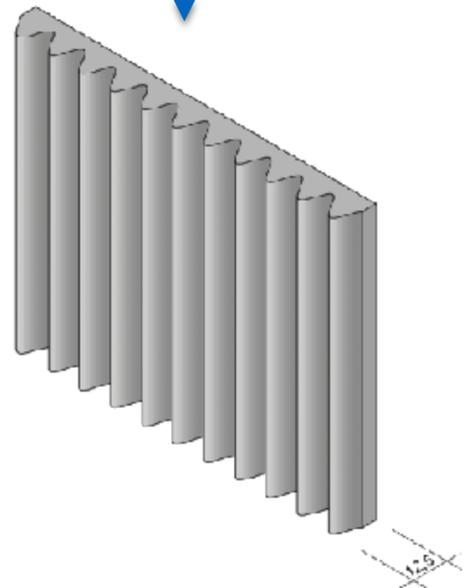
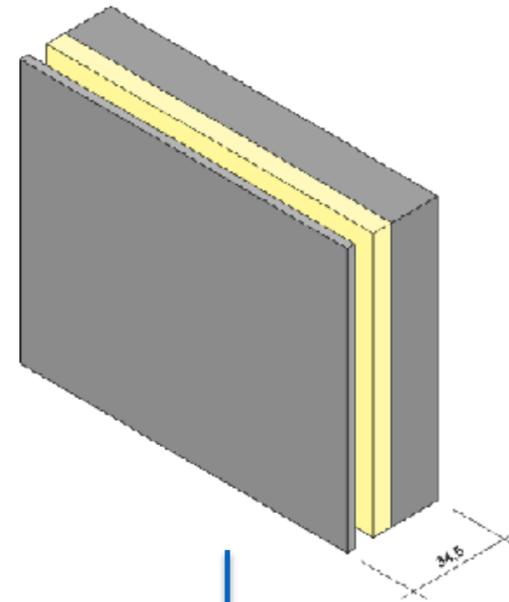
UHPC Matrix & Aggregates

Can be produced with nearly any aggregate, also recycled materials.



Noise Reduction Panels

ACOUSTIC CONCRETE



ADVANTAGE

noise reduction = 11 dB

void volume = 36 vol. %

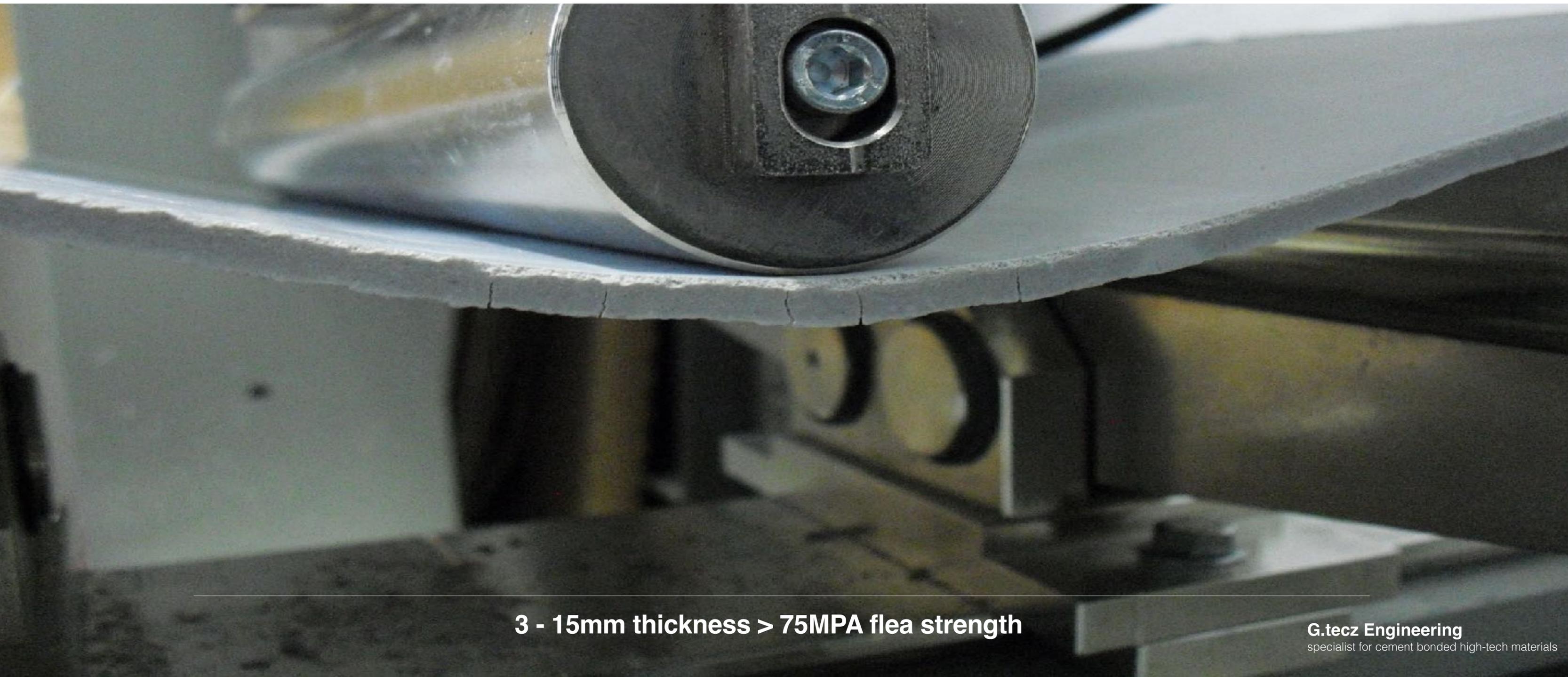
compressive strength = 35 MPa

flexural strength = 6 MPa

splitting tensile strength = 5 MPa

UHPC Facade Technology

UHPC FACADES



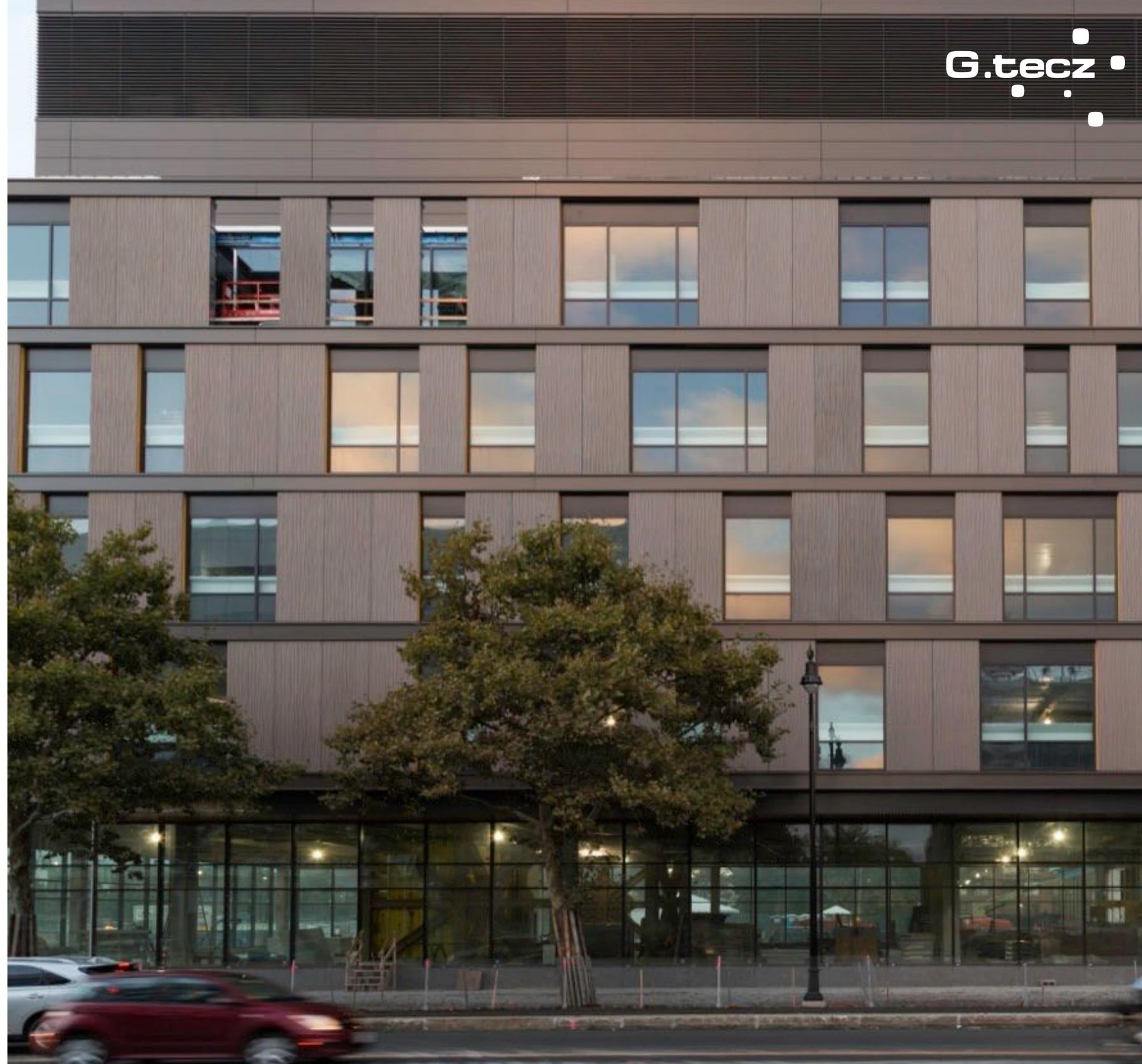
3 - 15mm thickness > 75MPA flex strength

UHPC FACADES

TAKTL®

success featured by G.tecz

- UHPC development
- Production development and consultancy
- Quality management & consultancy services
- Facade technology consultancy



A photograph of a modern building with white horizontal siding and a grey metal roof. The building has large windows and a glass door. In the foreground, there is a wooden structure and some outdoor seating. A ramp with a metal railing is visible in the lower right. The sky is blue and there are green trees in the background.

Chatham University Eden Hall Campus Dairy
Barn Cafe

9mm THICK UHPC FACADE PANELS by
GTECZ

9mm THICK UHPC FACADE PANELS by
GTECZ

UHPC Facade - next generation

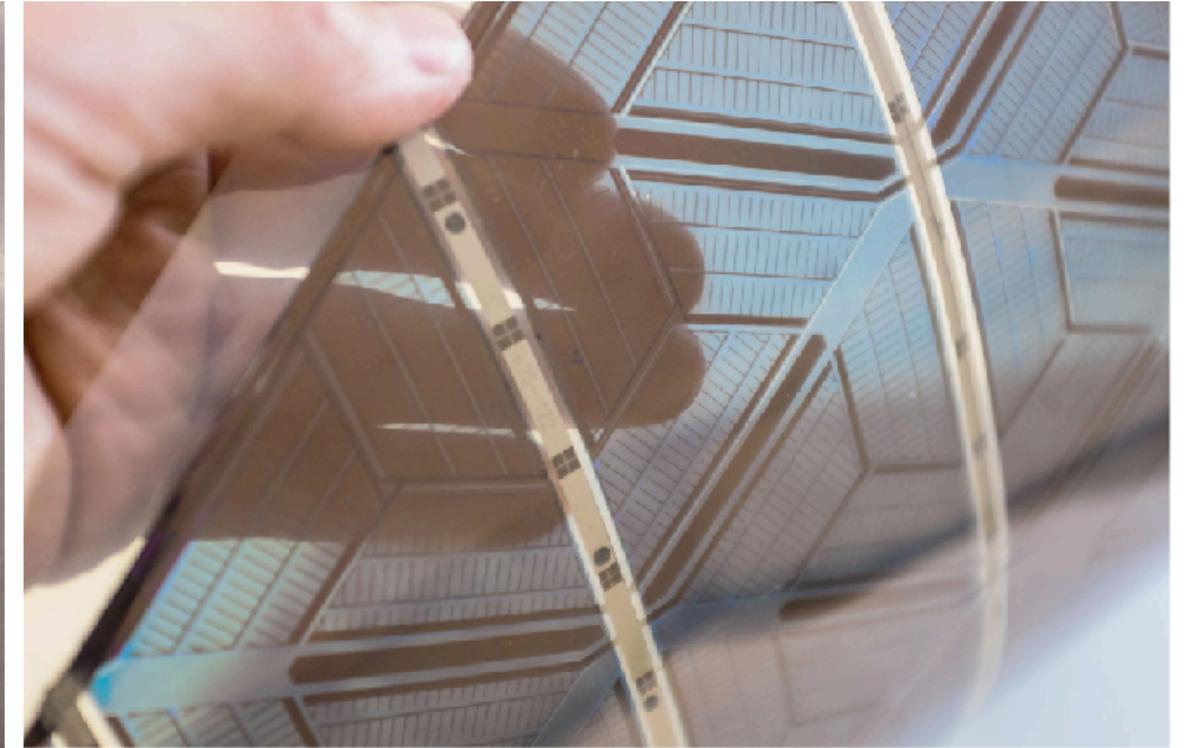
TABSOLAR FACADE - ALL IN ONE



**UHPC
VENTILATED
FACADE**



**THERMAL
ACTIVATED
FACADE**



**ORGANIC
PHOTOVOLTAIC
FACADE**

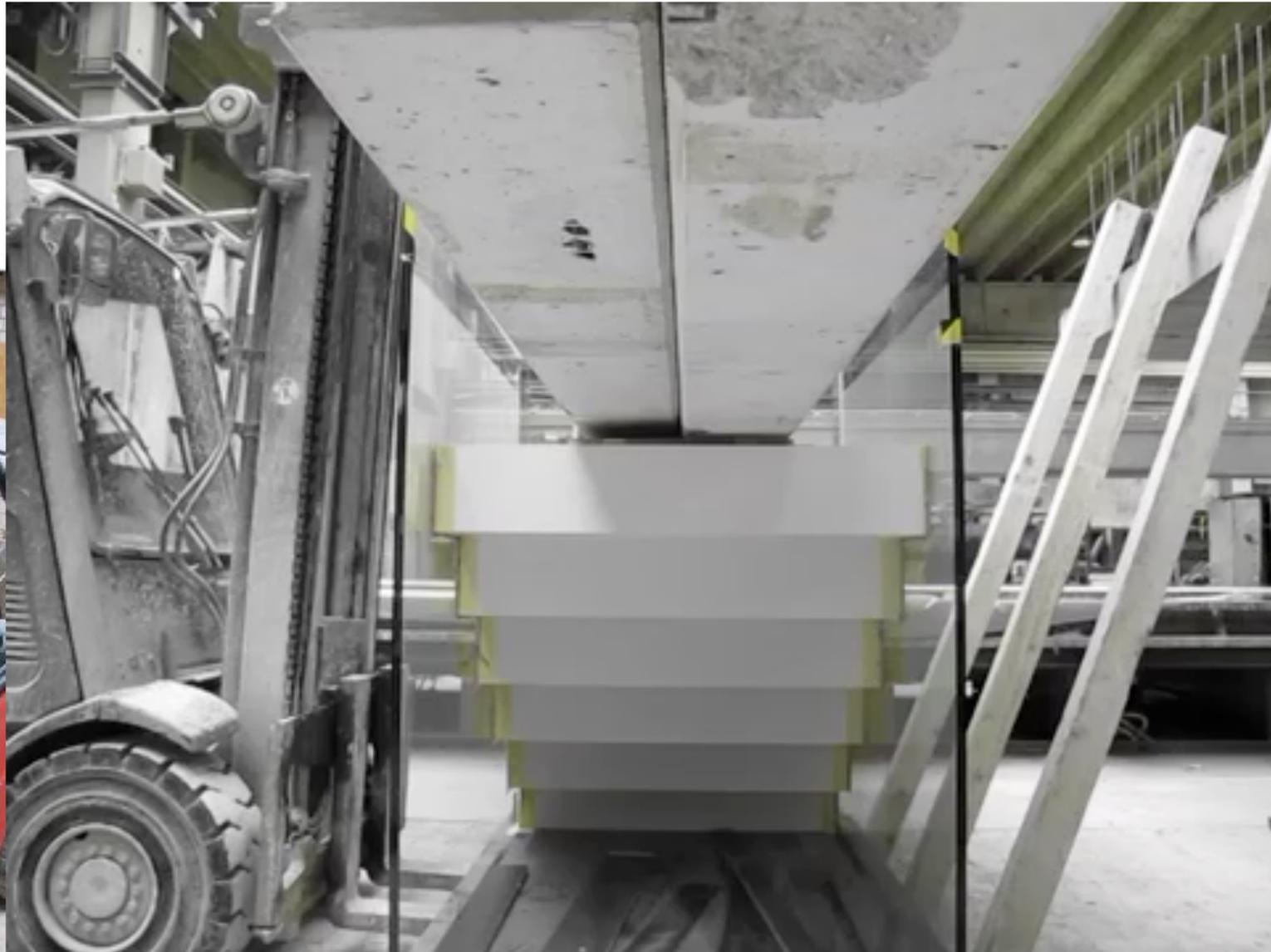
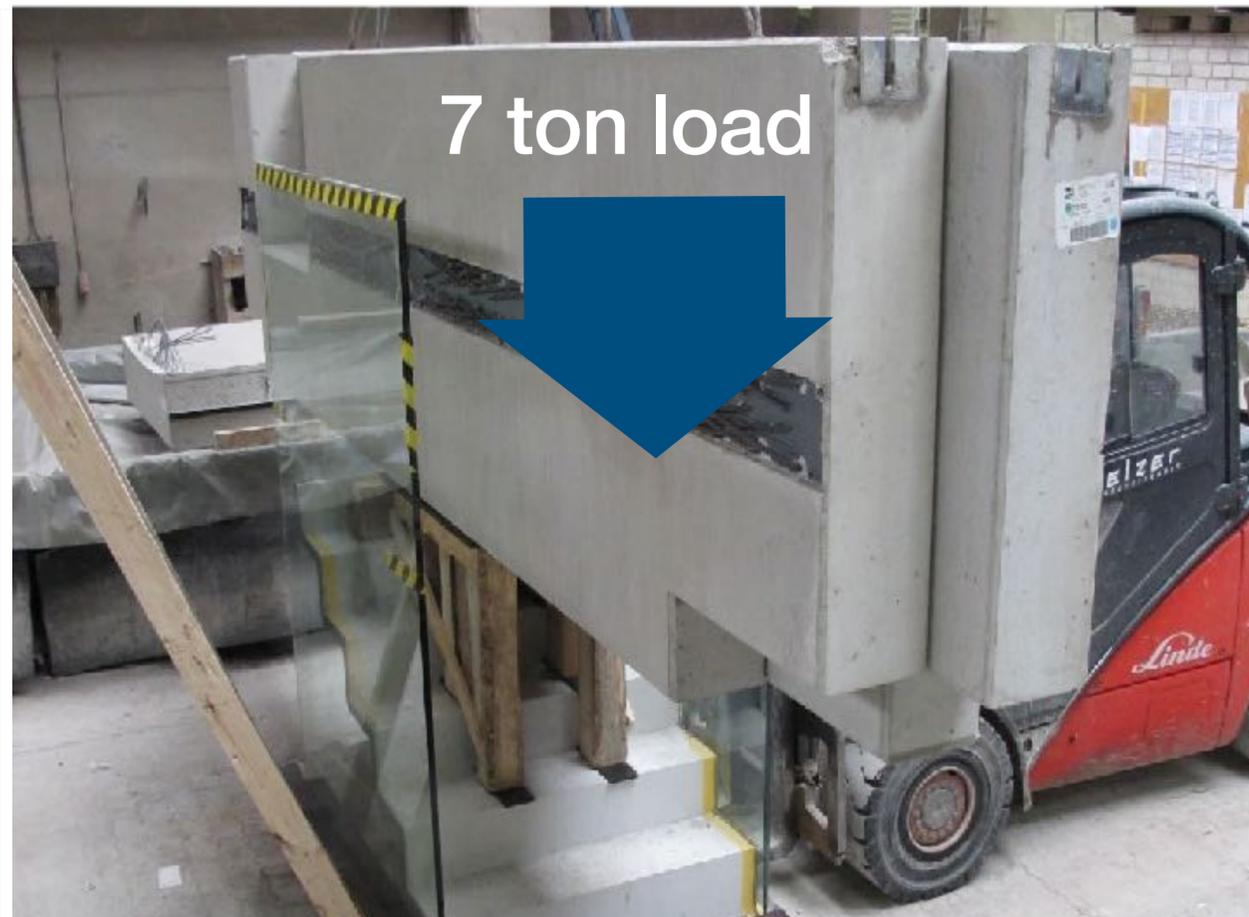
Glue Concrete

UHPC STAIR [3cm] & GLAS



3cm thick UHPC stair glued to glas panels

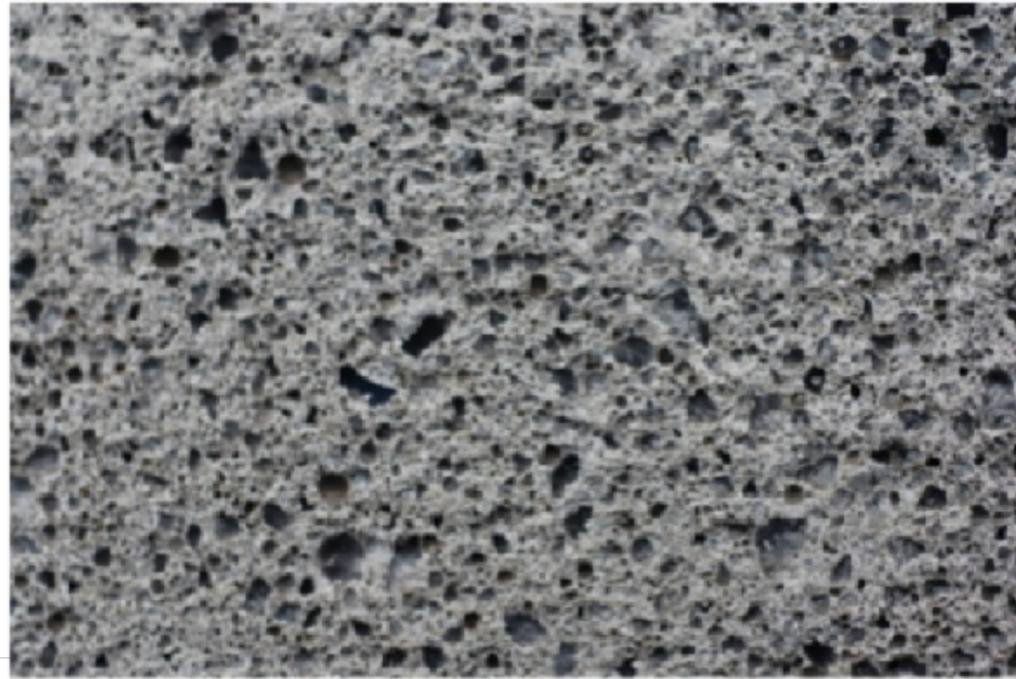
UHPC STAIR [3cm] & GLAS



Infra lightweight Aerogel Concrete

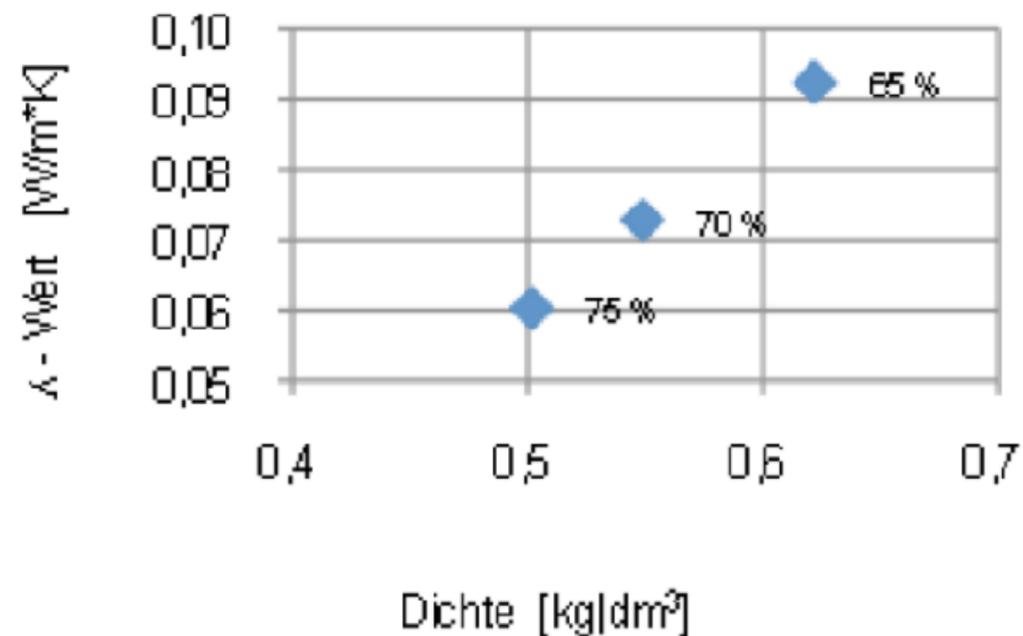
AEROGEL CONCRETE

AEROGEL CONCRETE



Aerogel: 65 Vol. %
Lambda: 0.093 W/mK
Density: 0.62 kg/dm³
Compr. strength: 3.0 N/mm²

Aerogel: 75 Vol. %
Lambda: 0.07 W/mK
Density: 0.51 kg/dm³
Compr. strength: 2.7 N/mm²



ADVANTAGE

Foamed Light Weight Concrete with lightweight aggregates and aerogel for structural and insulation applications.

- Very low density
- High thermal protection
- Still structural
- UHPC knowhow combined with lightweight technologies.

AEROGEL CONCRETE

G.tecz

HIGH TECH - INSULATING INFRA LIGHT WEIGHT AEROGEL CONCRETE

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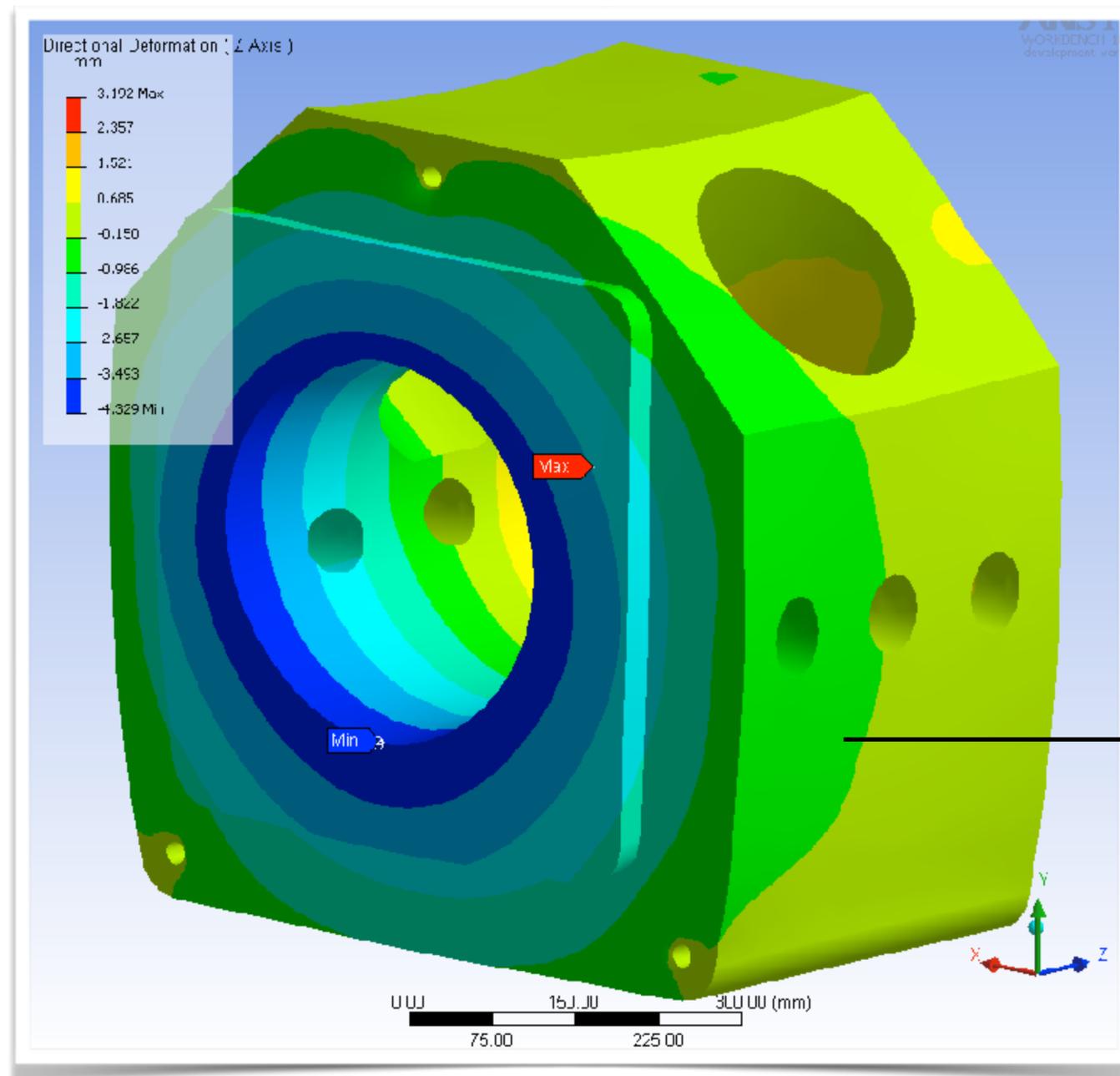
Thermal Protection

HEAT RESISTANT CONCRETE



15°C to 1300°C in 120 sec.

HEAT RESISTANT CONCRETE/Product Development



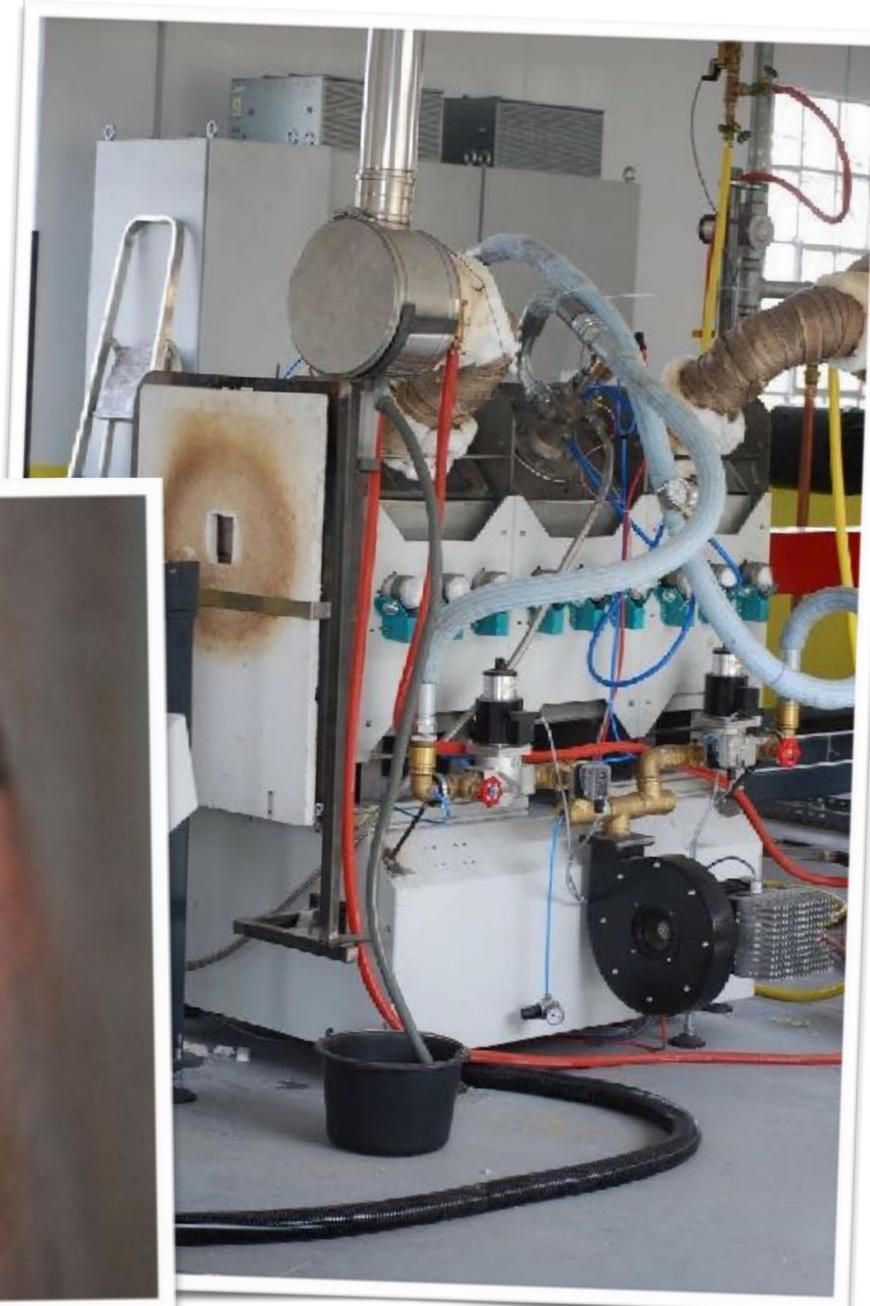
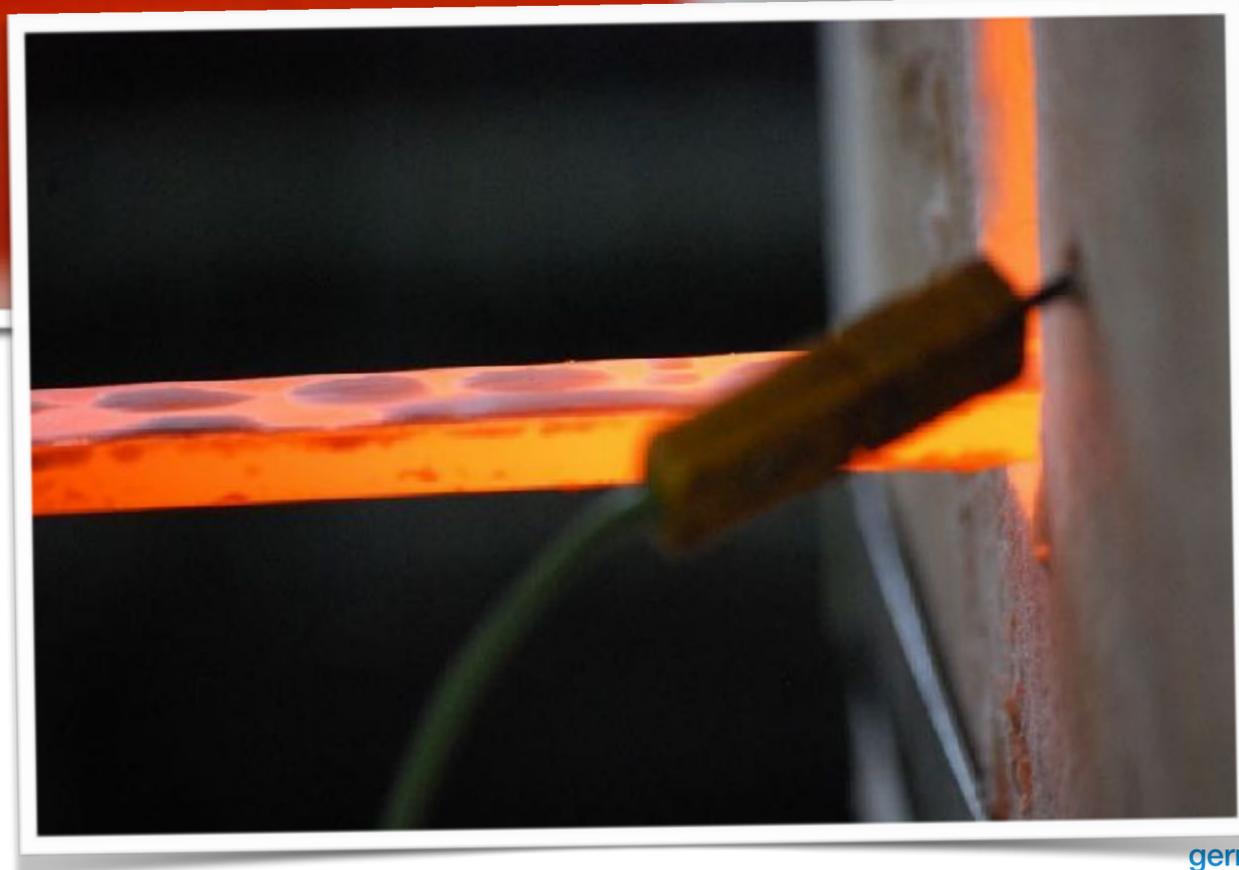
ADVANTAGE

Heat resistant concrete with high strength that takes still 70% load after full temperature load of 1.400 °C.

- High compressive strength
- High flexural strength
- Heat Resistant
- Cheaper than ceramics
- New product designs possible

from ceramic tiles
to low-cost concrete
100% change of product design

HEAT RESISTANT CONCRETE/Product Development

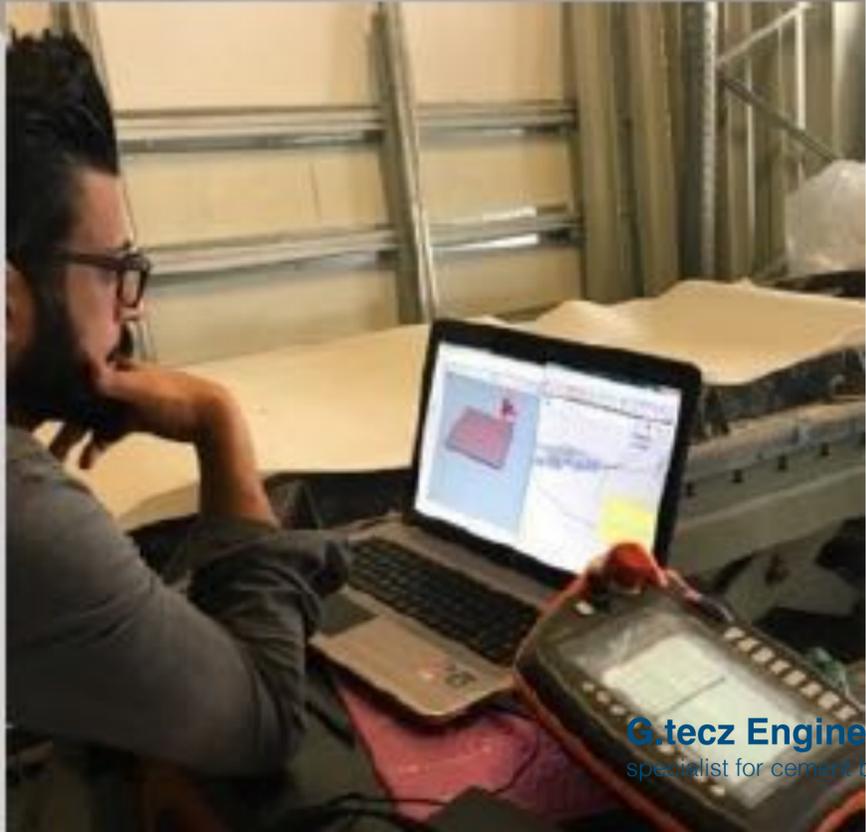
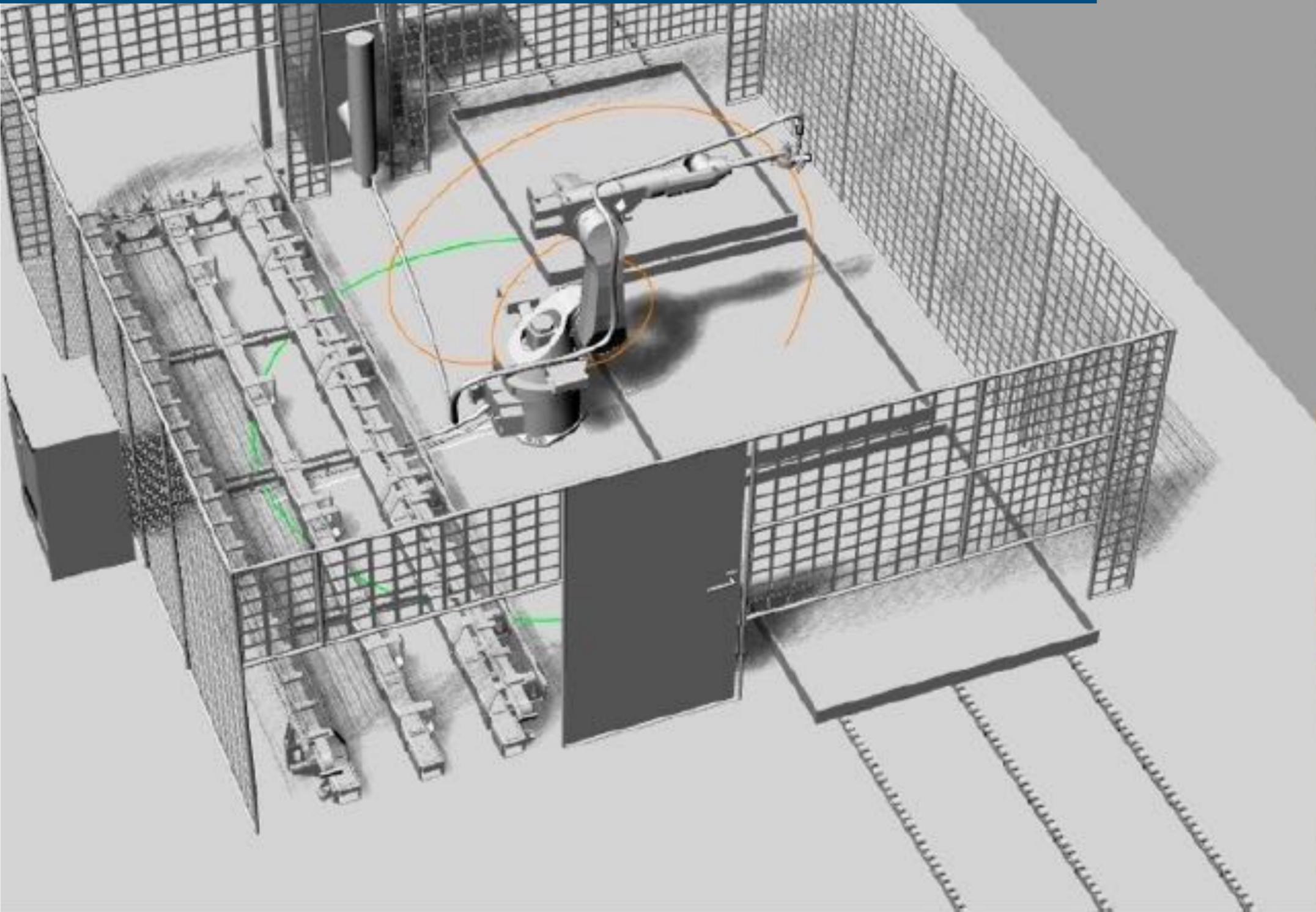


german research program: Universität Kassel, Hebö,
Volkswagen, G.tecz

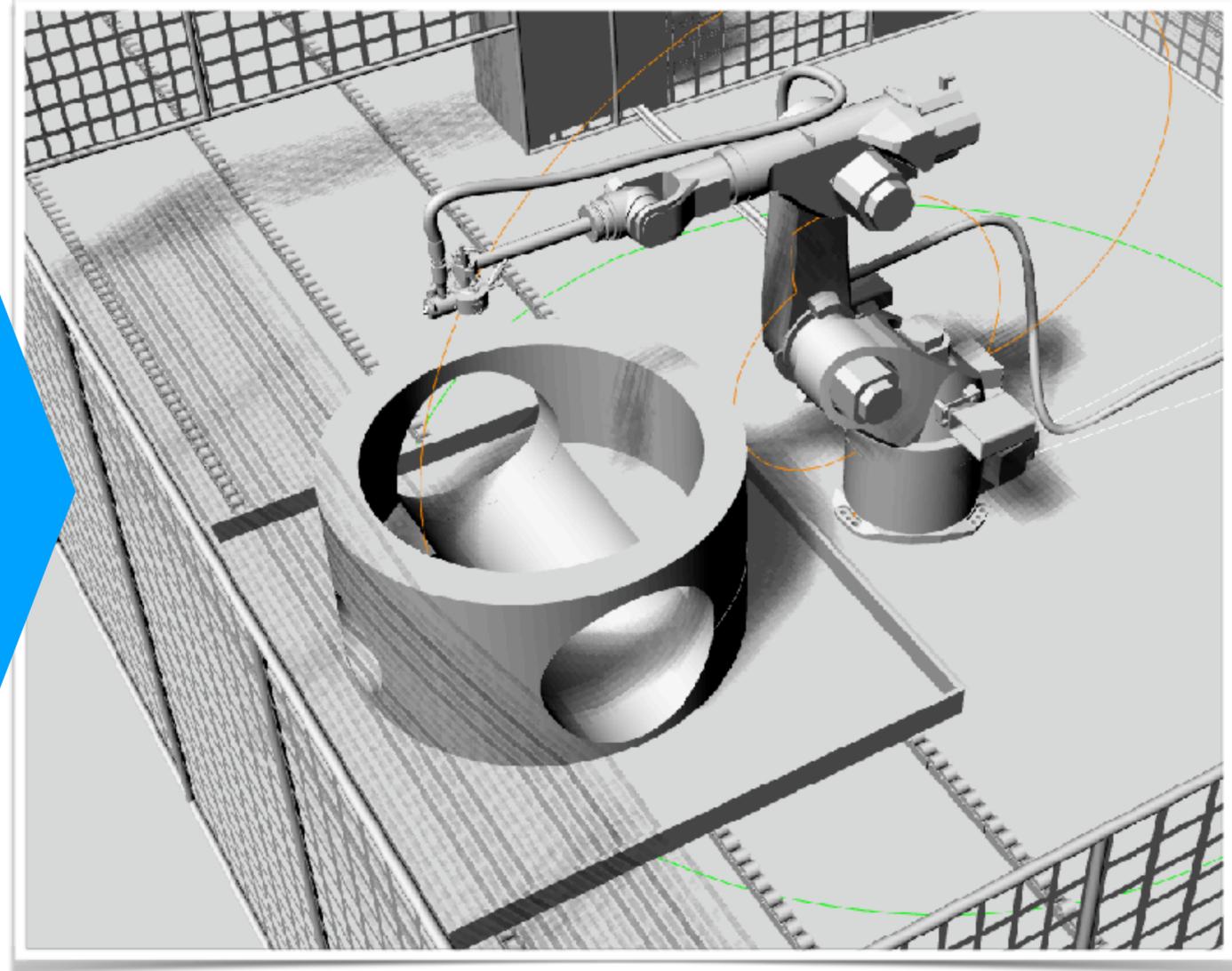
G.tecz Engineering
specialist for cement bonded high-tech materials

NEW TECHNOLOGIES

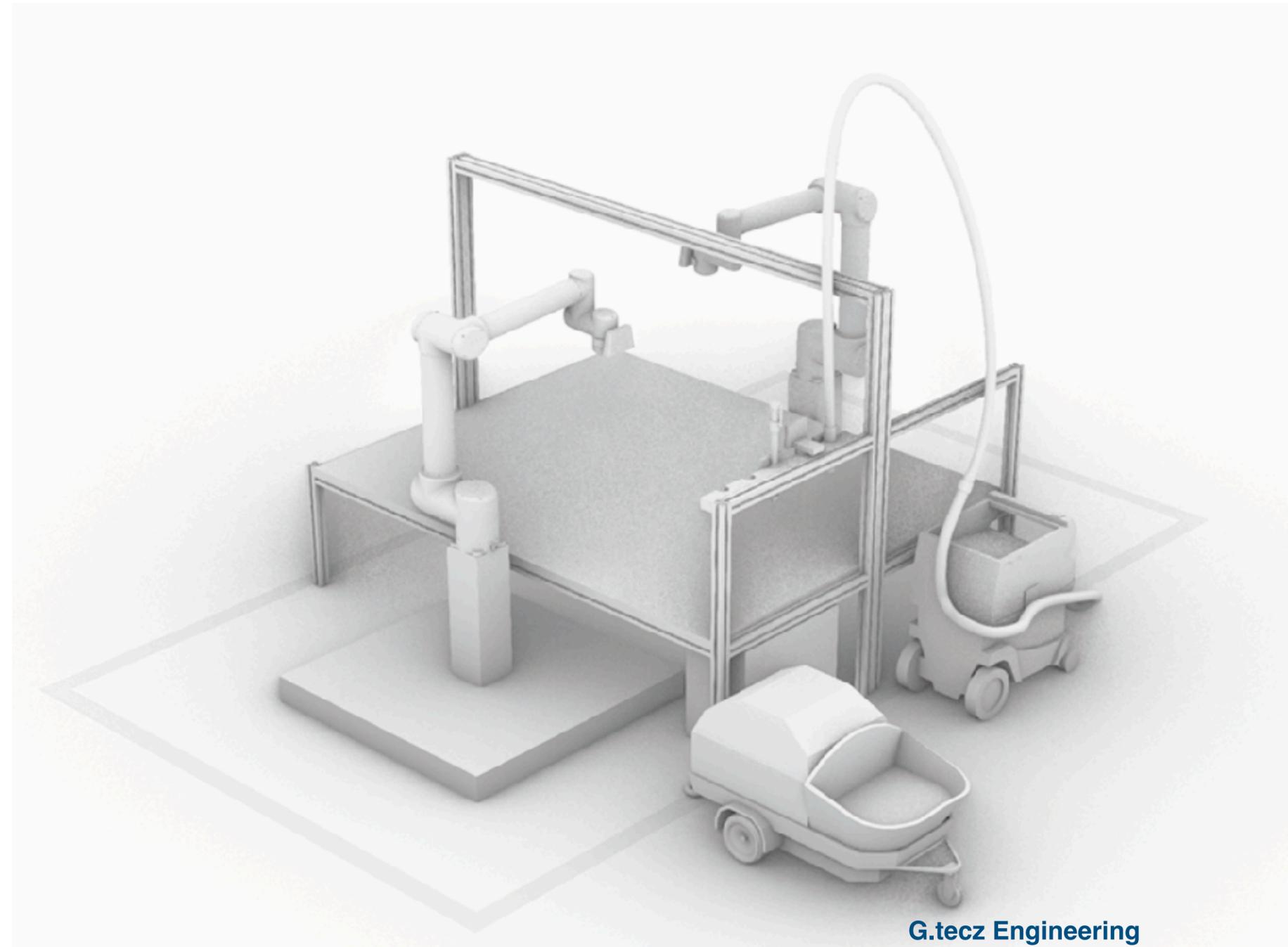
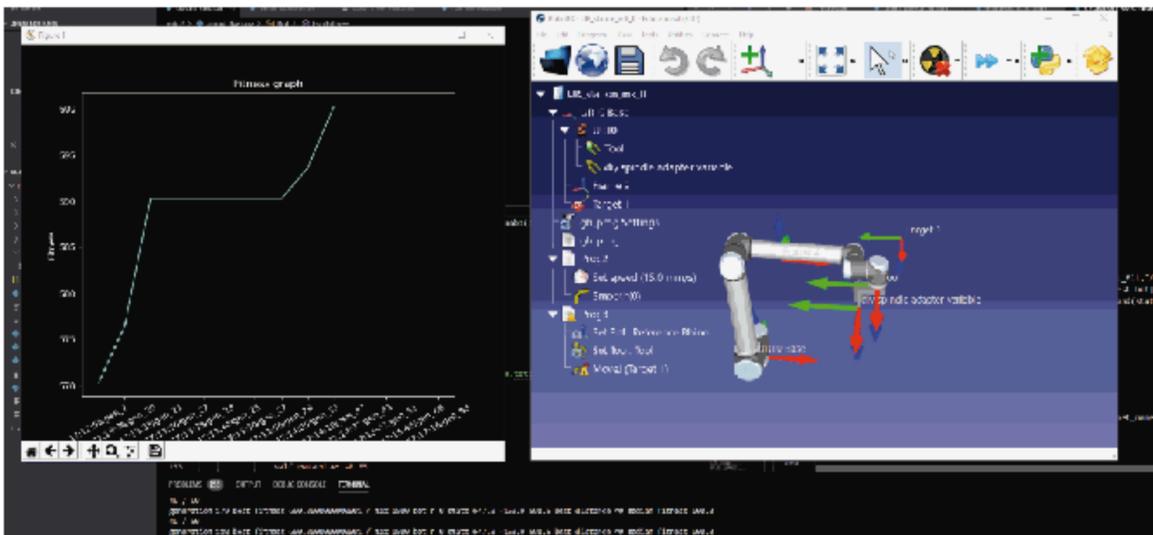
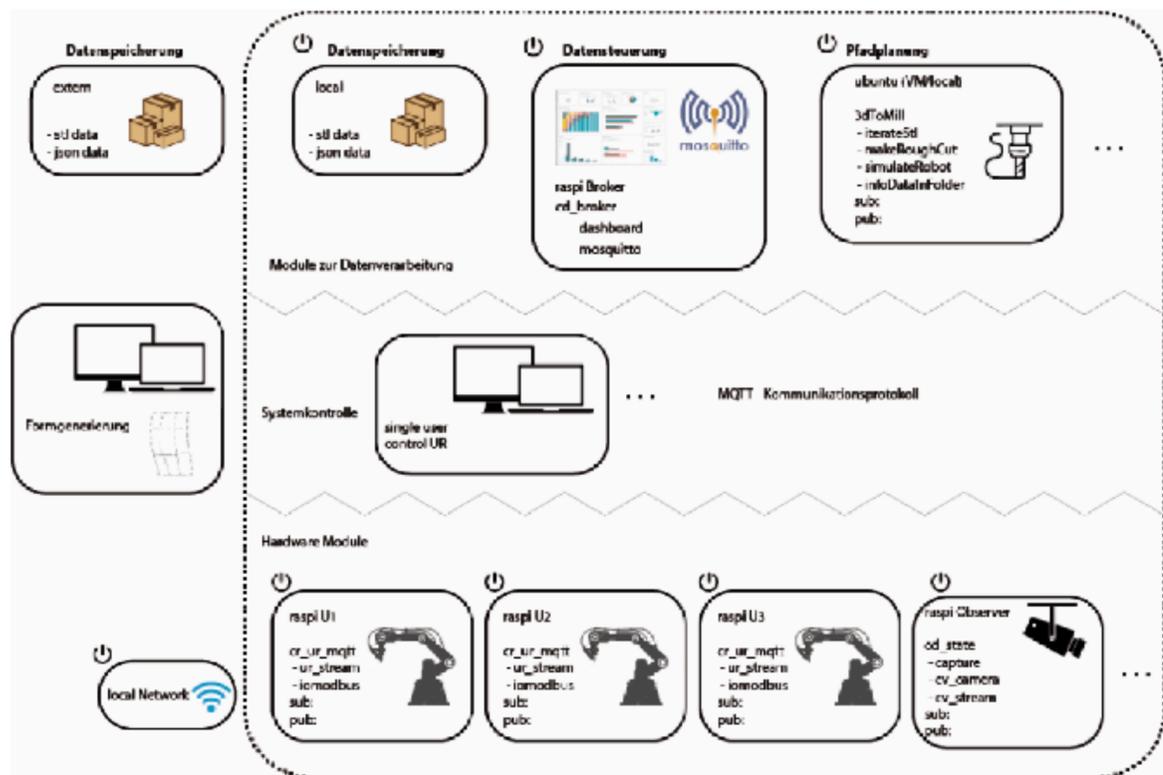
SHOTCRETE ROBOT



SHOTCRETE ROBOT CONCEPT



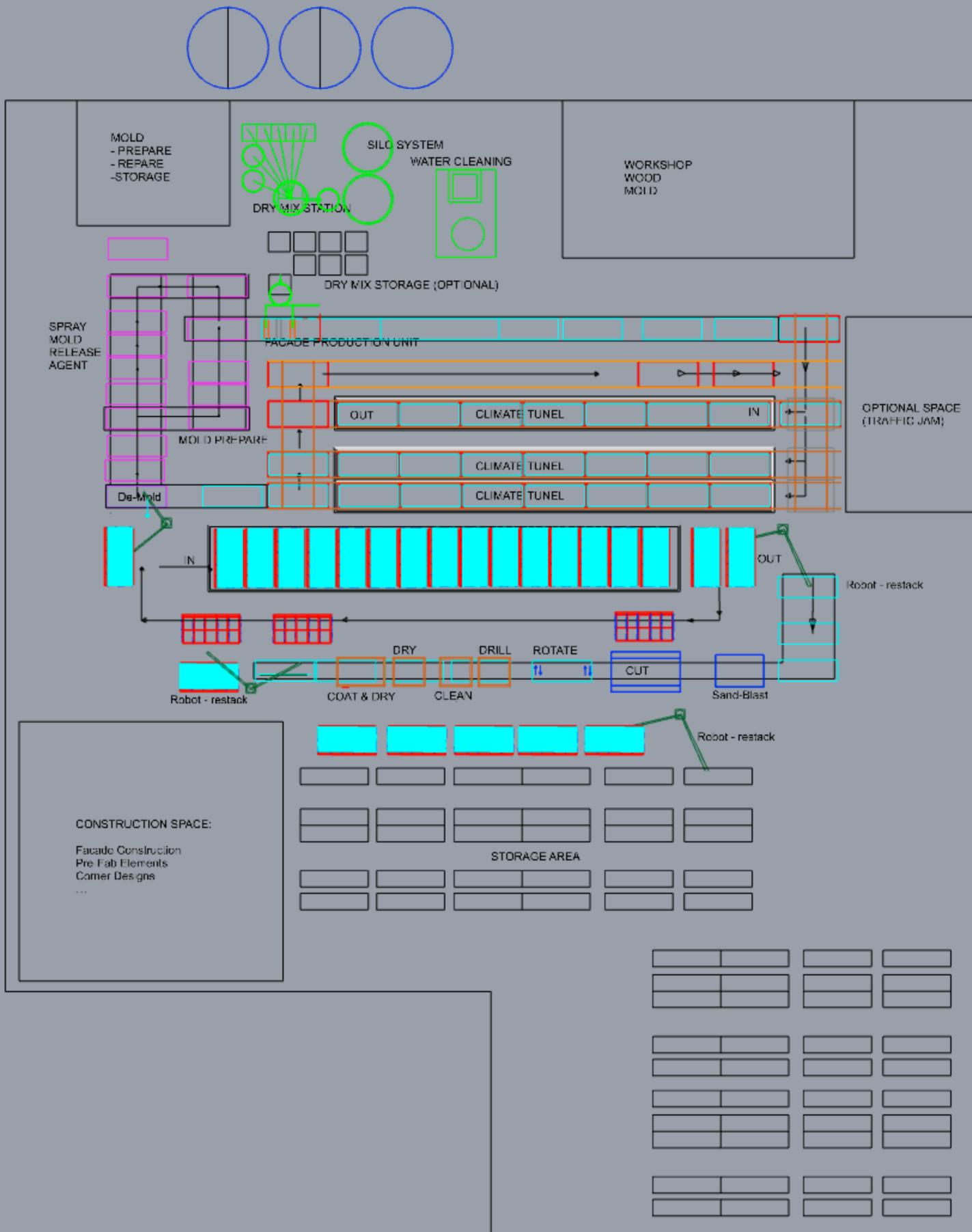
CYBERPHYSICAL FACADE PRODUCTION CONCEPT



NEXT LEVEL

Complete Solution

Production line + UHPC Technology = 12mm Facade Panels



We offer consultancy and complete solutions:

Facade & Wall production Line

- High production capacity
- High UHPC Quality
- Low Investment

We partner with: PreConPro
Developer of Pre-Fab production companies.



We offer consultancy and complete solutions:

Facade & Wall production Line

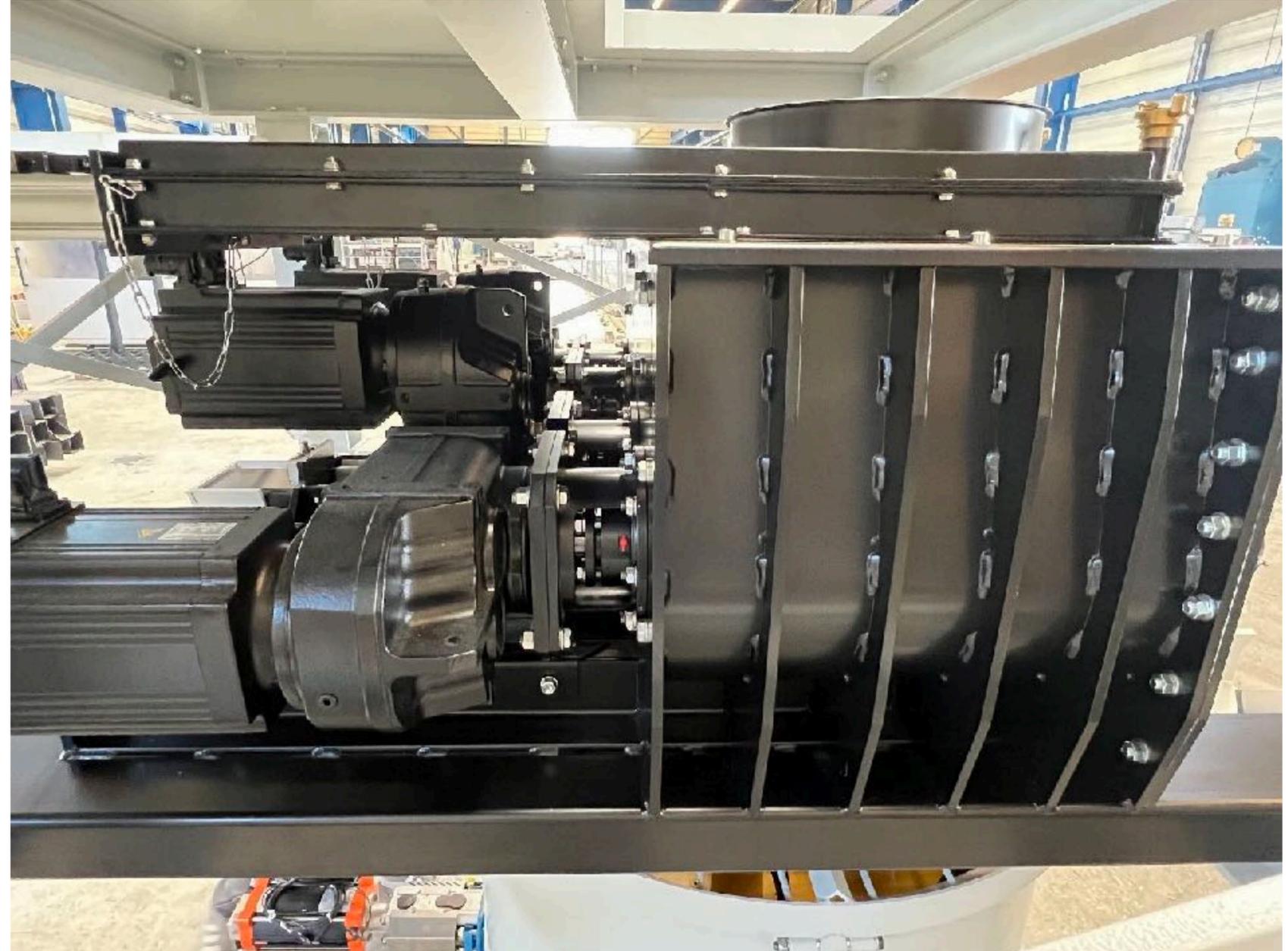
- High production capacity
- High UHPC Quality
- Low Investment



UHPC MIXER DEVELOPMENT



60L for 1.2 m³ per hour
2.000L for 40 m³ per hour



Mixing time 120 sec.

Concrete - Production Quality Control with AI

- SELF-LEARNING REAL-TIME PREDICTION SYSTEM > Concrete Quality Prediction 28d
- Retrofitting of existing precast plants and other production machines.
- Help system for production manager during production.
- Real-time recommendation system for recipe adjustment.
- Real-time recommendation for maintenance of production units.

- REAL-TIME tracking
- Quality Control. Reduction of scrap.

OUR PARTNER



U N I K A S S E L | M A S C H I N E N B A U
V E R S I T Ä T

FORSCHUNGSPARTNER: MRT

G.tecz

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