



Zero Energy System for Precast Concrete

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Business Development manager

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BASF segments



Chemicals

- Petrochemicals
- Monomers
- Intermediates



Performance Products

- Dispersions & Pigments
- Care Chemicals
- Nutrition & Health
- Paper Chemicals
- Performance Chemicals



Functional Materials & Solutions

- Catalysts
- Construction Chemicals
- Coatings
- Performance Materials



Agricultural Solutions

- Crop Protection



Oil & Gas

- Oil & Gas

Innovation

Meeting challenges, developing new business areas

Research for the future: with our innovative products and processes, we provide sustainable solutions for global needs.

- Expenditures for R&D circa €1.84 billion, world leader in chemical industry
- Around 10,650 employees worldwide involved in research and development
- Strongest innovation power in the chemical industry (No.1 in the Patent Asset Index)
- Around 3,000 projects
- Around 1,300 new patents registered in 2013
- Targets 2020: circa €30 billion sales and circa €7 billion EBITDA from innovations



BASF in India



- » BASF had its first business contact with India in 1890
- » 9 manufacturing sites, 8 sales offices
- » R&D facilities are part of Global Technology Platform
- » Sales 2013: INR 7900 Crs.
- » Employees (as on 31st Dec'13): 2254
- » 13 out of 14 global businesses operate in India
- » Mangalore plant in India is BASF's largest manufacturing site in South Asia

Dahej site – BASF's greenfield project with single largest investment in India of 1000 crores

Partnering India's growth story



Invisible contribution, visible results. BASF contributes to Bandra-Worli Sealink



Prosperity for farmers through BASF's Samruddhi project



BASF Construction Chemicals - keeping India's Parliament House dry



Tata Nano on the roads with BASF's light weight and colorful solutions

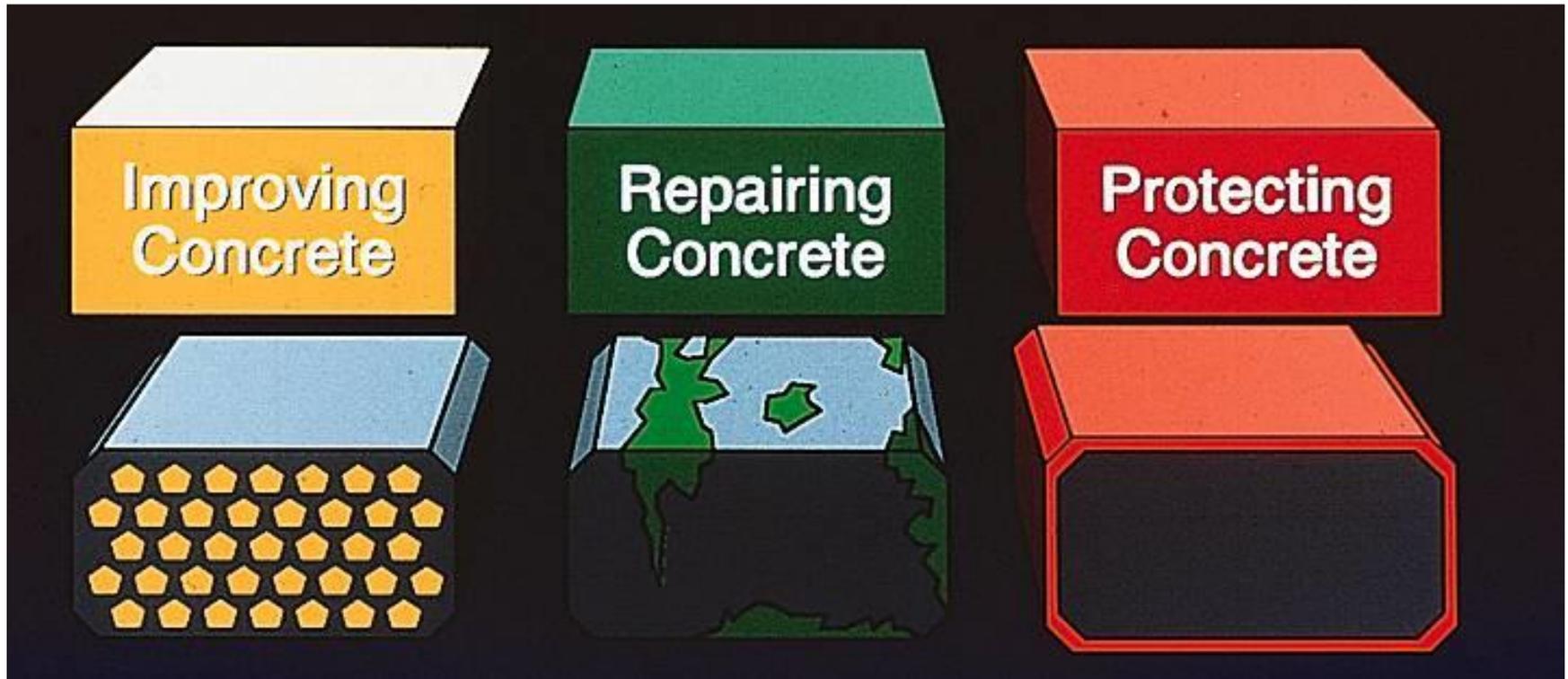


BASF skincare solutions enable HUL to help their customers look beautiful



BASF's no-smell paints are innovative and eco-friendly at the same time

Area of expertise



Traditionally Vibrated Concrete (Precast Concrete)

Promoted on the basis of

- » Speed in Construction
- » Improved quality of products
- » Material & labor savings
- » Savings in the construction process

- » Common aim of any **precast process** is to **accelerate concrete hardening** in order to increase production output, without sacrificing quality and durability.

Economic Elements of a Precast Process

- » COST OF THE MIX
- » COST OF LABOUR
- » COST OF ENERGY
- » COST OF MAINTENANCE
- » PRODUCTION CAPACITY

Cost of the Mix

- » Quantity of cement
- » Type of cement
- » Inorganic addition

Cost of Labor

- » Difficulty of placing
- » Congested reinforcement
- » Vibration time
- » Forms handling

Cost of Energy

- » Vibration
- » Steam
- » Hot water

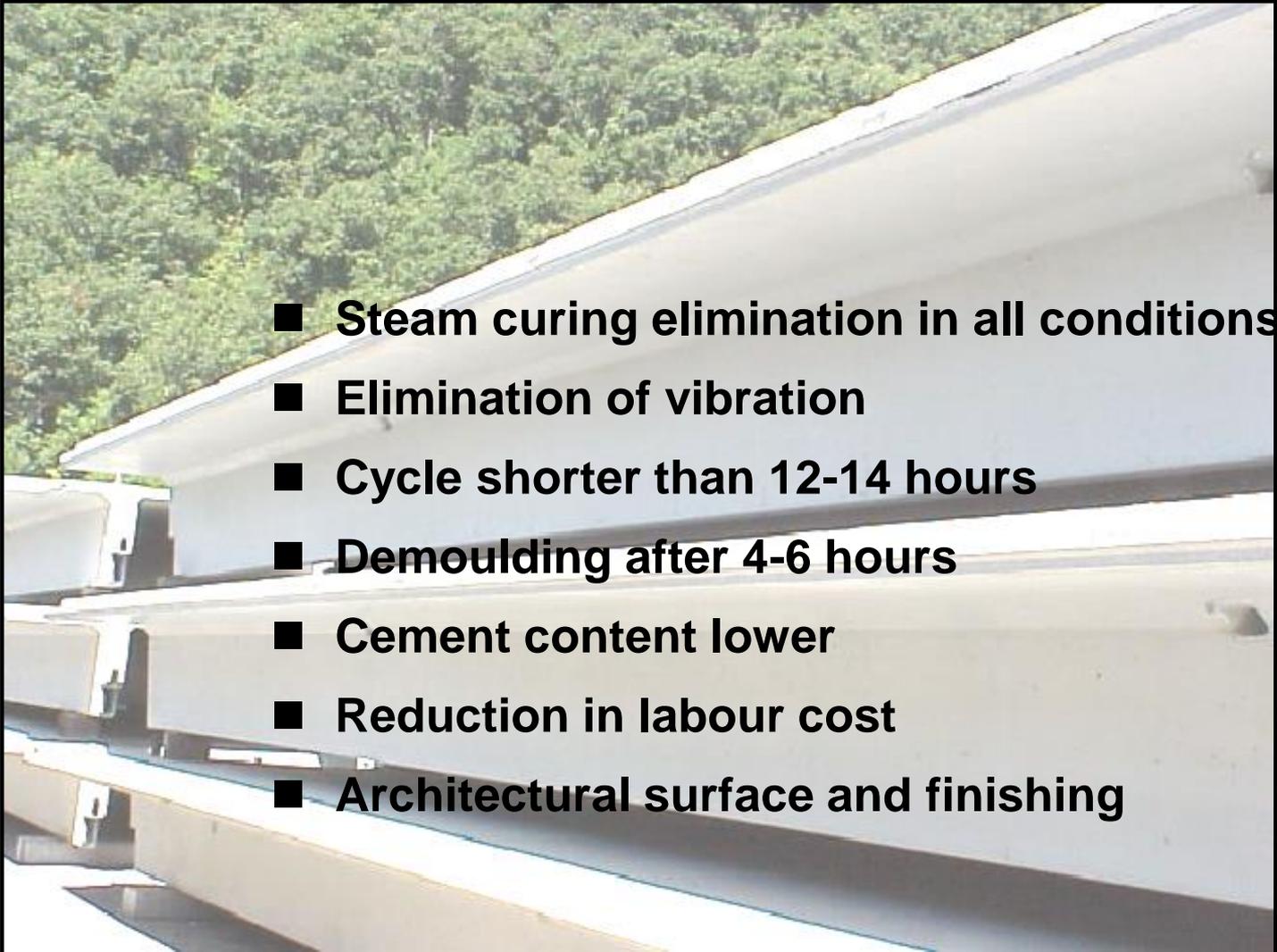
Cost of Maintenance

- » Forms, vibrators, wear and tear
- » Steam generators
- » Mixers

Production Capacity/Output

- » Concrete placing time
- » Curing cycle
- » Steam treatment
- » Form demoulding
- » Time to tendons cutting

Precasters Wish List

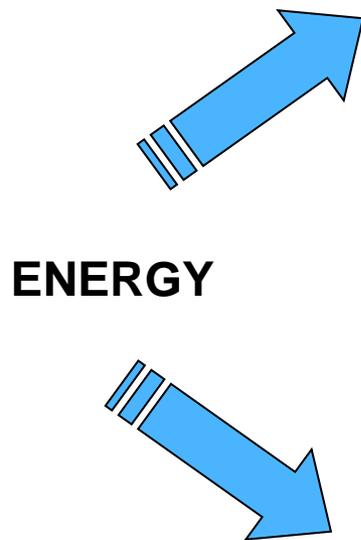
- 
- **Steam curing elimination in all conditions**
 - **Elimination of vibration**
 - **Cycle shorter than 12-14 hours**
 - **Demoulding after 4-6 hours**
 - **Cement content lower**
 - **Reduction in labour cost**
 - **Architectural surface and finishing**

Zero Energy System

Zero Energy System (ZES) is a new technology developed to help producers of precast concrete **CHANGE** production processes in a way that will allow them to achieve energy reductions or elimination in various aspects of their operations.

The Mechanism of Action

zero  energy
system



Kinetic Energy

RHEODYNAMIC™ CONCRETE

Thermal/Kinetic Energy
Fast Hydration Rate

MasterGLENIUM ACE

Kinetic Energy

RHEODYNAMIC™ CONCRETE

RHEODYNAMIC™ CONCRETE

**Is An Optimisation and
Evolution**

of Self Compacting Concrete

RHEODYNAMIC™ CONCRETE:

 Superior homogeneity of the mix

 Minimum energy dissipation

 Superior speed of self compaction

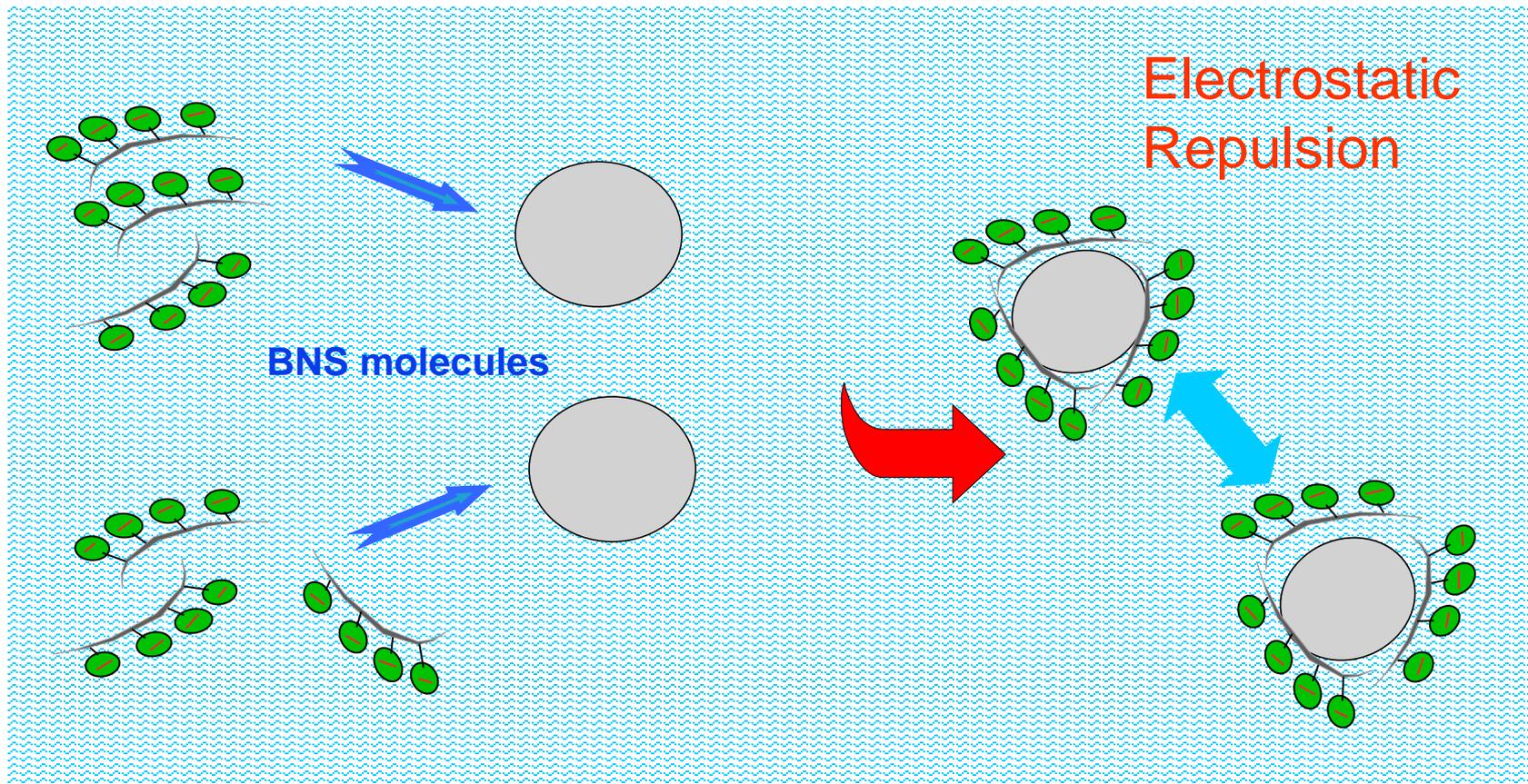
 Superior filling ability

The optimum exploitation of ENERGY
is the key to go beyond
the initial concept of Self Compacting Concrete

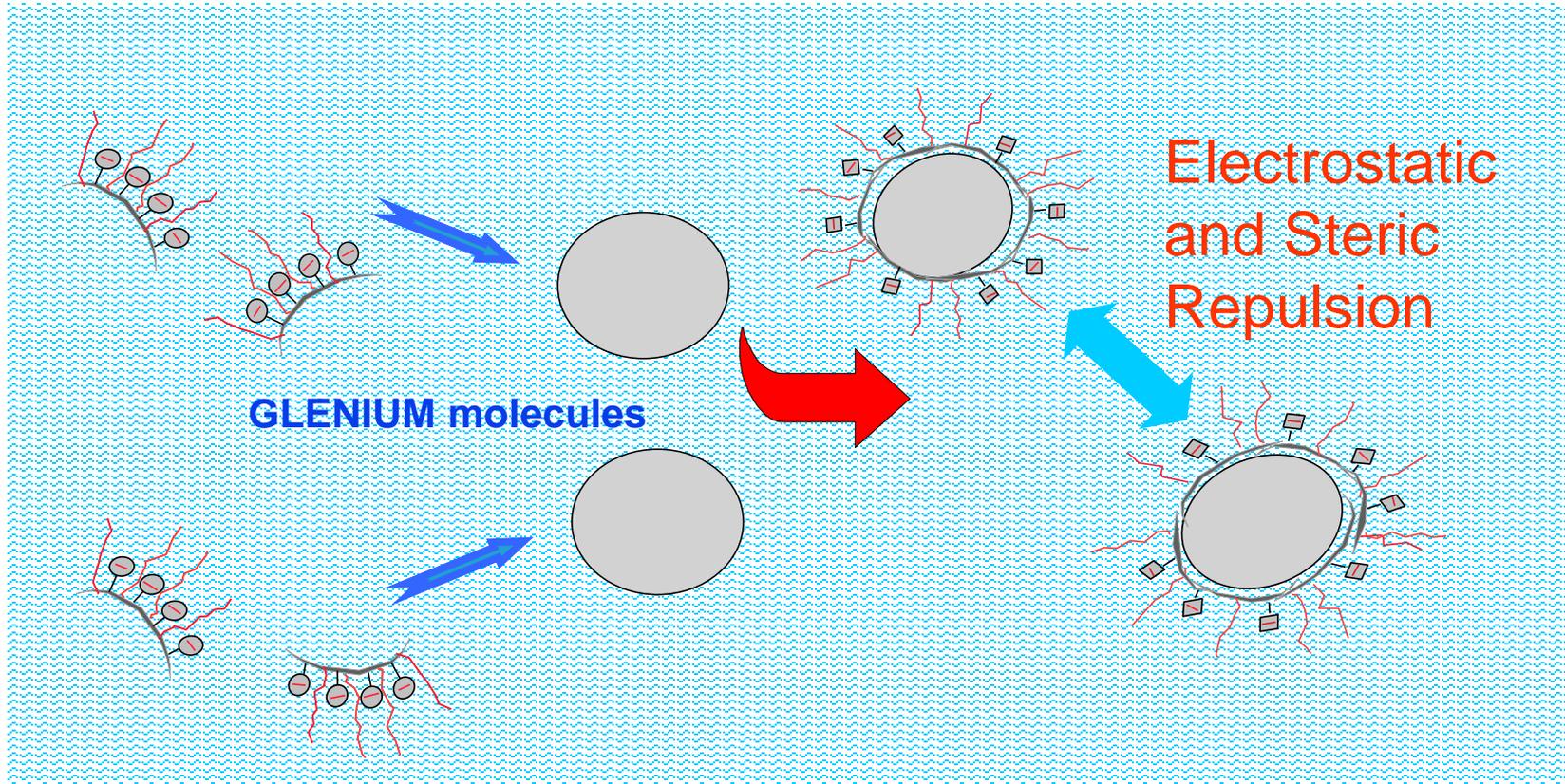
Mechanism of Action of a Superplasticizer

- » Diffusion of the molecules of superplasticizer in water
- » Adsorption of the molecules of superplasticizer on the surface of the cement granule
- » Repulsion between the cement particles electrostatic (and steric) effect
- » Dispersion

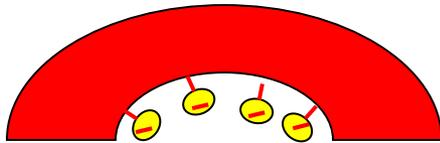
Diffusion and Adsorption of BNS molecules



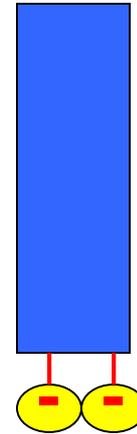
Diffusion and Adsorption of Standard GLENIUM Molecules



The shape of the molecules is one of the key issues of the mechanism of action



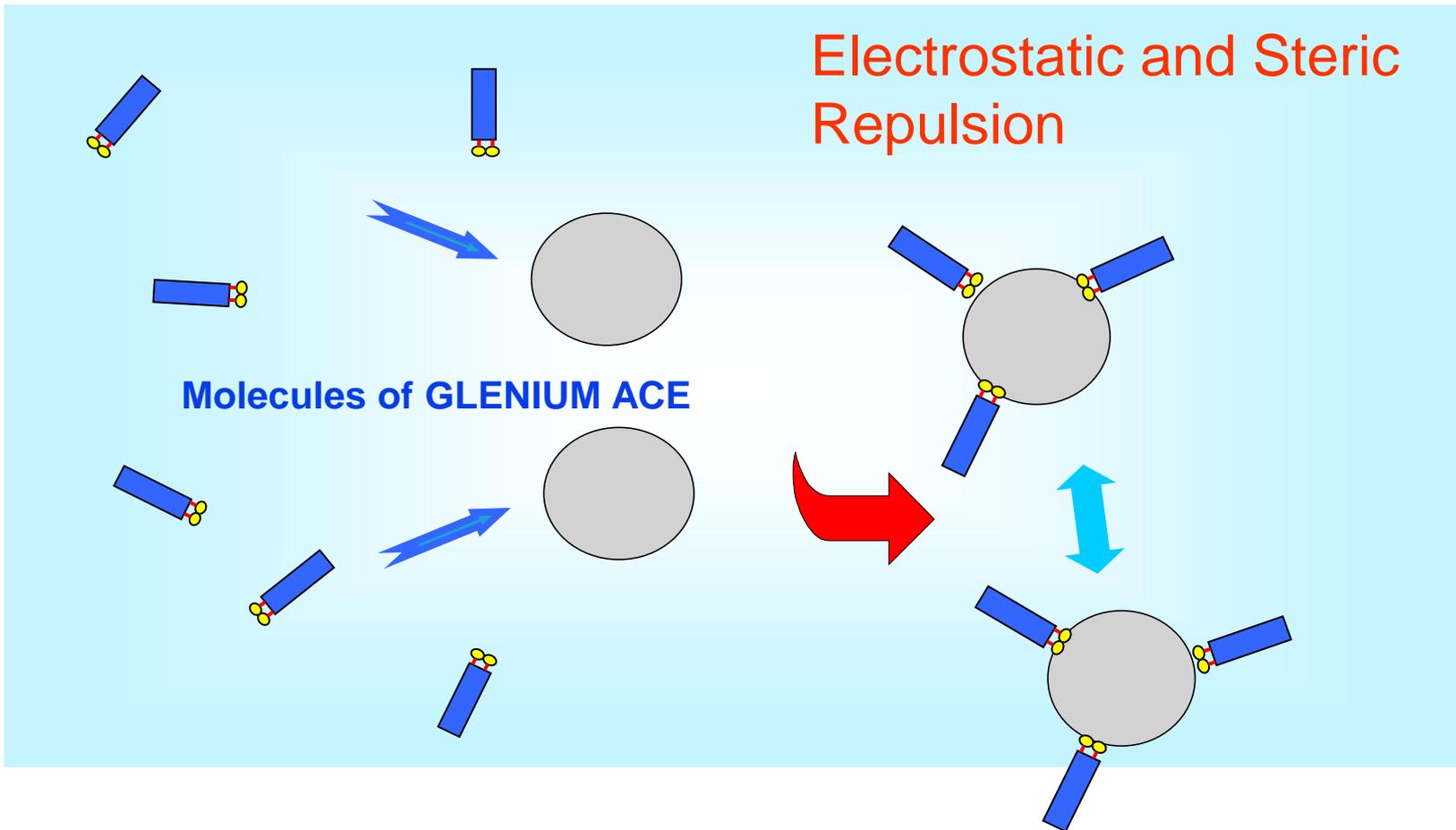
**Standard Molecule
of MasterGlenium**



**Molecule of
MasterGLENIUM ACE**

Diffusion and Adsorption of the Molecules of GLENIUM ACE

Electrostatic and Steric Repulsion



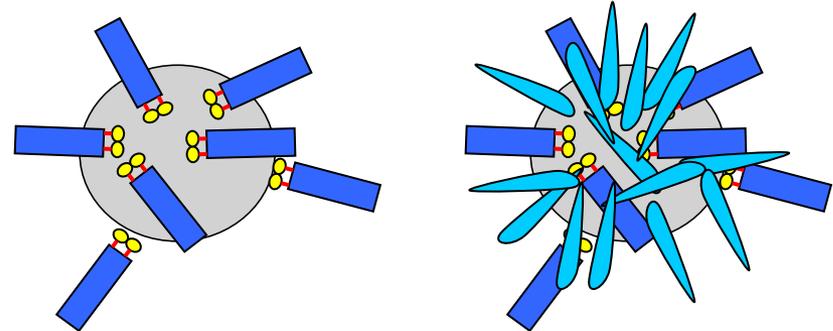
Standard MasterGlenium



The molecules cover
all the cement surface=
BARRIER

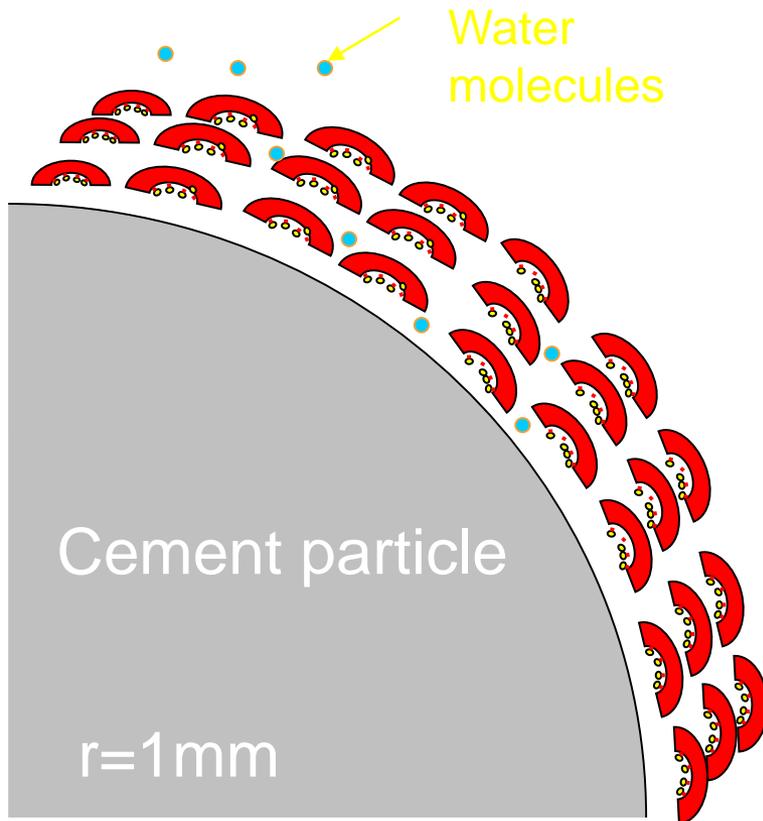
 The hydration of the
cement proceeds slowly

MasterGlenium ACE

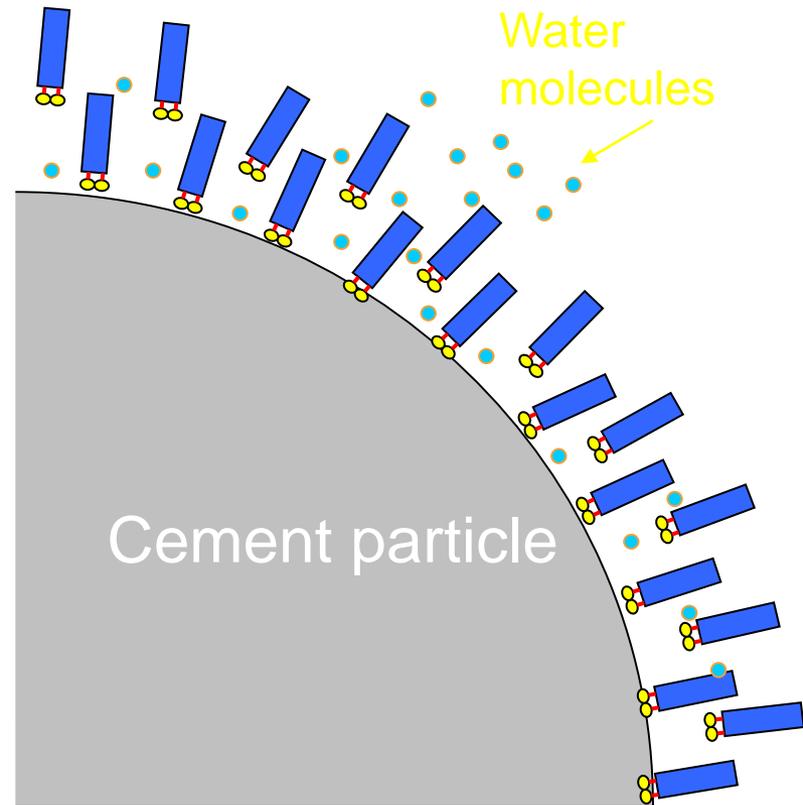


The molecules of the New Polymer
leave > FREE SURFACE

 The hydration of the
cement proceeds rapidly

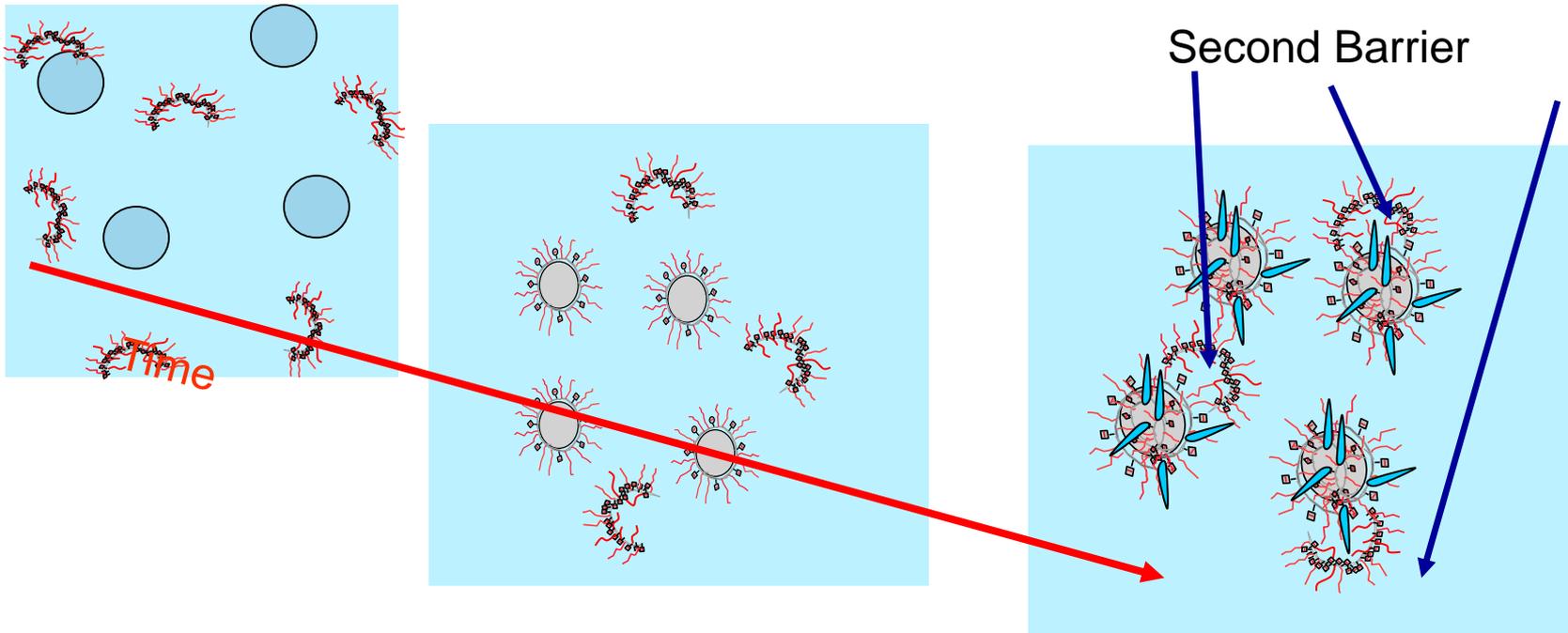


Standard GLENIUM

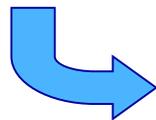


GLENIUM ACE

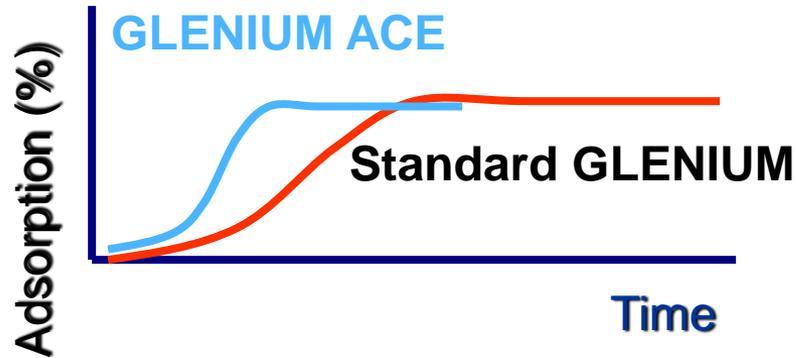
Standard GLENIUM Molecules



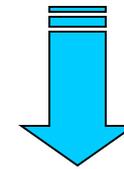
The adsorption proceeds slowly so that part of the polymer is adsorbed onto hydration products:



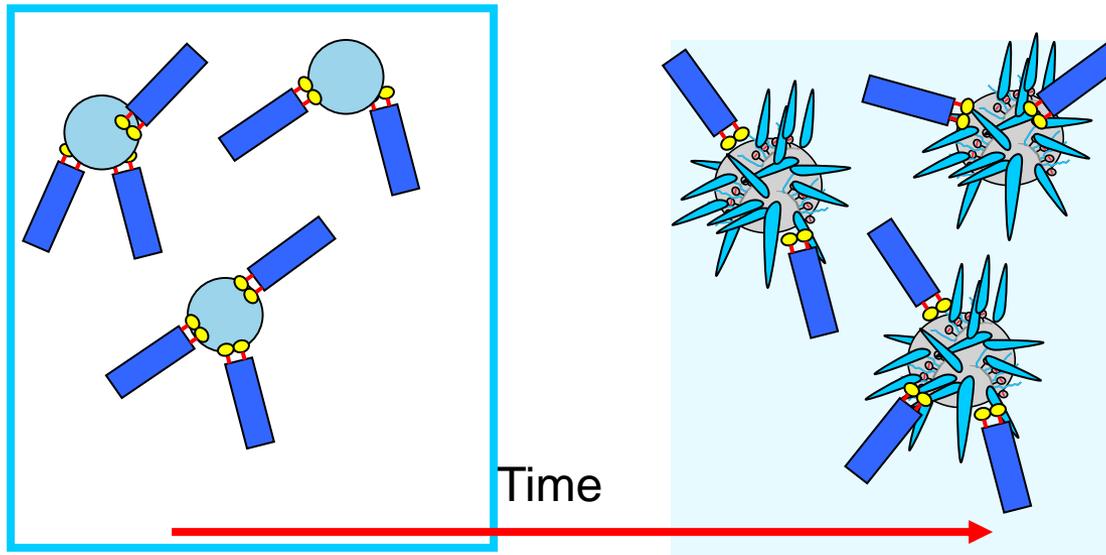
the hydration reaction is delayed
- formation of a Second Barrier



The adsorption of
GLENIUM ACE
proceeds rapidly:



No formation of
Second Barrier-
Cement
hydration is not
delayed



Mechanism of Action of MasterGlenium ACE Summary:

Accelerated evolution of the heat of reaction



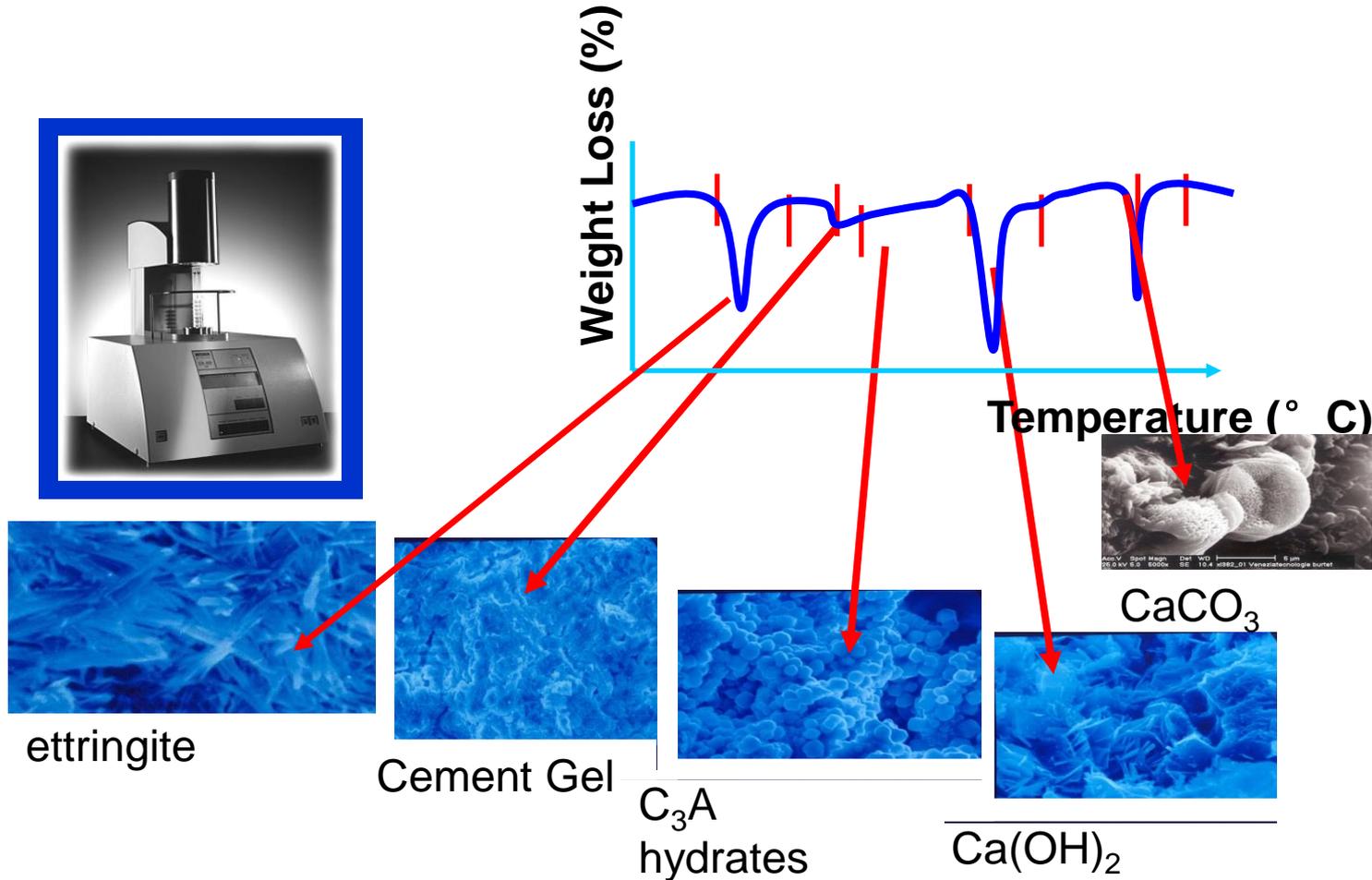
Rapid formation of hydration products



Decreased porosity of the cement paste/concrete

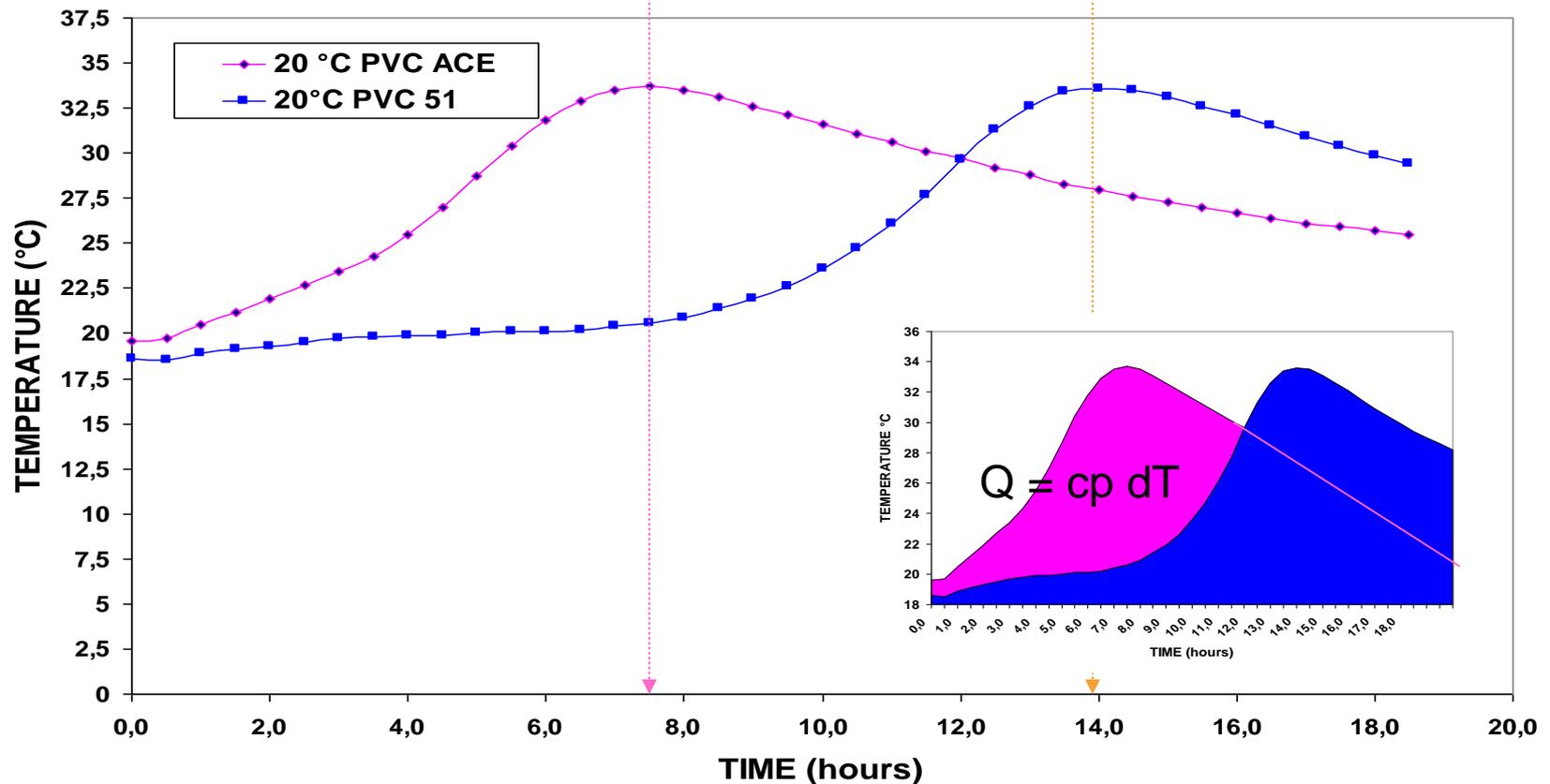
Quantitative determination of the Hydration Products

Thermo Gravimetric Analysis (TGA)



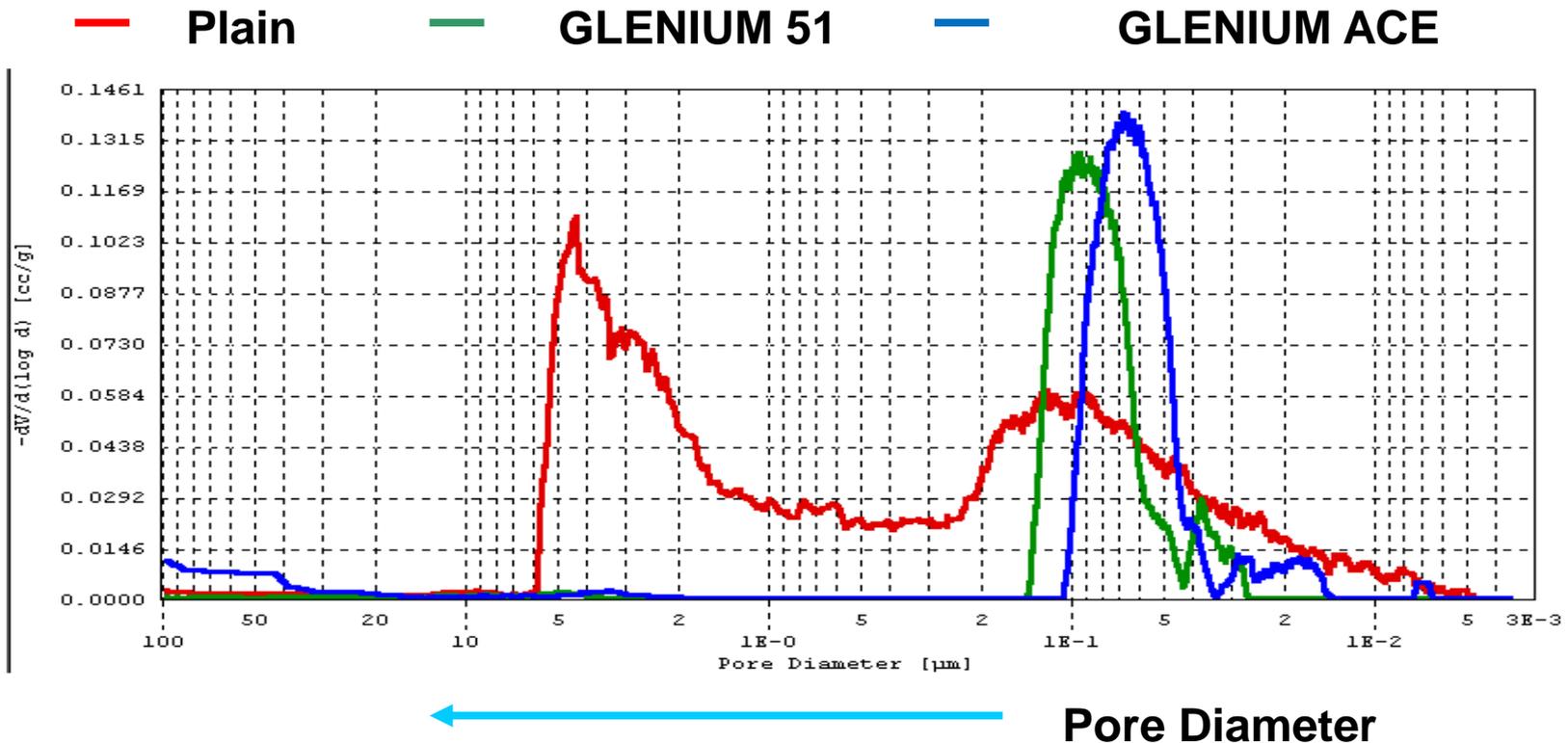
The higher rate of the cement hydration can be observed in terms of:

Quicker evolution of the heat of reaction

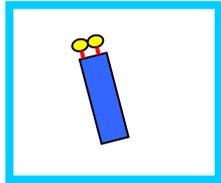


Porosity

The higher hydration ratio generates a more compact structure of the cement paste, thus a higher compressive strength and superior durability

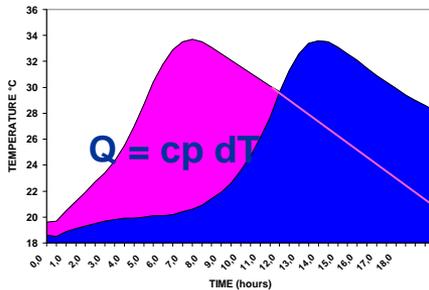


The contribution of GLENIUM ACE to the hydration

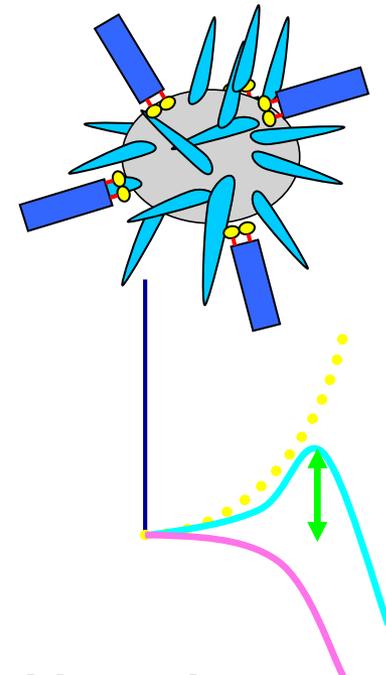


The properly designed molecule...

...controlling the hydration rate...



...and utilizing the heat of reaction in the best way...



...leads to a fast curing of the concrete without the need of external thermal energy

Rheodynamic Concrete

Rheodynamic concrete is self-consolidating without the need for vibration during placement, reducing the energy required to operate and maintain vibration systems.

The technology of RHEODYNAMIC concrete assures:

- » Thorough concrete mixing
- » faster discharge rates,
- » less energy to run mixers,
- » less wear and
- » maintenance on the mixing equipment.

MasterGlenium ACE

GLENIUM ACE acts on the hydration kinetics of cement, without affecting the morphology of the hydrated products. MasterGlenium ACE accelerates the hydration of cement.

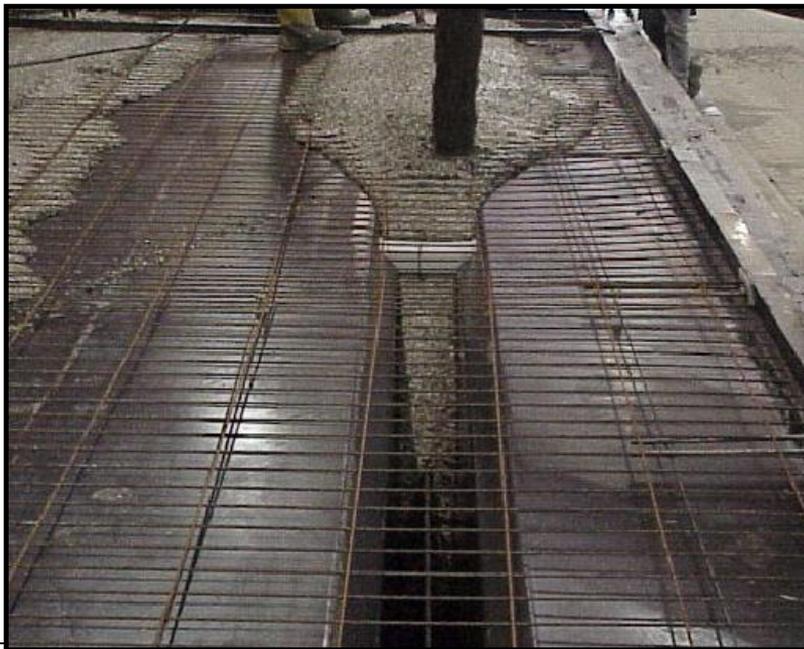
The heat of hydration released in the first few hours is able to self-accelerate the hydration process, and therefore the strength development. It allows producers to maintain a regular production cycle, without steam, even at 8-15°C (45-60°F).

ZES Implementation

Structural Precaster Use of *Rheodynamic* Concrete



ZES Implementation



Seeing is Believing



Smart Dynamic Concrete

Up to..

50% savings in labour

50% savings in time



Advantages of Smart Dynamic Concrete

1. Reduced Labour Requirement & Faster Completion



ZES Implementation



ZES Implementation

Structural Precaster Finish Using *Rheodynamic* Concrete



Applications



PRECAST



East West Gas Pipeline project



Shrinkage In Cement – 2 Stages

- » Plastic shrinkage
 - When the grout is wet (fluid or plastic).
 - Loss of excess free water
 - Up to 2%
 - Irreversible

- » Drying shrinkage
 - After the grout has hardened. Loss of capillary water
 - In a few days to an year
 - Max. 0.3%
 - Depends on climate
 - Reversible

- » Both shrinkages caused by loss of water.

Shrinkage Compensated Grouts – 2 Types

- » General Purpose Grouts
 - Only Plastic shrinkage compensated
 - ASTM C 1107 type A grout
- » Precision grouts
 - Plastic and hardened shrinkage compensated
 - ASTM C 1107 type C grout
- » Ideally, grouts must be formulated not to shrink – type C!



Designation: C 1107 – 02

**Standard Specification for
Packaged Dry, Hydraulic-Cement Grout (Nonshrink)¹**

BASF : Non shrink Grouts

- » MasterFlow 928 T : Precision Grout , 1 day = 35 MPa, 28 days = 75 MPa
- » MasterFlow 718: General Purpose Grouts, 1 day = 20MPa, 28 days=65MPa
- » MasterFlow 715 : General Purpose Grouts, 1 day = 15MPa, 28 days= 50 MPa

MasterSeal (Conipur) Membranes Engineering Waterproofing

Where to Use Conipur[®] systems?

- **Concrete**
- **Car parks**
- **Exterior-grade plywood**
- **Plant rooms**
- **Stadiums**
- **Plazas**
- **Balconies**
- **Incidental metal surfaces**
- **Podiums**
- **Roofs**
- **Complex roof structures**
- **Old Heritage Structures & Old Roofs**

Zurich Airport Carpark



Roof parking - Stockton, Castlegate, UK

 **BASF**
We create chemistry



IKEA, Leeds UK

 **BASF**
We create chemistry



IKEA, Leeds, UK



Cape East, Dubai



Cape East, Dubai



Shopping Mall, Abu Dhabi



MAIA Shopping, Porto Portugal

 **BASF**
We create chemistry



MAIA Shopping, Porto Portugal

 **BASF**
We create chemistry

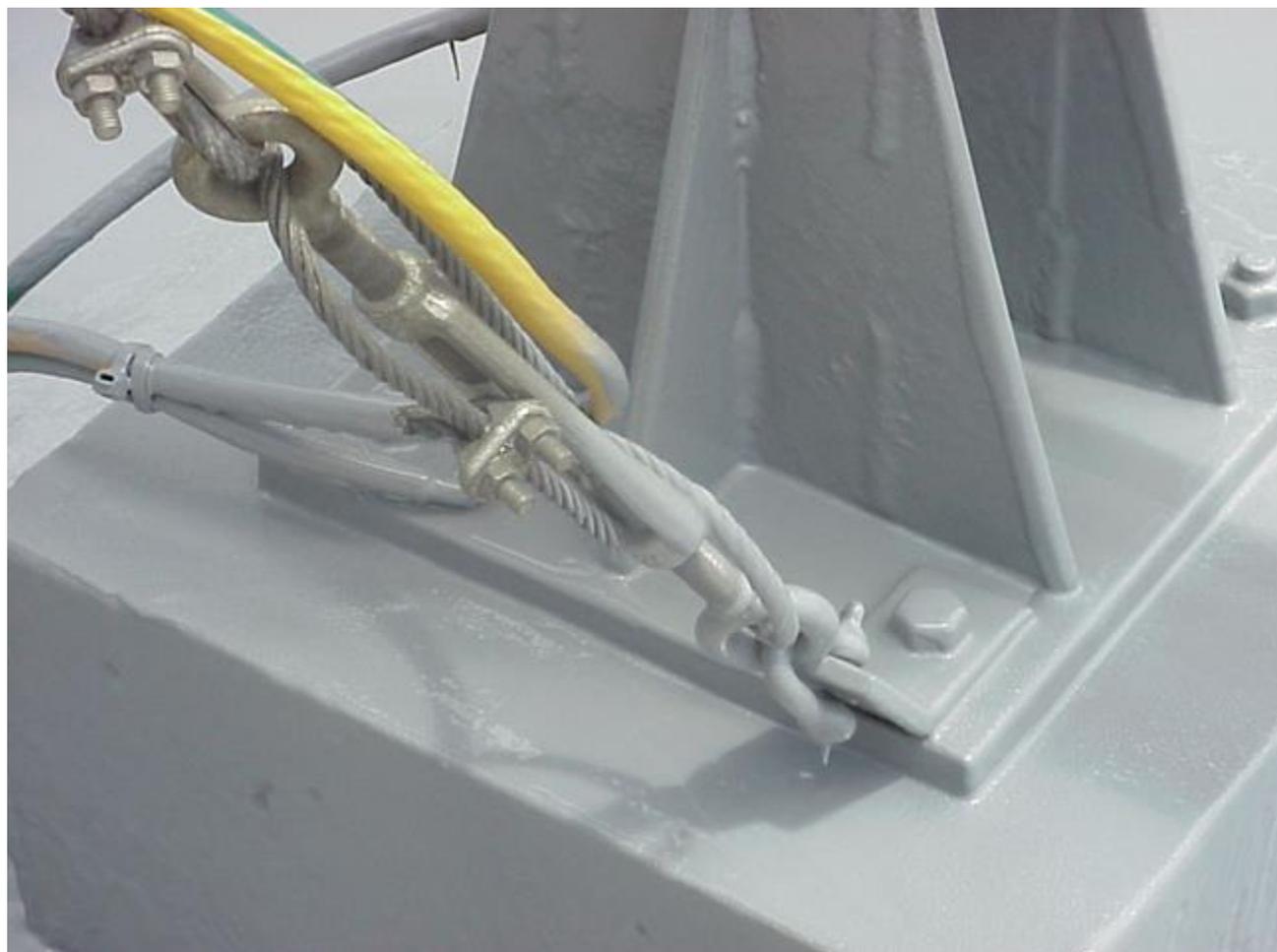


MAIA Shopping, Porto Portugal

 **BASF**
We create chemistry



MAIA Shopping, Porto Portugal



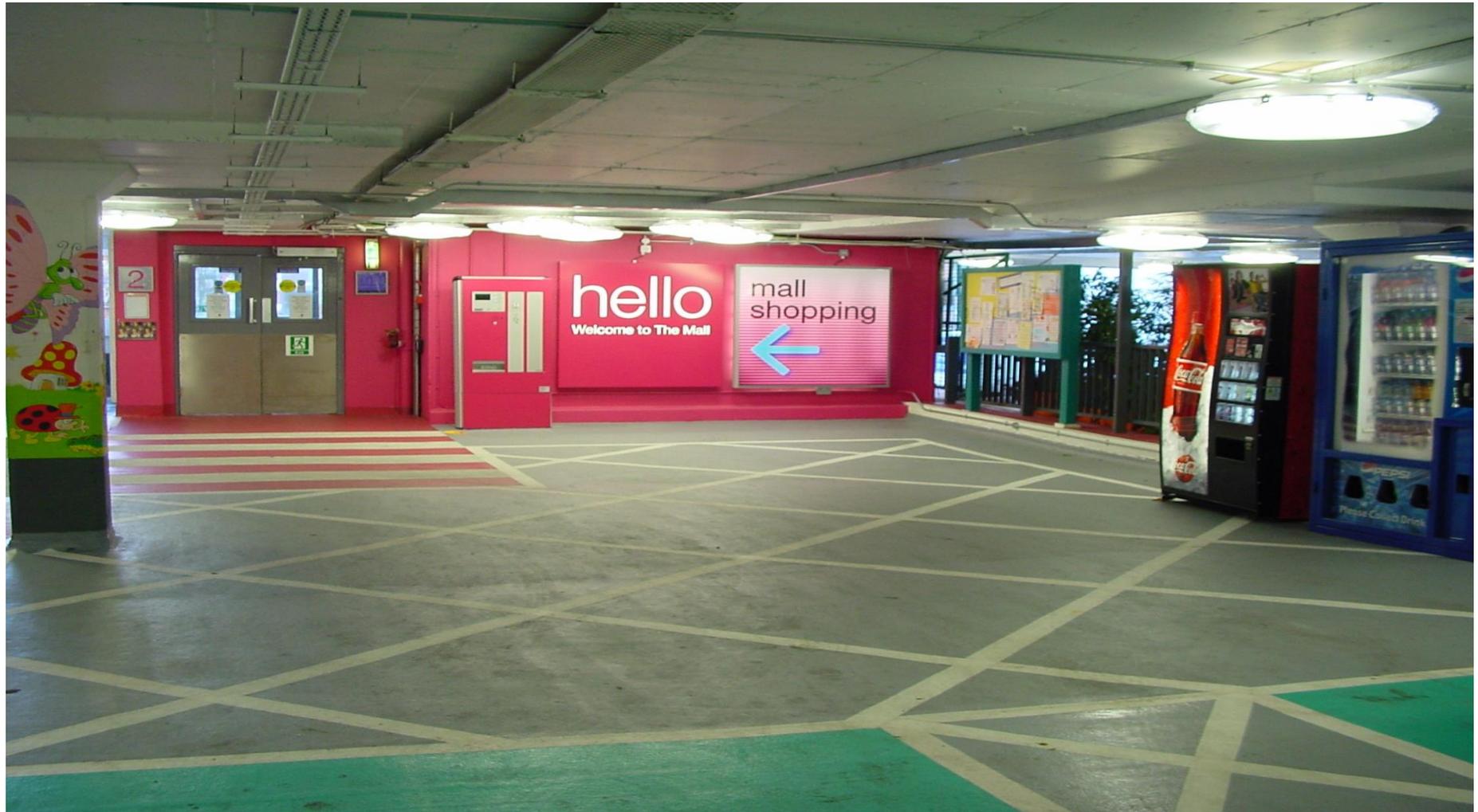
mall shopping, Sutton Coldfield UK

 **BASF**
We create chemistry



mall shopping, Sutton Coldfield UK

BASF
We create chemistry



Hotel Kremlin Palace, Antalya, Turkey

 **BASF**
We create chemistry



Hotel Kremlin Palace, Antalya, Turkey

 **BASF**
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Radio station FM Choice, London, UK



Mosque, Kuala Lumpur Malaysia



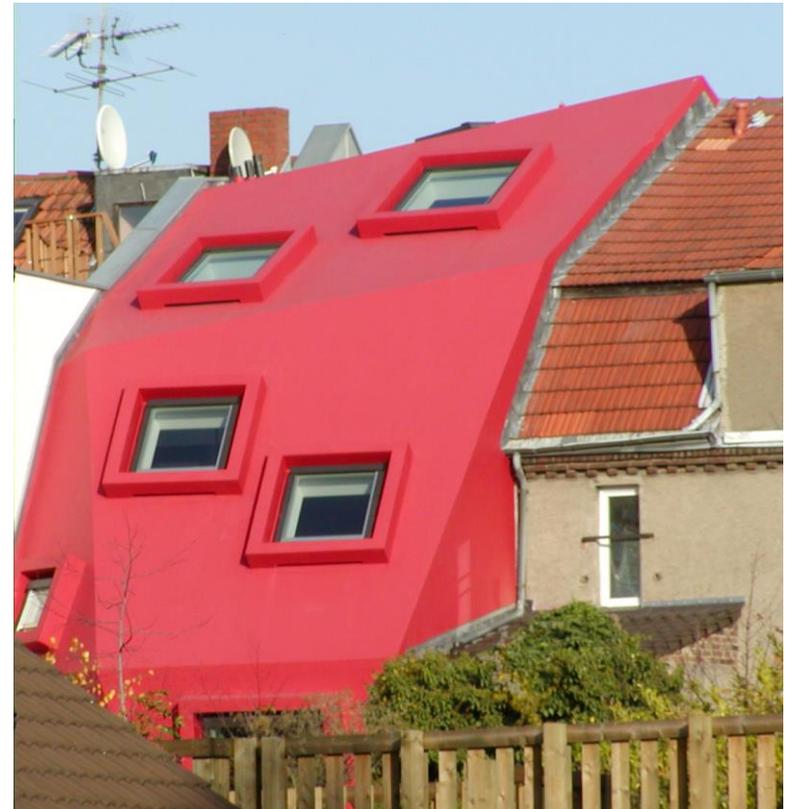
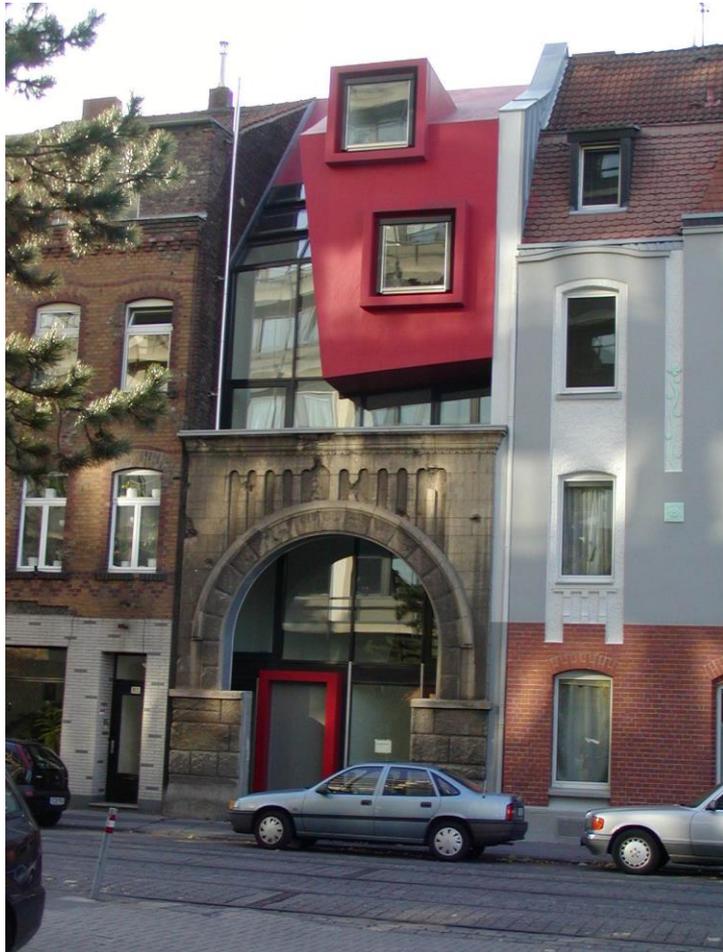
Mosque, Kuala Lumpur Malaysia



Nestlé, Kuala Lumpur Malaysia



House in Cologne Germany



BRIGADE METROPOLIS - BANGALORE (2008)

(12500sqmts) Coniroof on Curved Concrete Roof

 **BASF**
We create chemistry



PREM MANDIR PROJECT - MATHURA (2009)

Coniroof on Marble Stone Roof (2000sqmts)

BASF
We create chemistry



Master Builder Solution

W.H.O South East Asia Regional Office – Delhi (2009)

Roof Waterproofing (1600Sqmt)

(Substrate: Concrete/ thermocrete/ Tiles/ Bitumen)

BASF
We create chemistry



Parliament House – Delhi (2010)

Coniroof applied on the Dome (Substrate Stone) (1200sqmts)



Jawahar Bhawan – Delhi (2010)

Coniroof applied on Podium Slabs for landscaping (600sqmt)



We create chemistry



JAWAHAR BHAWAN





Complete Bathroom Waterproofing Protective System

Waterproof Protective System for: Wet Areas, Showers & Bathrooms

» Waterproof Protective System comprises of :

- **MasterSeal 561** (Formerly Known as PCI Lastogum) a **Ready to Use waterproof, flexible protective coating for use under ceramic coverings** in showers, bathrooms and other internal wet areas.
- **Pecitapes**, a special waterproof sealing tapes for corners and perimeter joints, pipe culverts and floor drains in bathrooms



System Approach:

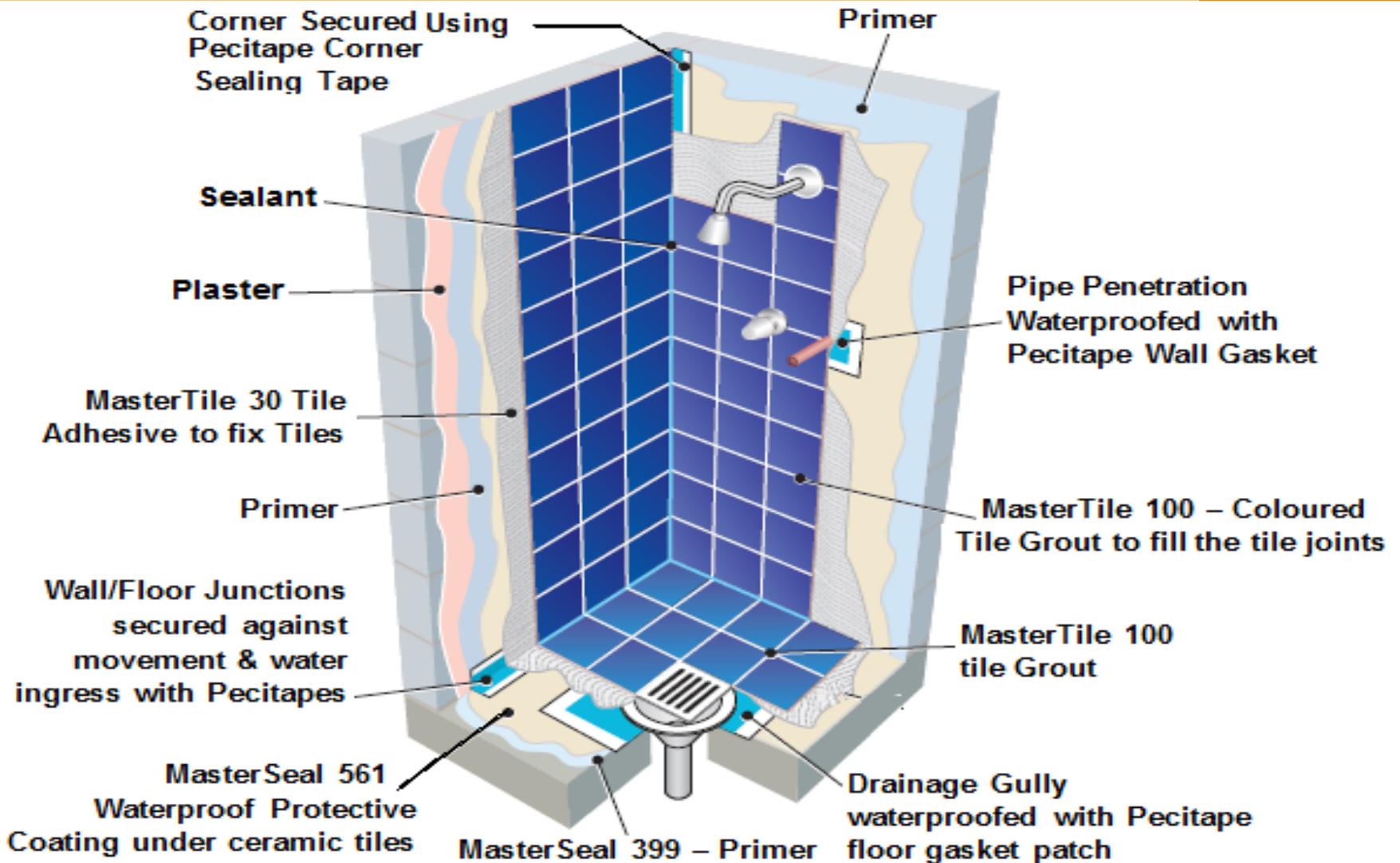
STEPS:

- ❑ Inspection & System Assessment
- ❑ Leakage Testing in Slab by water ponding
- ❑ Surface Preparation (repairs / rectification of defects in concrete substrate)
- ❑ Treatment to pipe penetration & cutouts to make it watertight
- ❑ Fixing of Pectapes Sealing Tapes & Profiles to corners & perimeter joints .
- ❑ Waterproof Protective Coating System application on the substrate
- ❑ Testing
- ❑ Laying of screed to protect (as per requirement)
- ❑ Tile Fixing using Tile adhesive.

Recommended Use :

- » For Indoor use
- » For Walls & Floor
- » For wet areas not exposed to pressurised water, such as bathrooms, showers in residential buildings, hotels, old people's homes and hospitals.
- » On moisture-sensitive, absorptive substrates, e.g. plasters, plaster slabs, gypsum fiber boards, plaster boards, wooden chipboards, anhydrite screeds in moist and wet areas subject to usual domestic use.
- » On absorptive mineral substrates, e.g. concrete, screed, render, aerated concrete,

MasterSeal 561 System Built-up



System Installation:



Tile Fixing: using Tile Adhesive & Tile Grout

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Waterproofed – Well finished Bathroom

 **BASF**
We create chemistry



Thank you!!!!

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The Chemical Company