



Precast

Quality and Durability

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MC FOR
CONCRETE INDUSTRY

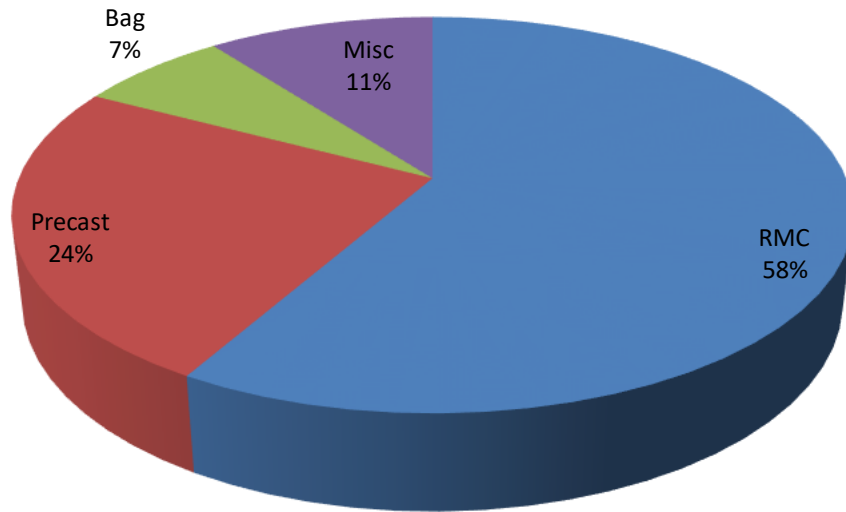


BE SURE. BUILD SURE.

Market

Cement consumption 2015

26.6 Mio to Cement Use (%)



VDZ German Cement producer Association



Precast 2015

	Mio to	Quota	Extrapolation Mio t
Structural	1.6	72	2.2
Pavements (roads, gardening landscaping)	1.9	53	3.5
Building	0.1	100	0.1
Roofing tile	0.1	100	0.1
Other elements	0.7	72	0.9
Misc	0.5	82	0.6
Total	5.2		8.0

Production and Product

Precast Production

Optimisation

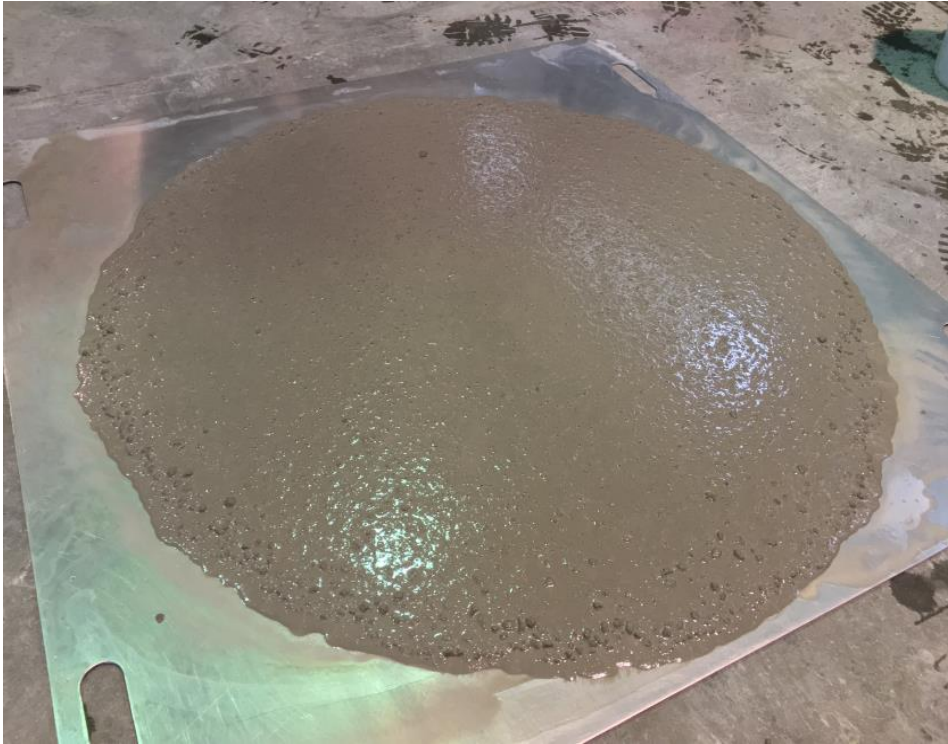
- Concrete mix design
Variables : cement type/content, w/c ratio, crushed or recycled aggregates, scc, ...
- Process : more cycles, faster demolding
- Superplasticizers
Hardening accelerators

Precast Product

Optimisation

- Surface Quality
- Durability
- Combination of several technologies

Precast Production SCC



Slumpflow > 800 mm
 t_{500} : < 10 sec / 5 sec
J-ring : below 4
stable

Precast Production SCC



Precast Production SCC



Precast Production SCC



Higher Durability
Longer service life

Acid resistant binder

- Mortar specimen 2 1/2 months acid exposure
- Sulfuric acid pH 3,5



Mortar specimen

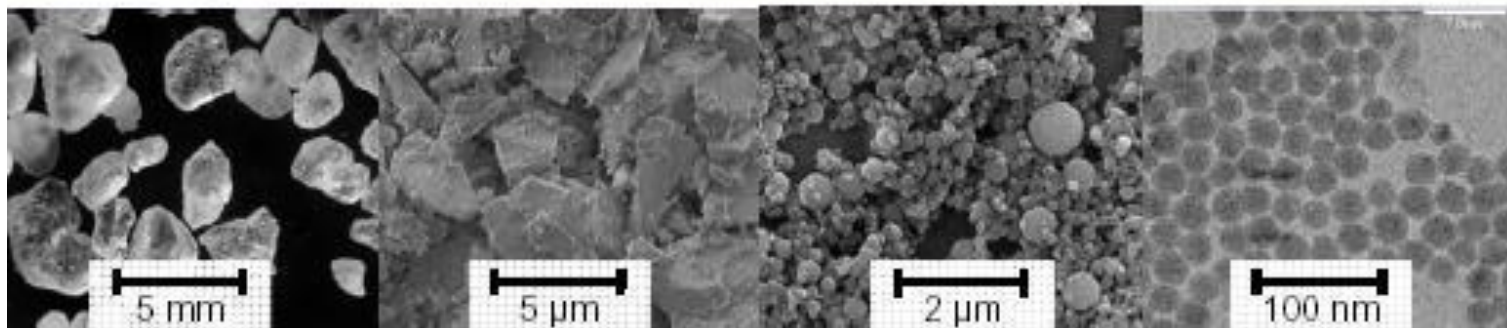
- Cement
- Fly ash
- Alumosilicate

Mortar specimen

- Cement

Acid resistant binder

Grading/Binder optimisation



Concrete performance criteria

Parameter

Acid resistance

(Test method MPA Berlin Brandenburg)

Total porosity

Raw- and particle density

Cumulative pore volume

< 0,1 mm, (Hg porosimetry)

Mean pore radius

< 0,1 mm, (Hg porosimetry)

Chloride migration coefficient

(Test method Tang, Schießl)

Electrical resistance

Wenner Probe

Limit value

Penetration depth < 1,3 mm

(exposure 12 weeks in H₂SO₄; pH 3,5)

< 11 Vol. %

< 40 mm³/g

< 0,1 μm

< 1,0 * 10⁻¹² mm²/s

Initial type testing determine value for QC

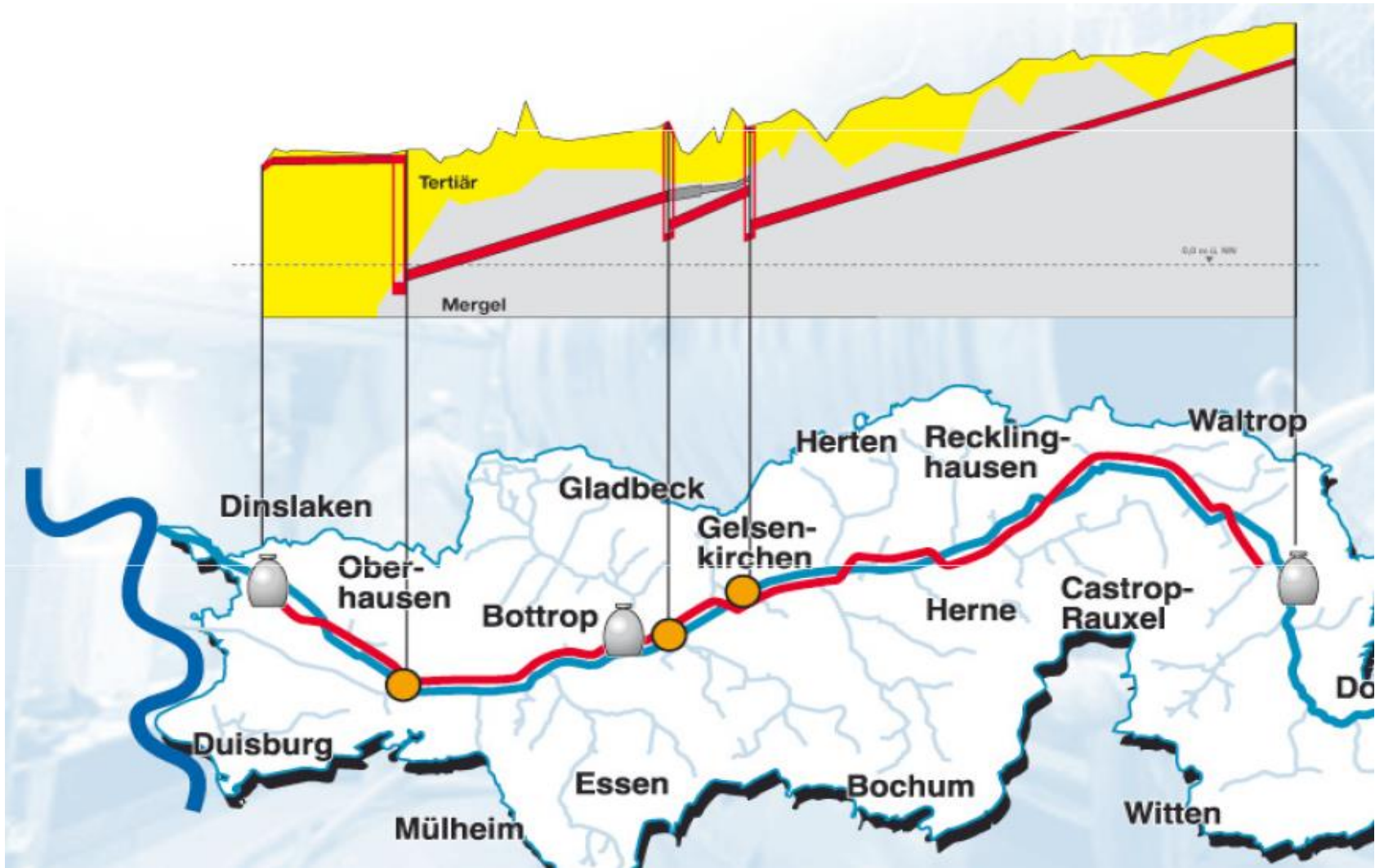


Die „schwatte“ Emscher

Image of the old Ruhr district



Green Emscher



Durability Green Emscher



Durability Green Emscher



Surface Quality

Combination

- Mix design : Binder, Additions
- Grading optimisation
- Plasticizing – water reduction
- Superplasticizer
- Stabilizers, VMAs
- Release agent
- Repair Mortar



Facade



Geometry



Area



Challenge?

Colour



Trends

- Production optimisation
- Optimised Concrete : SCC
- Durability – longer service life
- **Mechanics : New markets**

Thank you!