



## Activity 6

### “Green” and smart structural materials repair products and systems



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**A6.1** Concrete mixes with sub-products and recycled aggregates  
(Univ. Bordeaux) (Fr)

**A6.2** Rebars more resistant to corrosion (SS, fibers)  
(Univ. Vigo) (Es)

**A6.3** Smart structural materials (Coatings, Permanent monitoring)  
(QUB) (UK)

**A6.4** New materials and systems for steel protection  
(LNEC) (Port)



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### Objective

#### Critical review on:

- the use of “green” concrete mixes for new or repaired structures.
- the use of structural materials with improved durability.
- the use of intelligent structural materials with active properties.  
(self cleaning concrete, coatings, permanent monitoring systems)
- the use of more resistant reinforcement materials than carbon steel.

**sustainable structures**

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**sustainable structures**

**Reduced consumption of:  
cement, arid, water**

**Re-use of industrial wastes**

**Increased service life**



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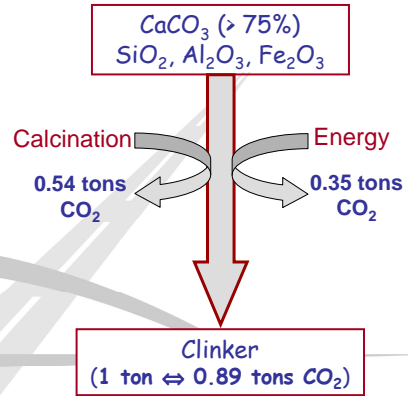
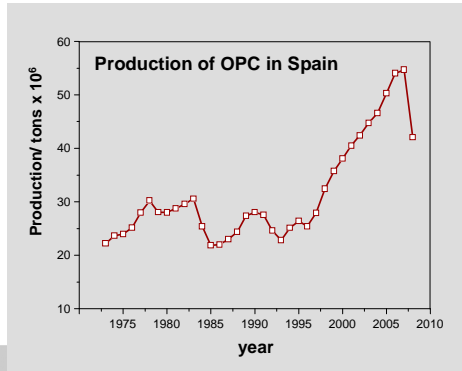
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**Reduced Consumption....**



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**Re-use of industrial wastes....**

**Aggregates, replacement material**  
(Demolition wastes)

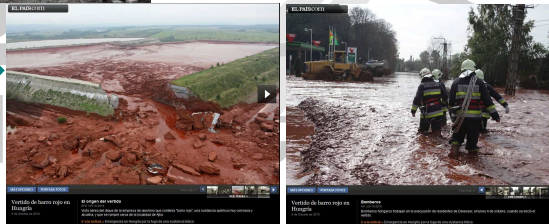


**Corrosion inhibitors**



**Granite cutting slurries**

**Red Muds**



Hungary,  
2010-10-05

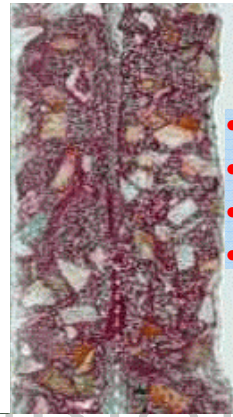
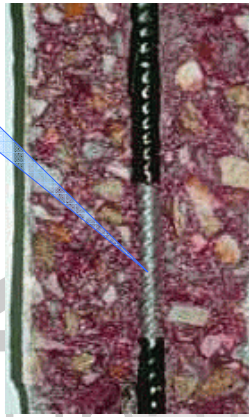


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Increased service life....

“Healthy”  
rebar



- pH 11-13
- Low [Cl<sup>-</sup>]
- Low RH
- High Resistivity



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- Low pH (< 10)
- High [Cl<sup>-</sup>]
- High RH
- Low Resistivity

“Ill”  
rebar

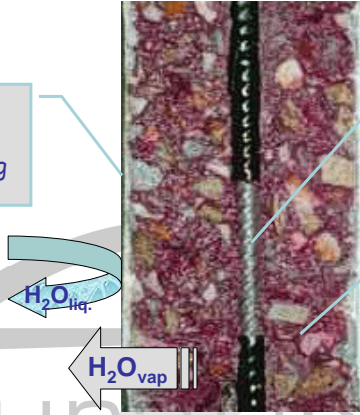


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Increased service life....

- Coatings
- Waterproofing

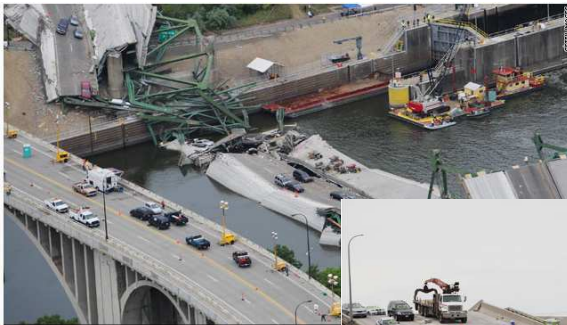


- Green Inhibitors
- Stainless Steels
- Galvanised steel

**MONITORING**  
RH, p, Cl<sup>-</sup>



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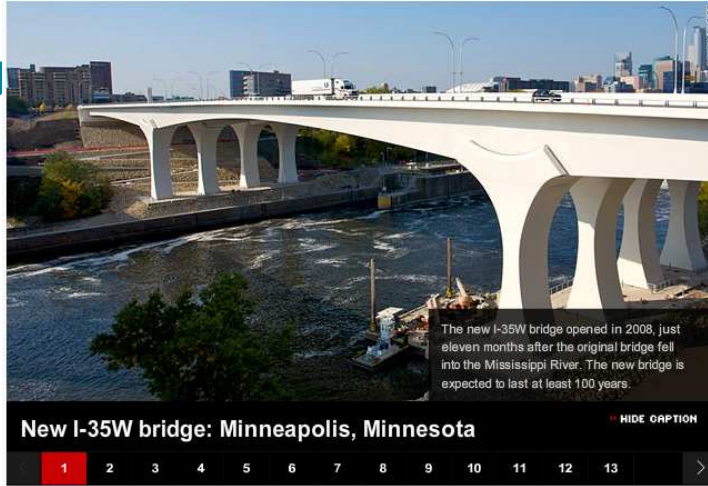
Interstate Highway 35W  
bridge in Minneapolis,  
Minnesota, 40-y old,  
On August 1, 2007



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### 3 years later....



<http://edition.cnn.com/2010/TECH/innovation/07/30/minneapolis.bridge.sensors>



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**Thank you**

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