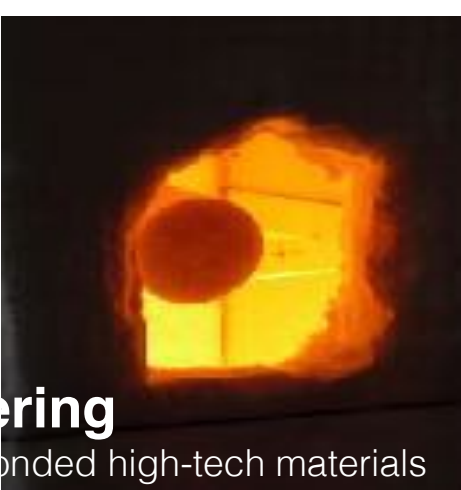
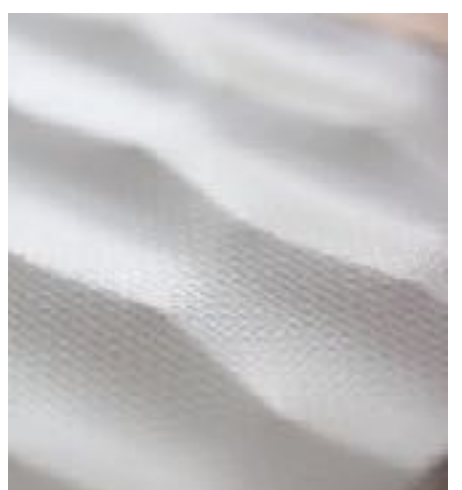
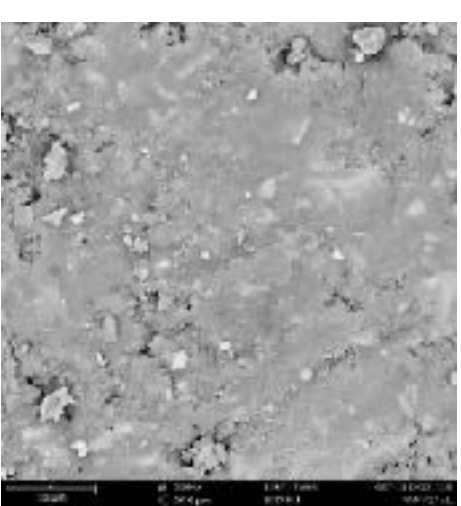
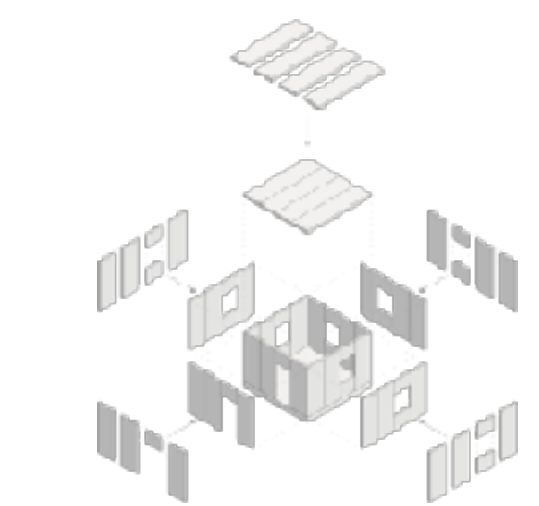
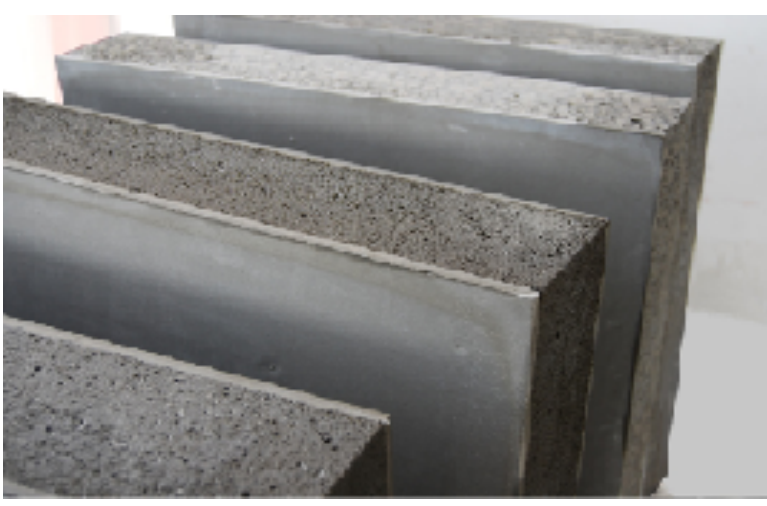
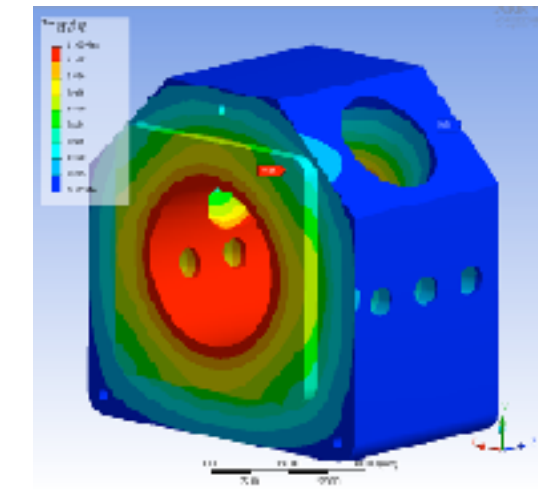
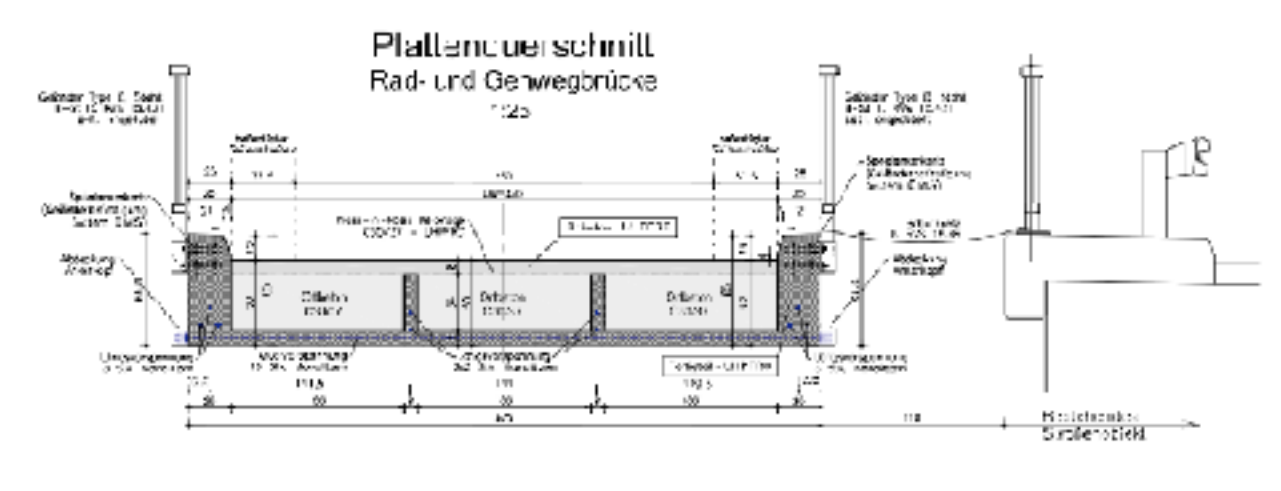


G.tecz Engineering GmbH

specialist for cement bonded high-tech materials



CONCRETE OVERVIEW



PORTFOLIO / Service

- 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

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**

> **Cost Reduction**

> **Co₂ Reduction**

> **Fast Development**

> **Raw-Material simulation
for Development**

> **Prediction AI Tools**

REFERENCES



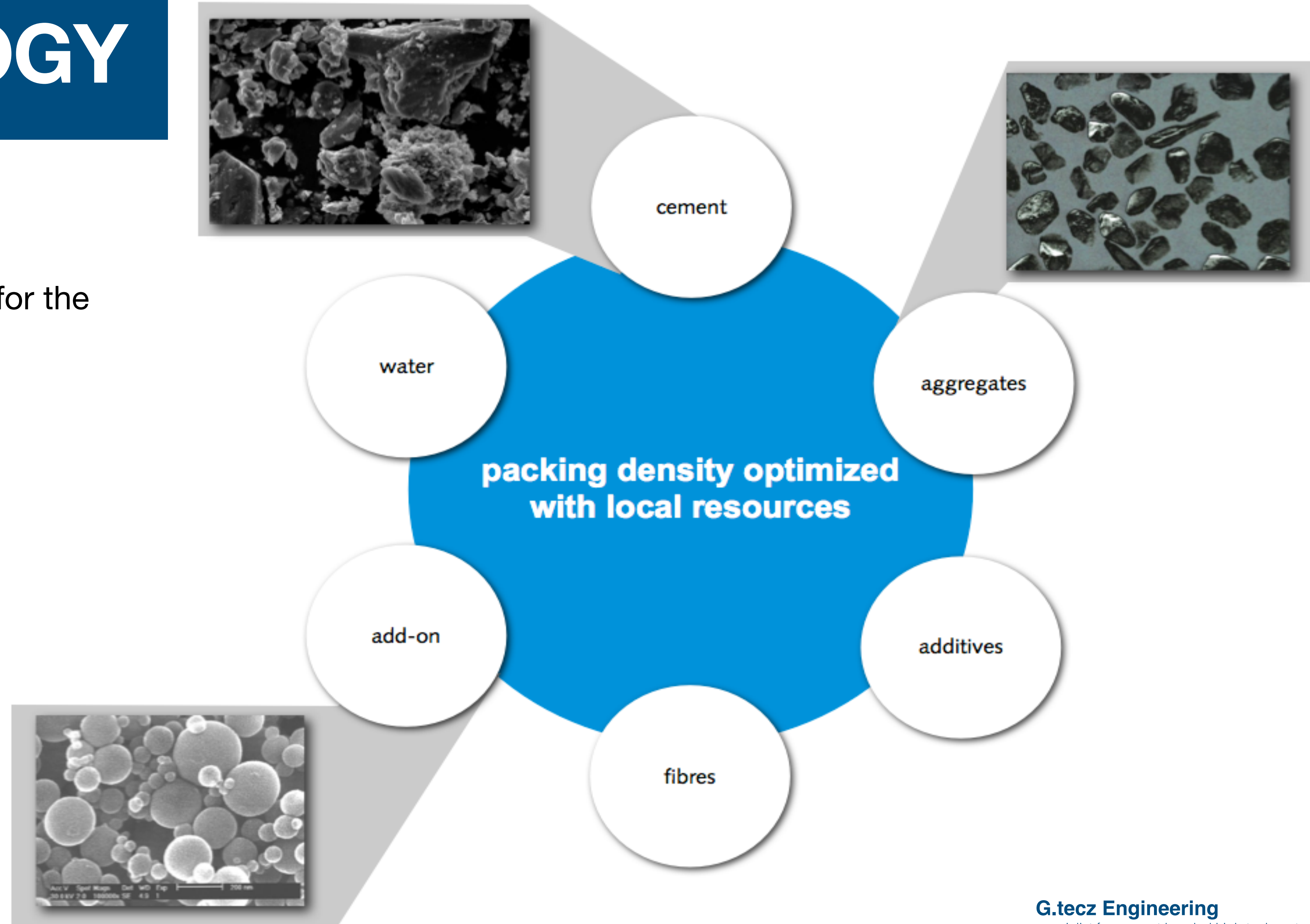
UHPC - Ultra High Performance Concrete

TECHNOLOGY

ADVANTAGE

We use local raw-materials for the developments.

- Local
- Low costs
- No shipping

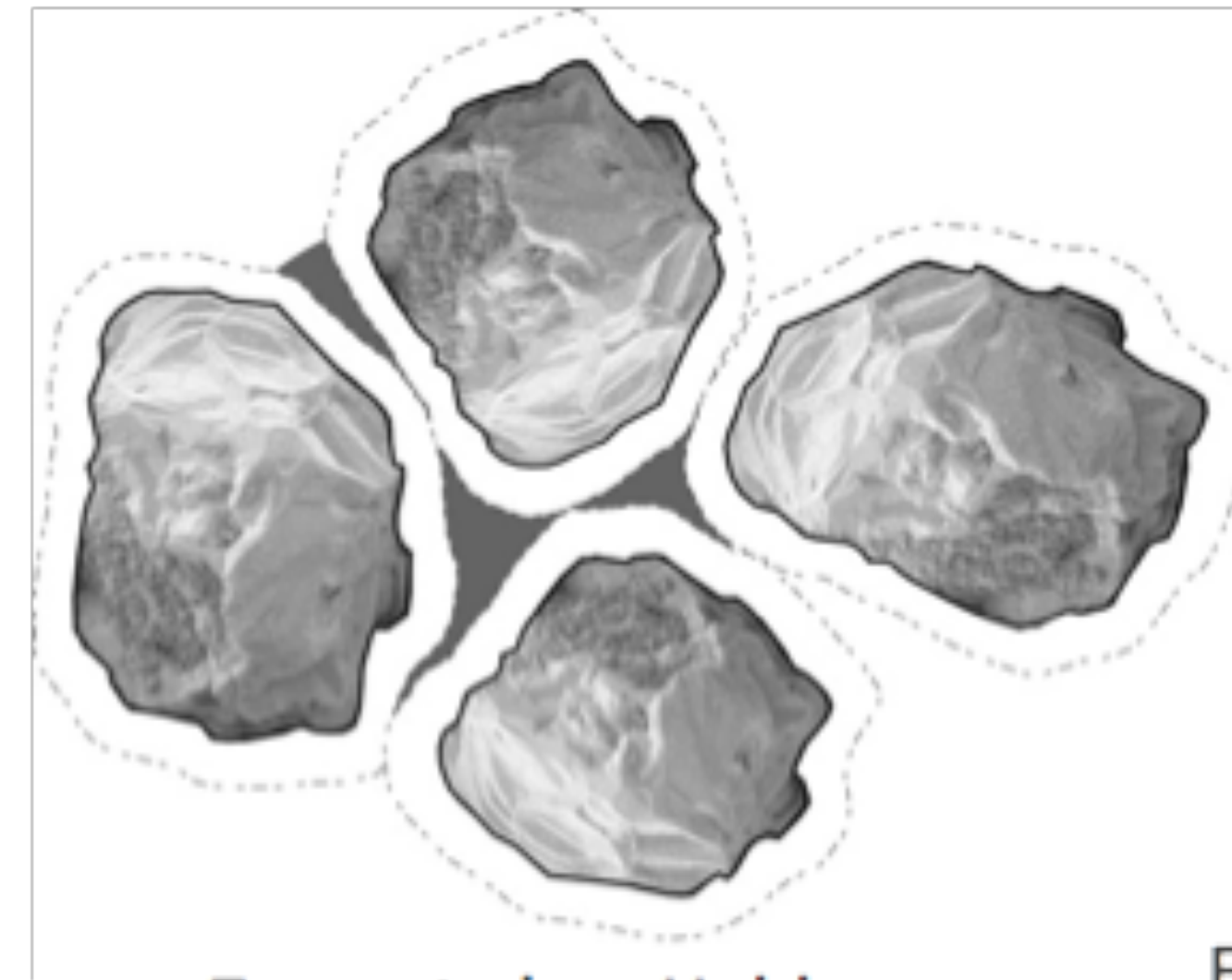


TECHNOLOGY

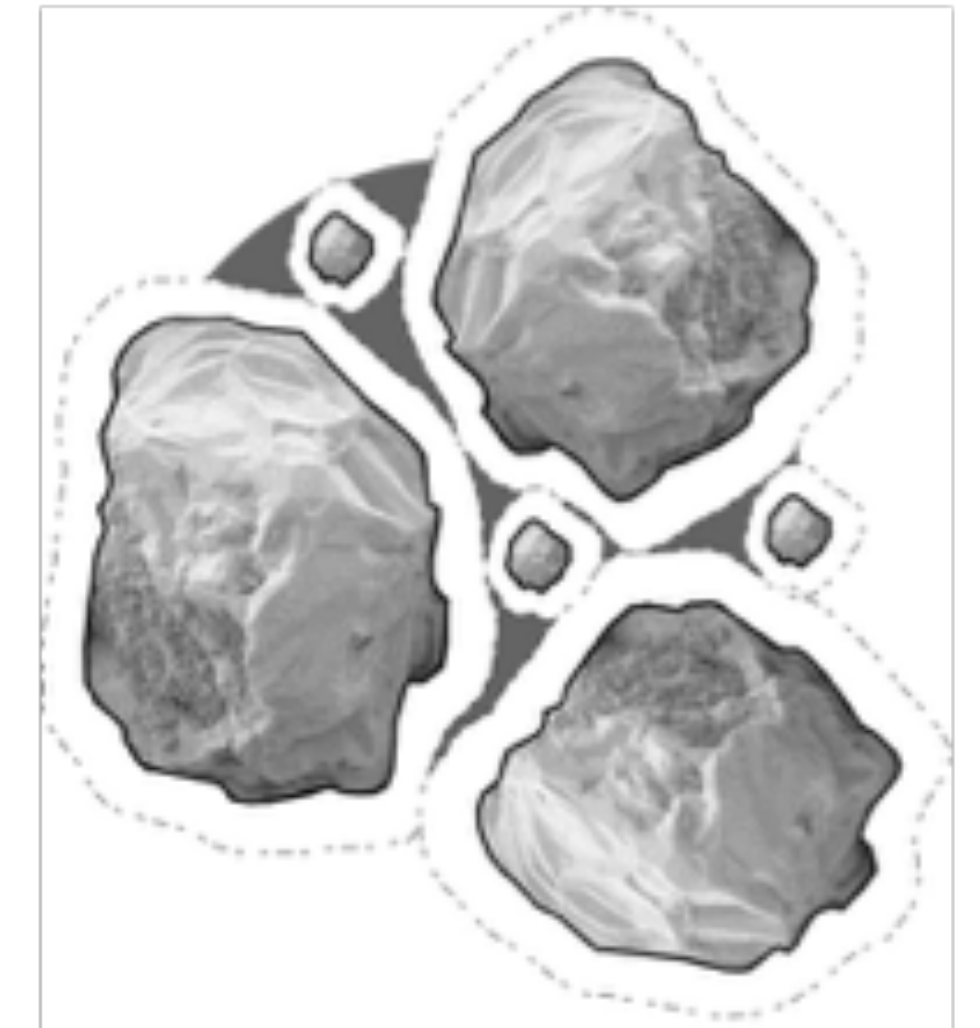
ADVANTAGE

Replacing cement by fine particles and optimized sieve lines.

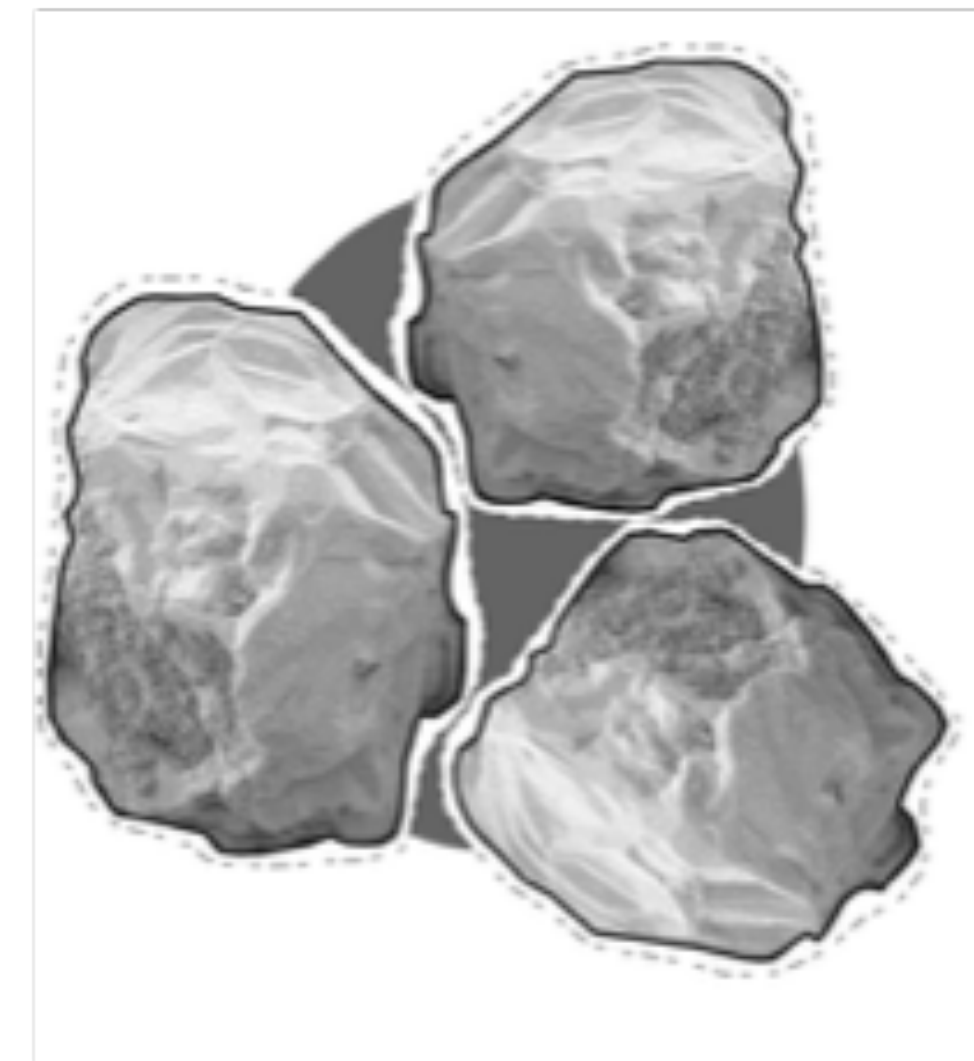
- Gaps will be filled
- Dense matrix
- Water reduction
- Better workability
- Higher concrete quality
- Cost reduction possible



Zement ohne Hohlraum
füllende Zusatzstoffe



Ersatz des Zements durch Hohlraum
füllende Zusatzstoffe



Wassergehalt reduziert



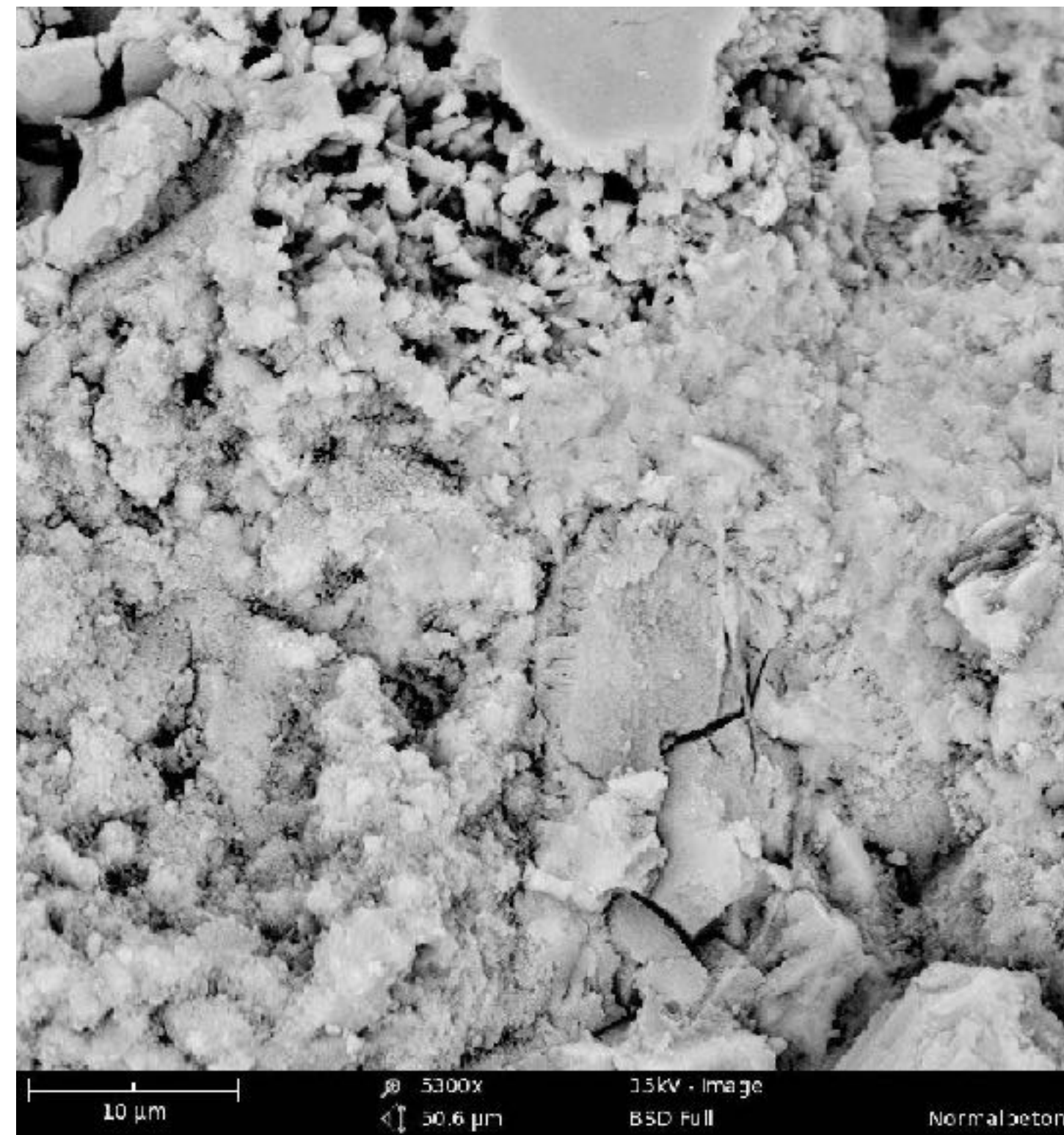
Wassergehalt reduziert,
Hohlraumfüllung

PACKING DENSITY

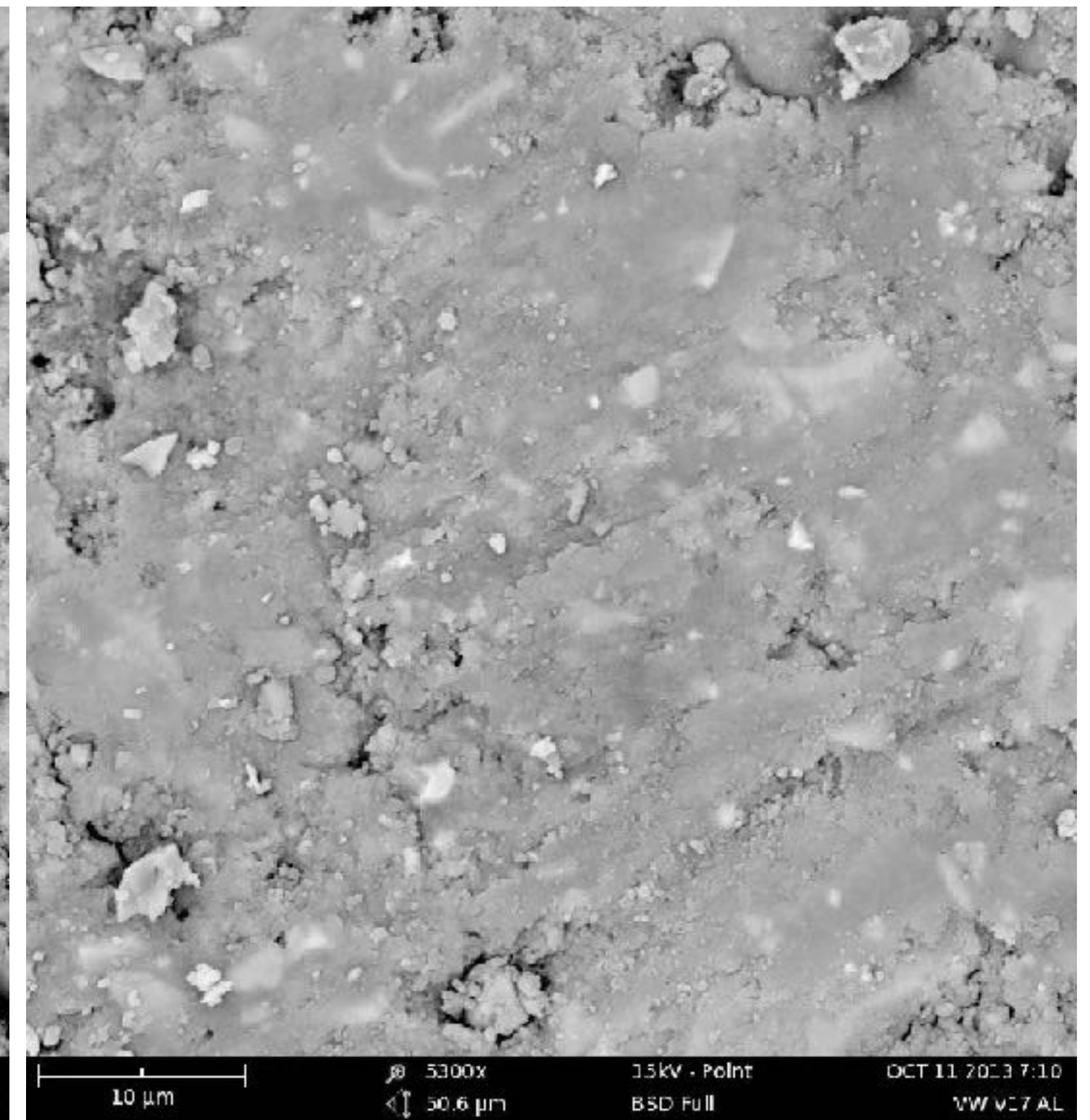
ADVANTAGE

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

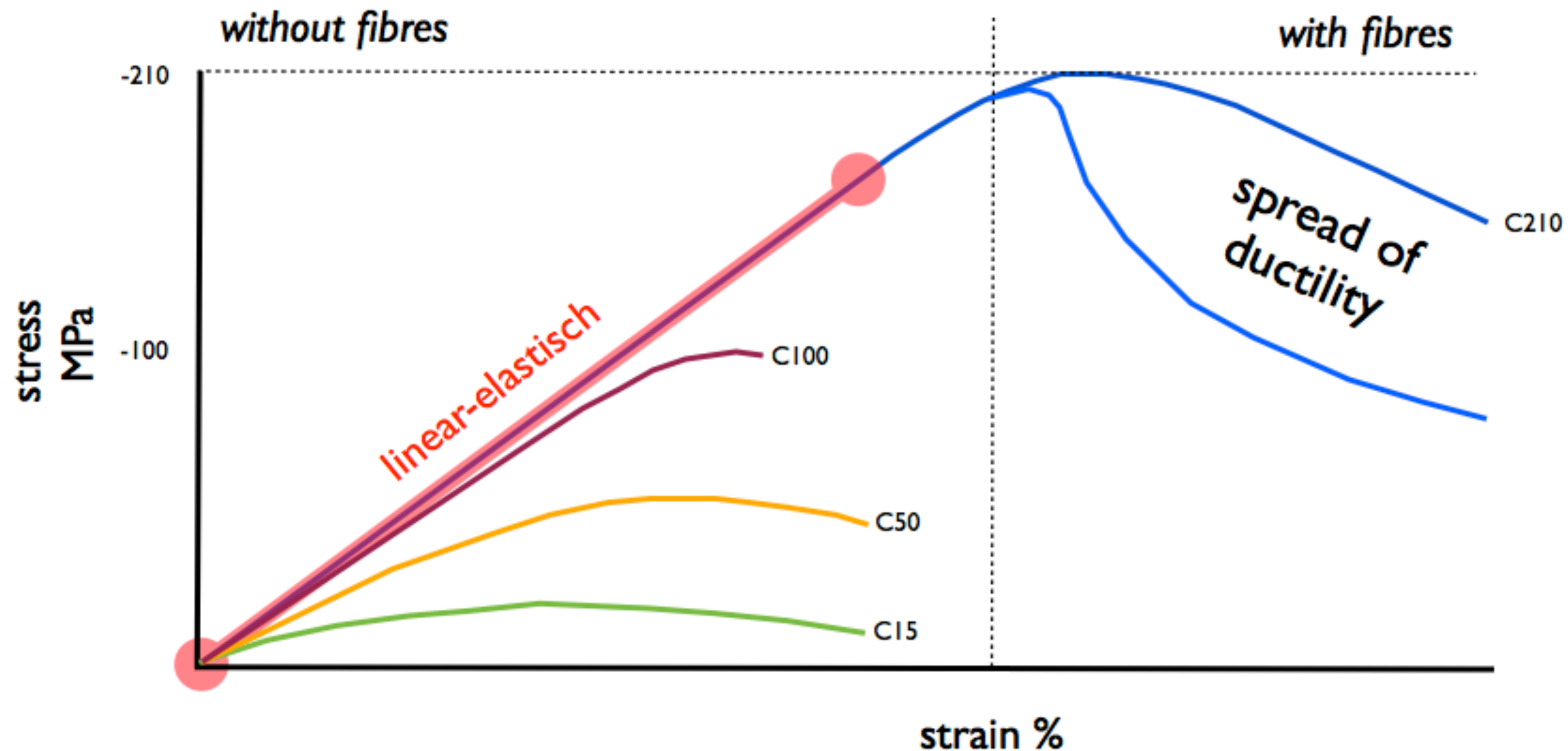


Ordinary
Concrete C35



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

UHPC - TOP 20 APPLICATIONS

- **Bridge construction**, including bridge decks, girders, and connections.
- **High-rise buildings** for structural components like columns and beams.
- **Architectural facades** and cladding for aesthetic appeal and durability.
- **Precast concrete elements** such as panels, beams, and facades.
- **Tunnel linings** and underground structures where strength and durability are critical.
- **Seawalls, coastal protection structures**, and marine infrastructure due to its resistance to saltwater corrosion.
- **Military applications**, including blast-resistant barriers and protective structures.
- **Highway safety barriers** and crash-resistant barriers.
- **Sound barriers** along highways and railways to mitigate noise pollution.
- **Prefabricated elements for modular construction** projects.
- **Railway sleepers** and track systems for high-speed rail and heavy freight lines.
- **Retaining walls** and earth reinforcement systems for soil stabilization.
- **Urban furniture** and landscape elements like benches, planters, and sculptures.
- **Water treatment plants** and reservoirs due to its impermeability and chemical resistance.
- **Industrial flooring systems** for warehouses, manufacturing facilities, and distribution centers.
- **Lightweight concrete production** for applications where weight reduction is important, such as precast panels and lightweight structures.
- **Grouting applications to fill voids**, anchor bolts, and repair concrete structures.
- **Concrete repair and rehabilitation projects** where UHPC overlays or patches are used to strengthen and extend the life of existing structures.
- **Nuclear power plants** and other critical infrastructure projects where high performance and durability are essential.
- **Renewable energy infrastructure** like wind turbine foundations and solar panel supports.

Information Sheets



Quantz®

The Next Generation of cement bonded materials!

Quantz is the Next Generation of cement bonded high tech materials with outstanding steel and ceramic like properties.

REFERENCES

G.tecz's clients are located worldwide. The material and the application range is large and starts with design objects, like the concrete-lace from the well known designer Doreen Westphal located in Eindhoven, pre-cast companies in The Netherlands and Germany that are producing facade elements or curbstones, machinery industry located in Germany that is building high-temperature ovens with Quantz to American clients that are producing facade systems and furniture. Clients are also located in Austria, Swiss, Spain, Romania, ...

AIM

Our aims are made-to-measure solutions for every individual client, product or production: developed fast, cost-effective, sustainable and industry compatible. One solution for everybody and everything - that's NOT our concept.

EXAMPLE

The following examples will show you characteristic mechanical properties of two Quantz developments: First one made for a company in The Netherlands and the second one for a special application where high compressive strength is needed.

Quantz Q156

Compr. Strength 7d	156 MPa
Flex. Strength 7d	19 MPa
Water/Cement Ratio	0.292
Slump (small cone)	29 cm
Density	2.38
Total Porosity	4 Vol.%
Permeability	n.m.

Pumpable	yes
Mixing Time	3-5 Min.

Application:	pre-cast elements Monolithic pre-cast bridge
--------------	---

Quantz Q300

Compr. Strength 28d	305 MPa
Flex. Strength 28d	45 MPa
Water/Cement Ratio	0.23
Slump (small cone)	25 cm
Density	2.65
Total Porosity	n.m.
Permeability	n.m.

Mixing Time	5-6 Min.	n.m. - not measurable
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Application:	Security industry
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TWO EXAMPLES

Quantz Q156

Compr. Strength 7d	156 MPa
Flex. Strength 7d	19 MPa
Water/Cement Ratio	0.292
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Total Porosity	n.m.
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Mixing Time	5-6 Min.
-------------	----------

Application:	Security industry
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Bridge Design



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



Goosenbridge, Utrecht by ROMEIN





Goosenbridge, Utrecht by ROMEIN

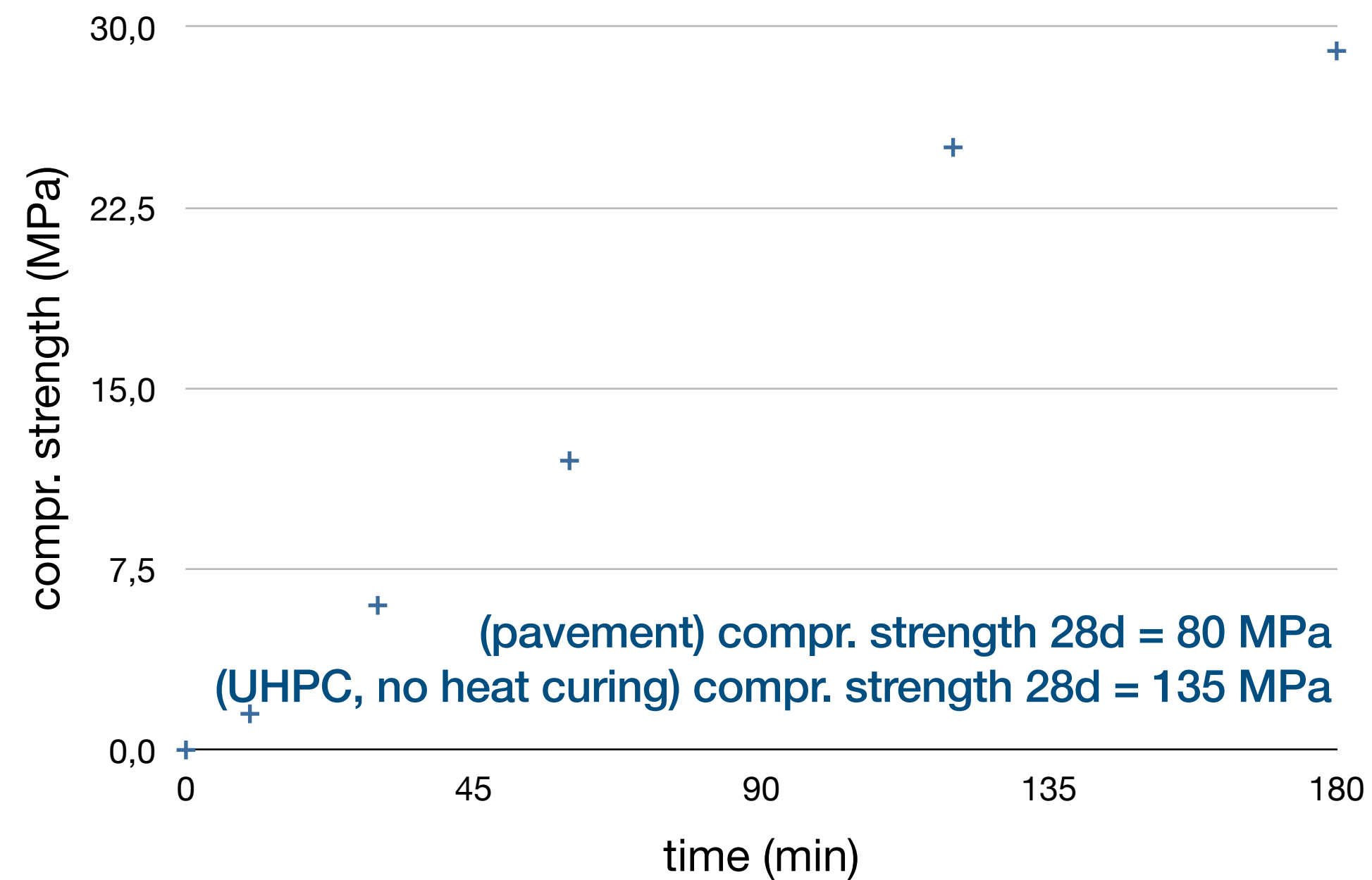
Fast Hardening - Road Construction -

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

Fast Hardening

- Water Pipe Construction -



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

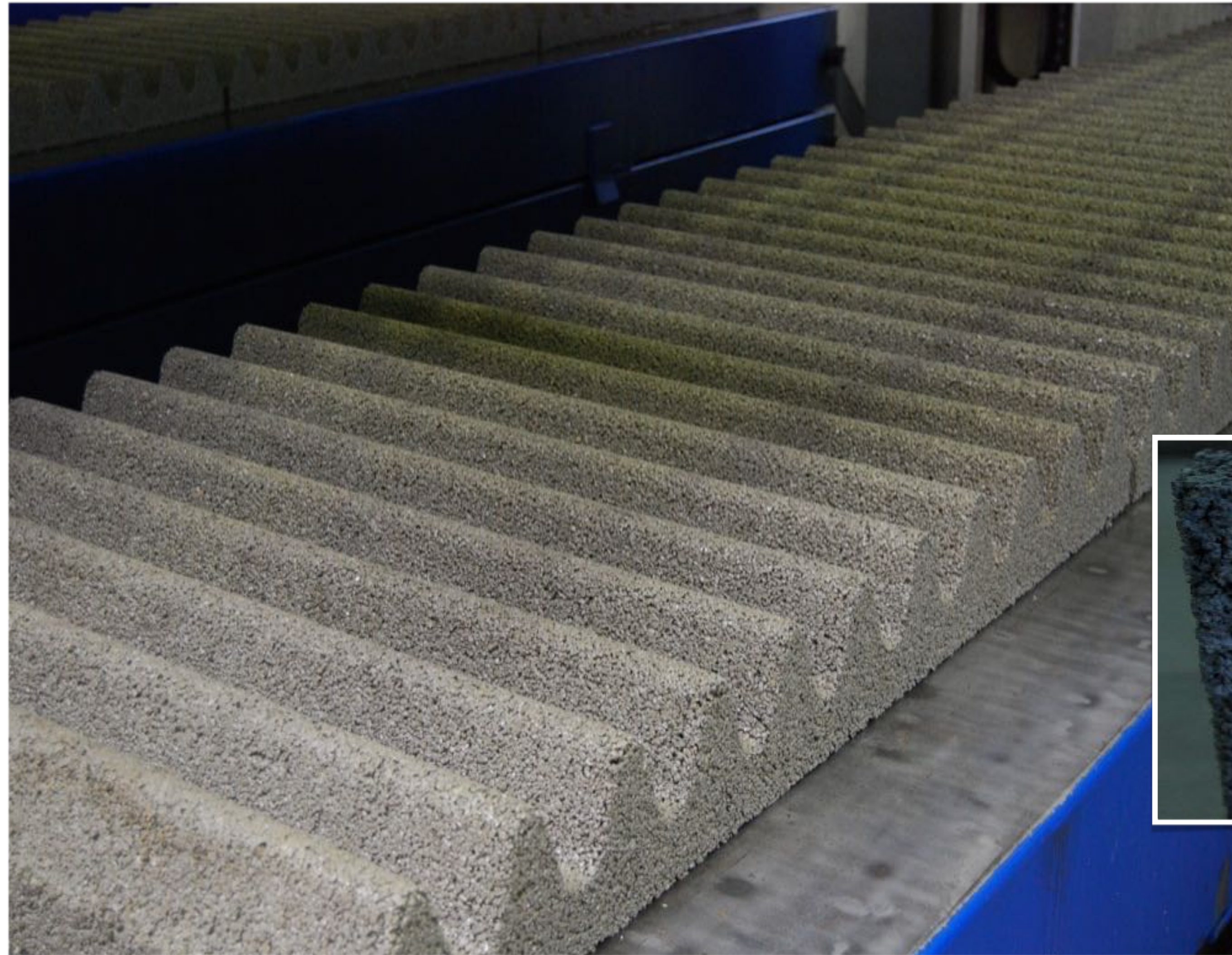
Project:

Parking Space

By OAT and G.tecz



ACOUSTIC CONCRETE

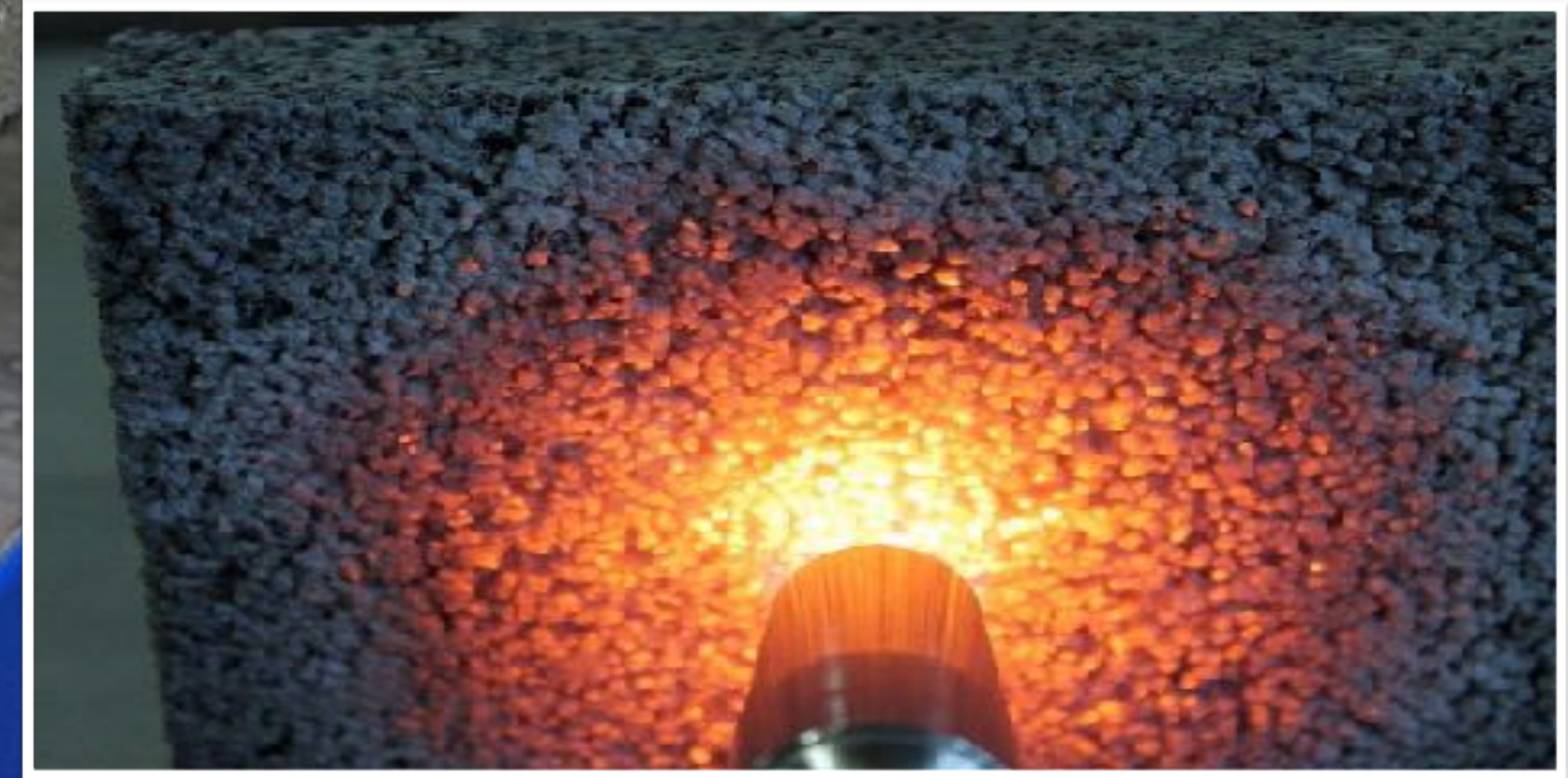


ADVANTAGE

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

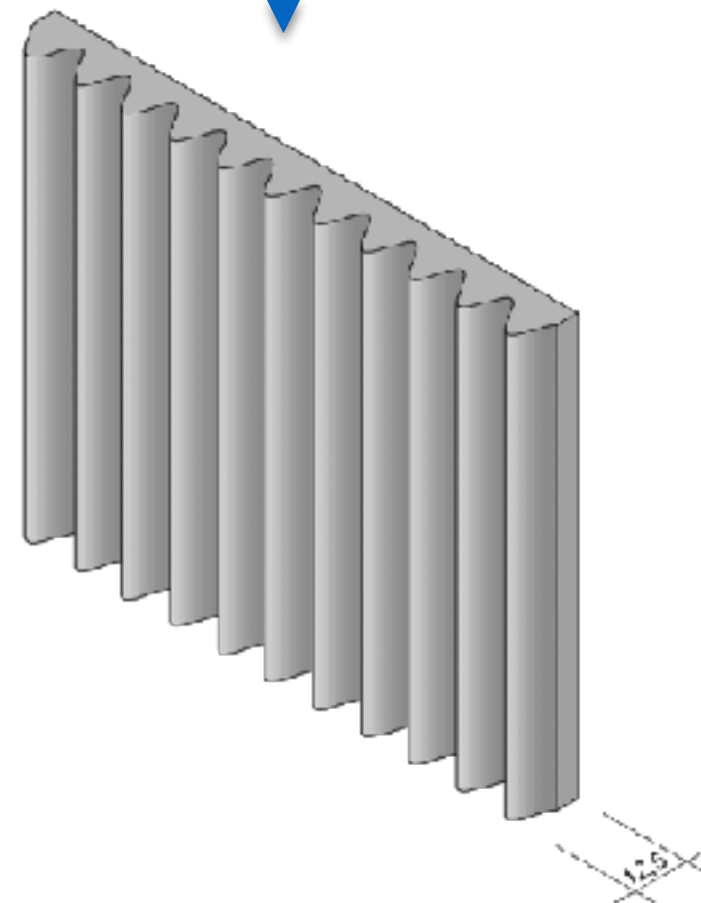
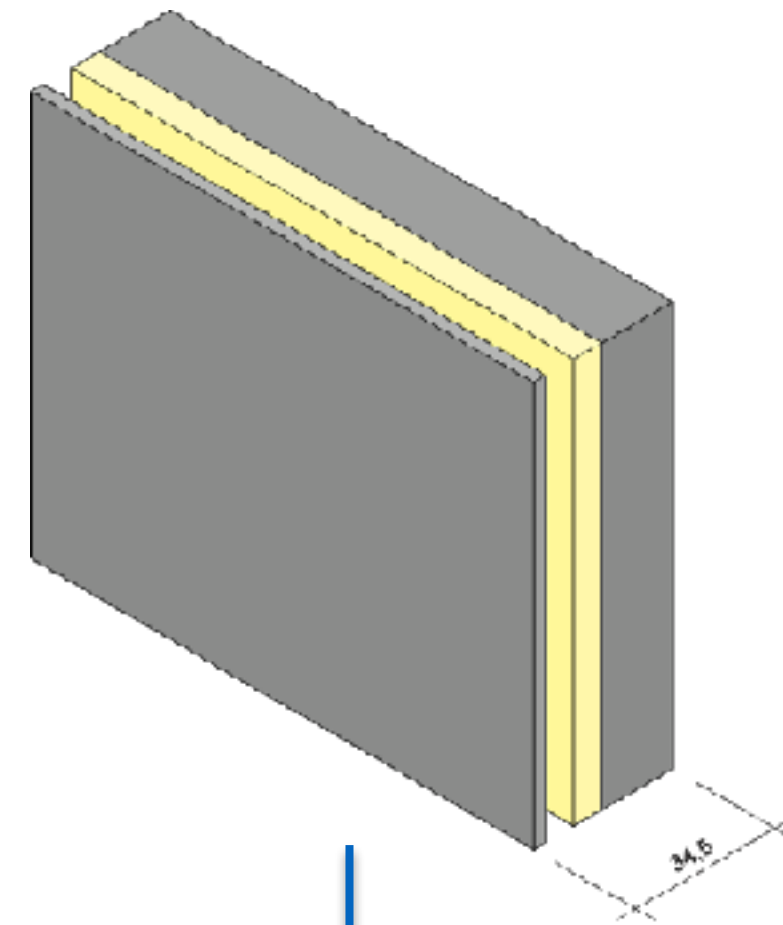
UHPC Matrix & Aggregates

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



Noise Reduction Panels

ACOUSTIC CONCRETE



ADVANTAGE

noise reduction = 11 dB

void volume = 36 vol. %

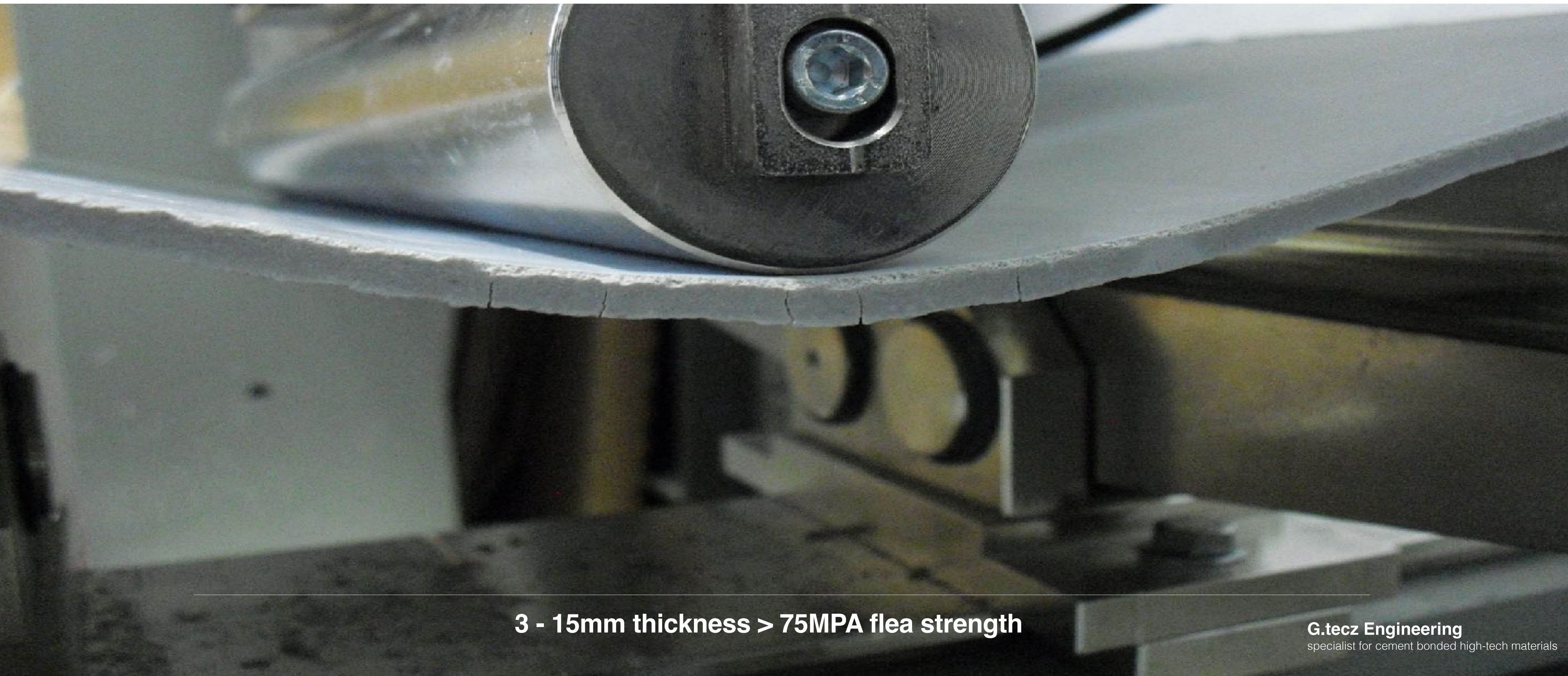
compressive strength = 35 MPa

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



TAKTL



G.tecz

Chatham University Eden Hall Campus Dairy
Barn Cafe

9mm THICK UHPC FACADE PANELS by
GTECZ

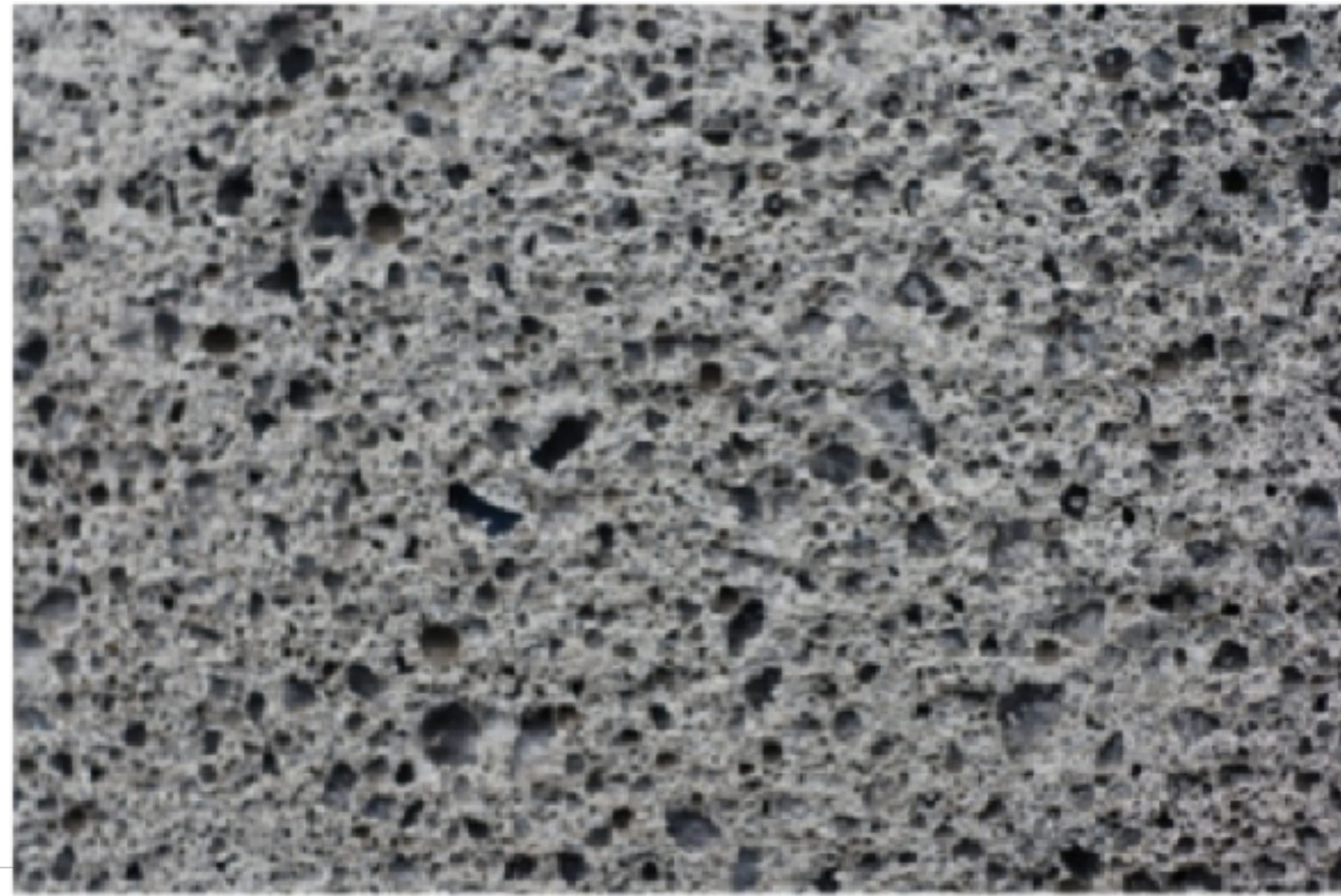
9mm THICK UHPC FACADE PANELS by
GTECZ

Infra lightweight Aerogel Concrete

- UHPC based technology -

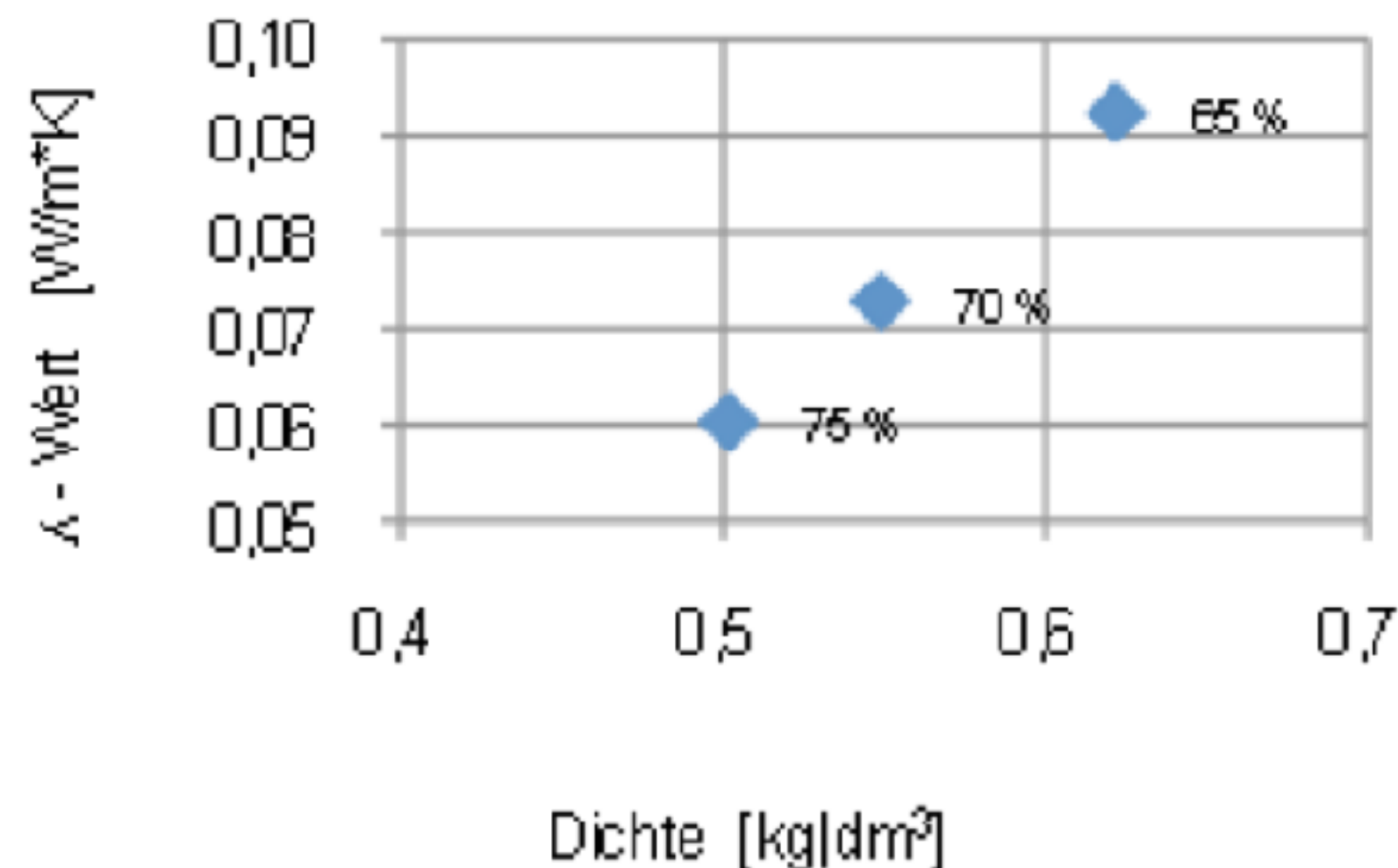
AEROGEL CONCRETE

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

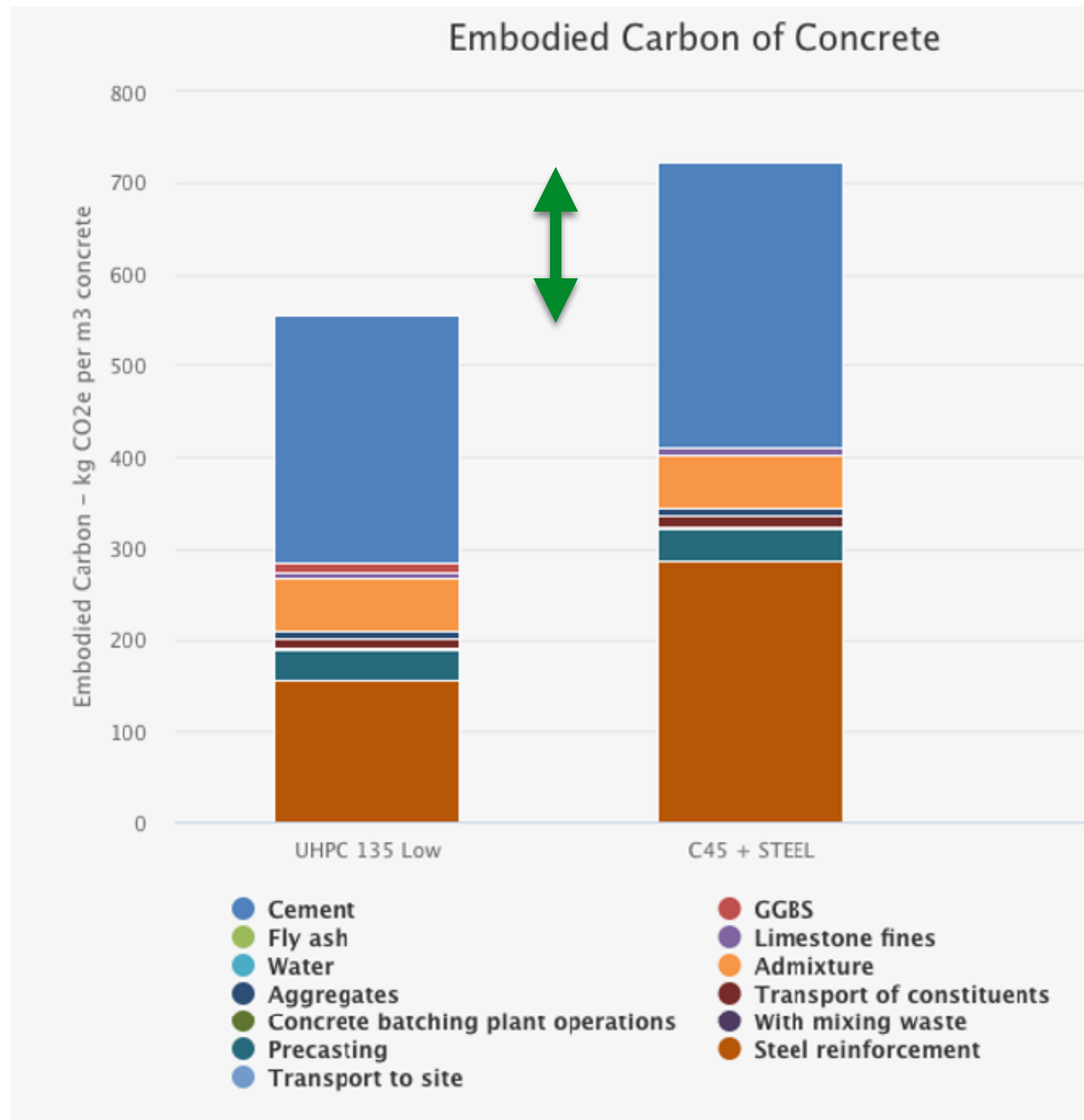
HIGH TECH - INSULATING INFRA LIGHT WEIGHT AEROGEL CONCRETE

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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:

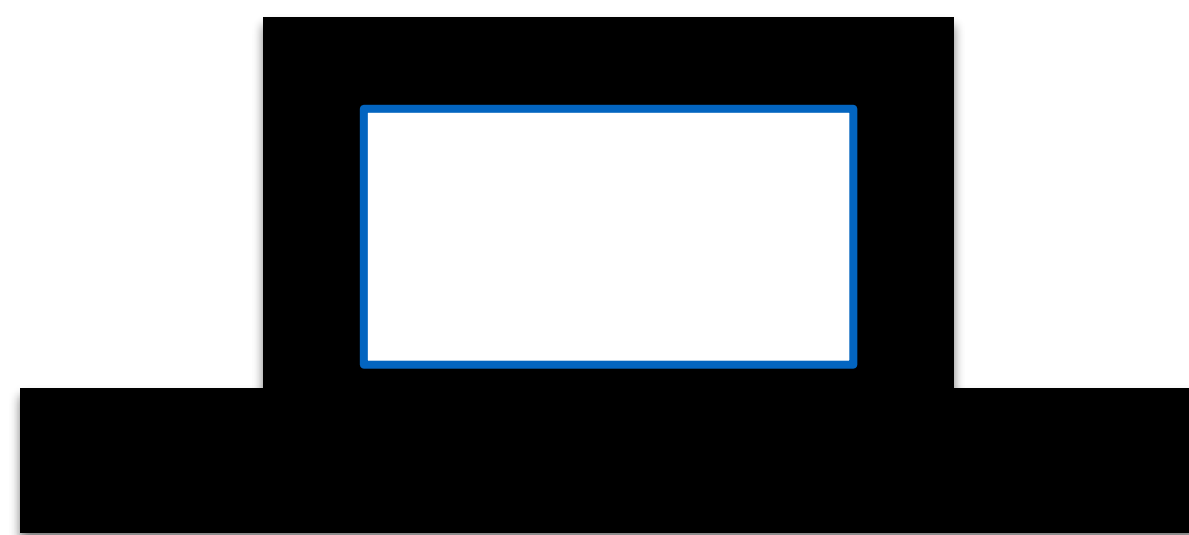
UHPC: 555

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%

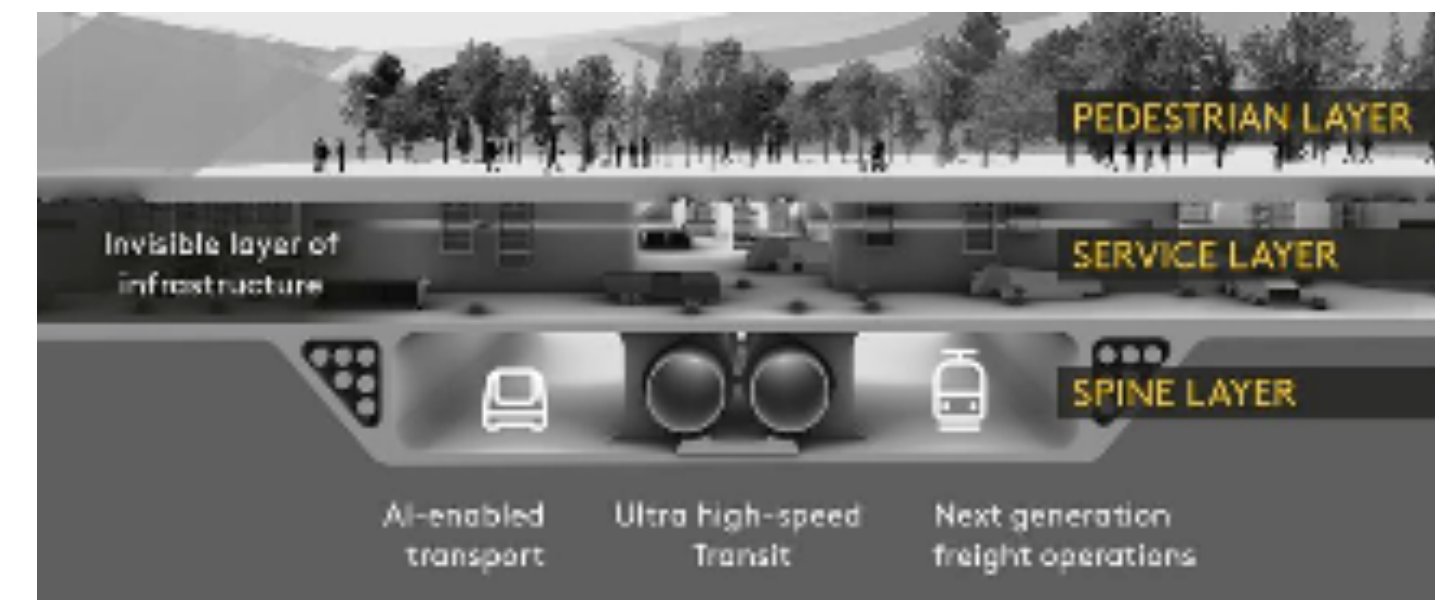


UHPC



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

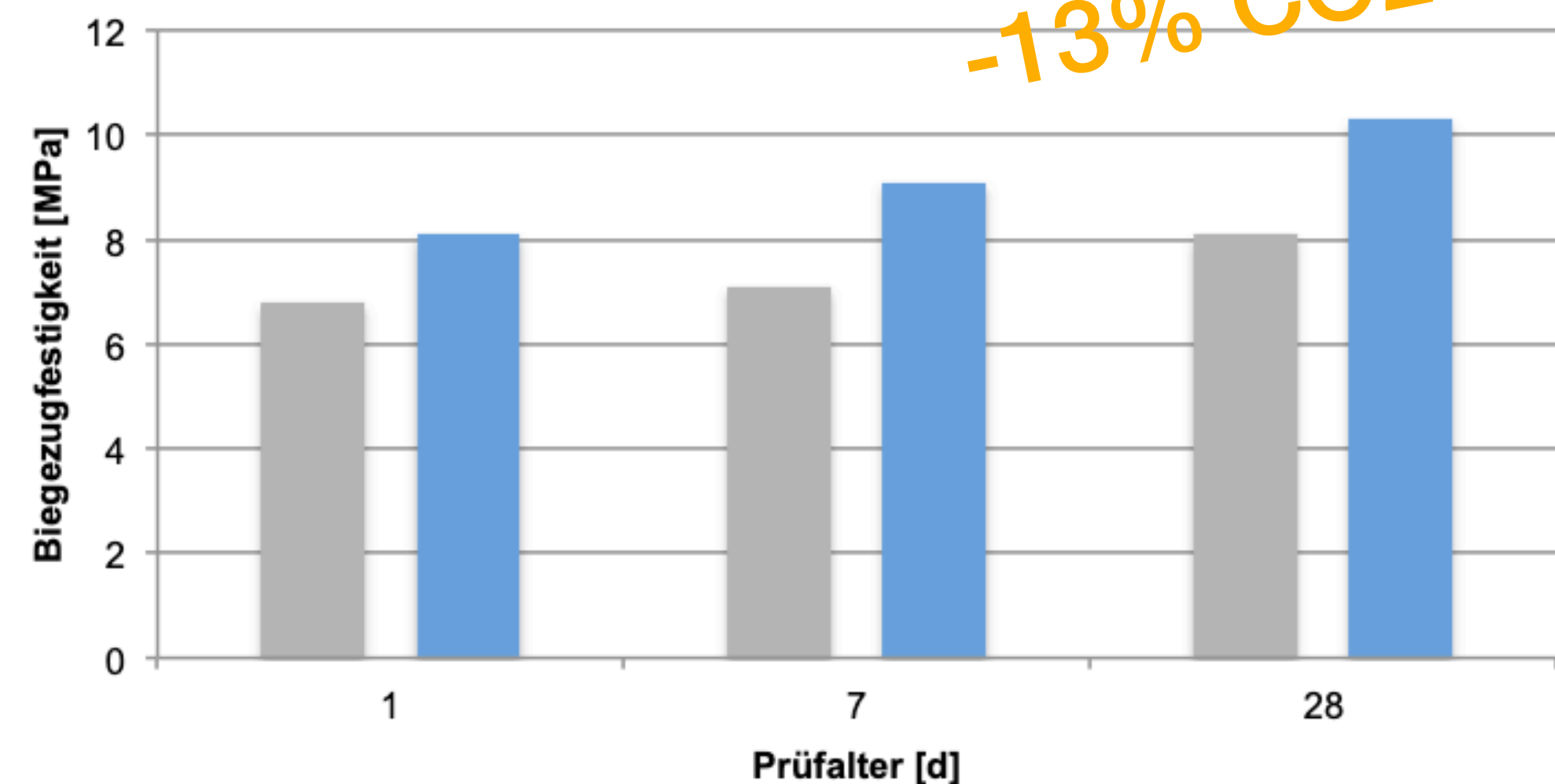
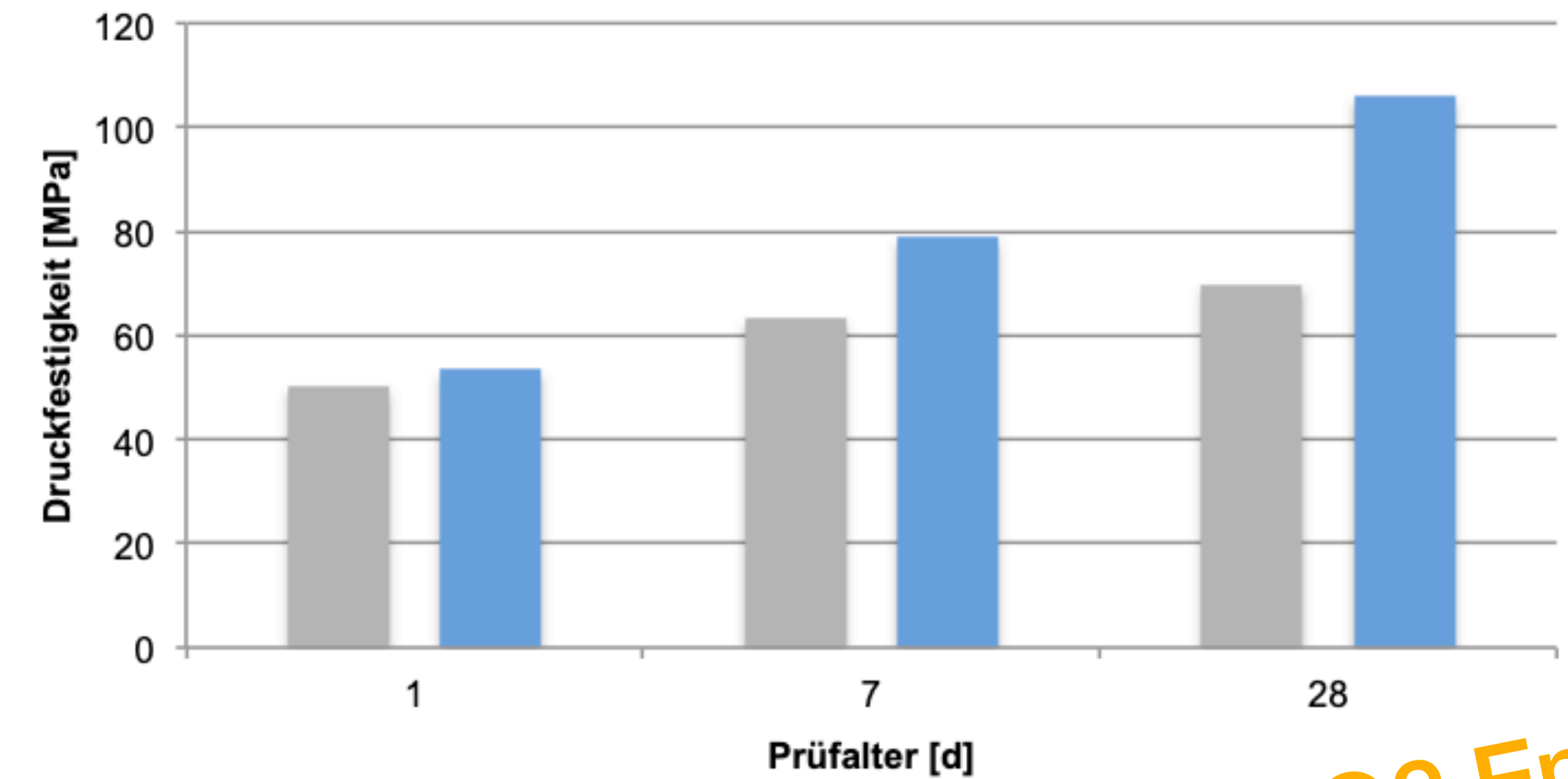
With UHPC:
 66% kg eCO2 savings
 25% cost savings (material only)

„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



■ Referenzmischung ■ optimierte Mischung

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

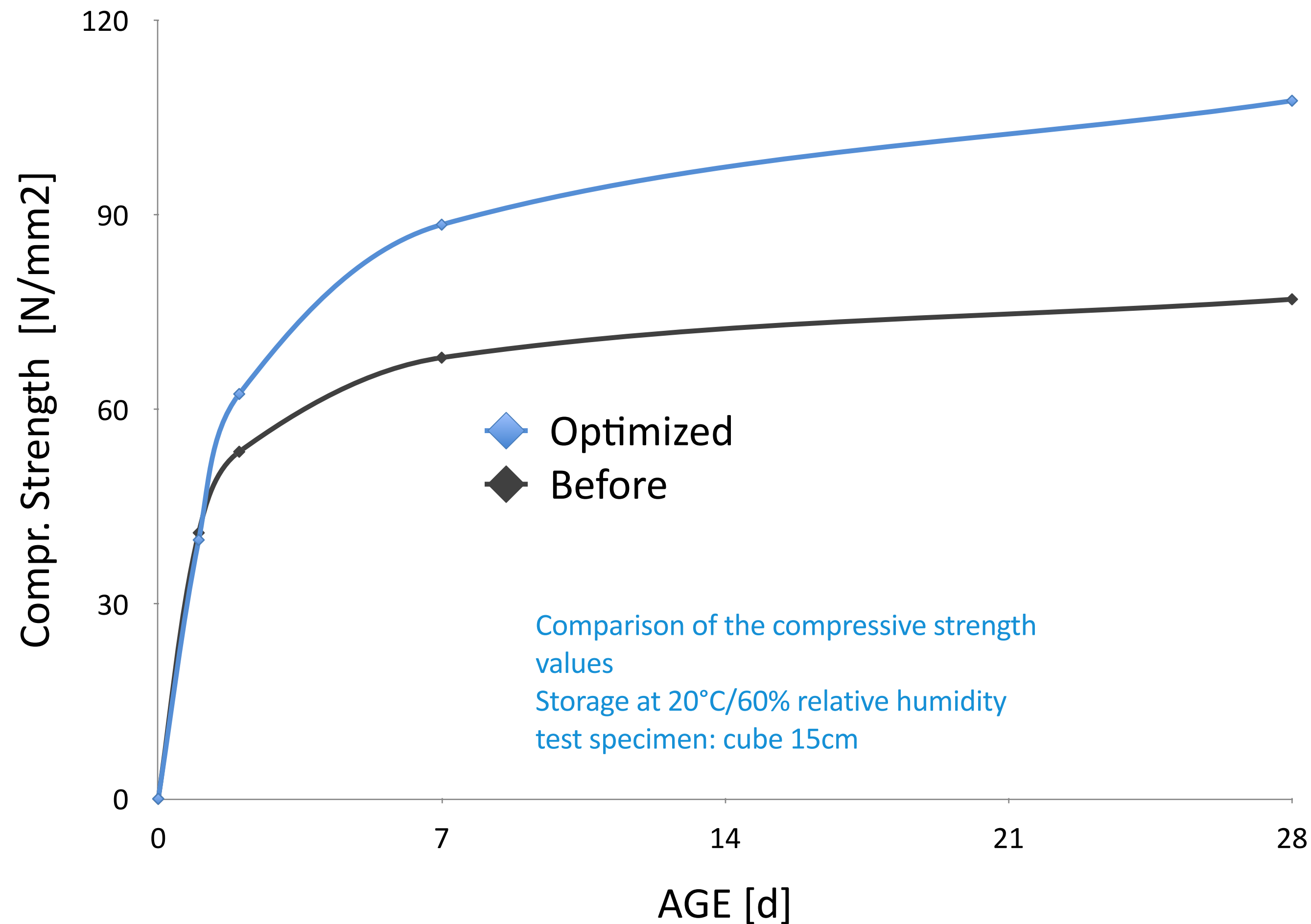
SSC C90

360 kg/m³ Cement

Costs: 69 Euro/m³

Cost reduction of 30%

UPGRADE FOR CONCRETE



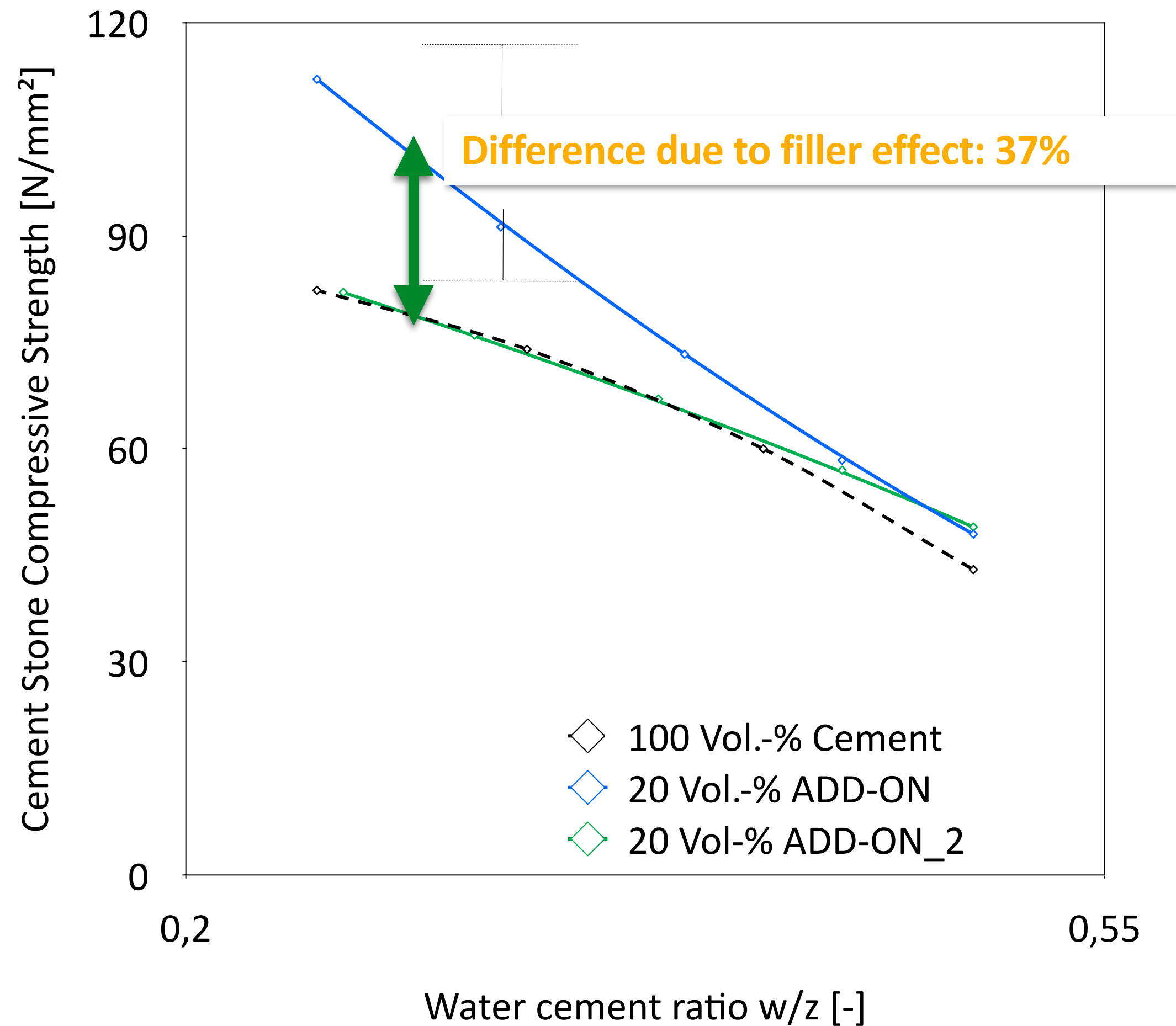
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Location:

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UPGRADE FOR CONCRETE

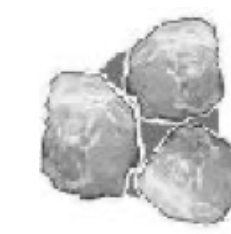


Relationship between water-cement ratio and compressive strength.

Calculation of efficacy factors (k-values)



Cement without void-filling additives



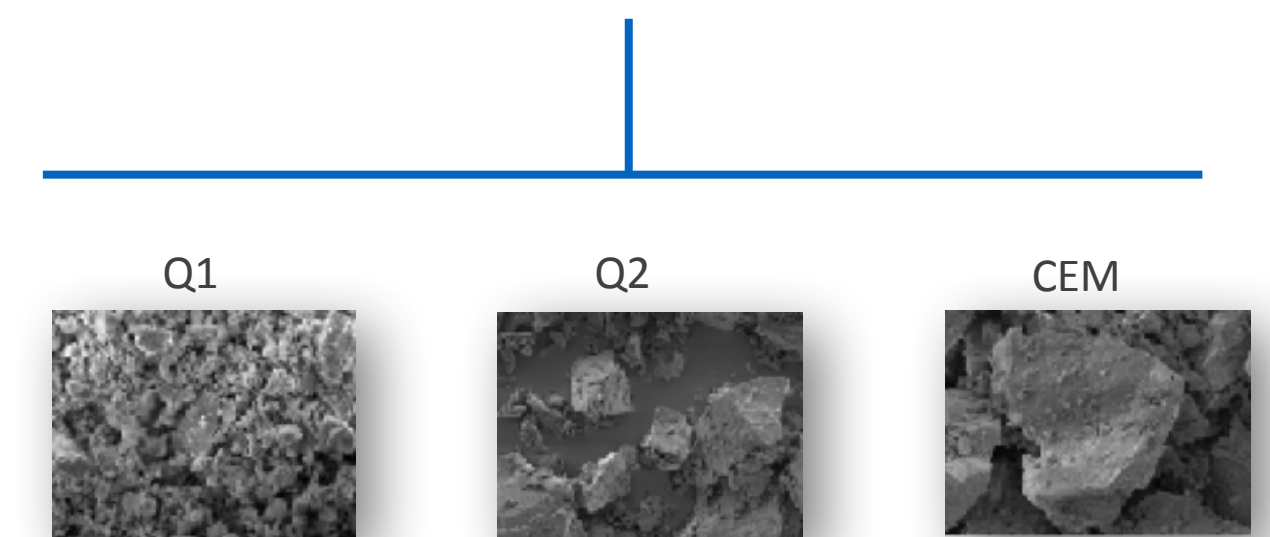
Water content reduced



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

ConSENSE

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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