

**LaSIE**  
University of La Rochelle

ACCESSIBILITY & TRANSPORTS  
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**duratiNet**


**7th Trans-national Workshop**  
Lisboa • LNEC • 30<sup>th</sup> May 2012

**DURATINET Case studies**  
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**Case studies in Working Group Activities 7**

**WG7 is divided into 3 main topics:**


**WG7.1.**  
**Repair systems in structures – Description of some practical cases**

**WG7.2.**  
**Repair systems in small scale samples exposed in experimental sites**

**WG7.3.**  
**Performance evaluation of repair systems and products at industrial scale**

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## 7.1. Repair systems in structures – Description of some practical cases

> Four repaired structures were selected for a technical description:

- **Barra bridge** (Portugal)
- **St-Nazaire wharf** (France)
- **Ferrycarrig bridge** (Ireland)



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## Barra bridge (Portugal)

> **Barra bridge:**

- Built on 1975
- First deterioration 1987
- First diagnostic : 2002
- Repaired : 2005
- Removal and replacement of the concrete at several crossheads : OPC mixt and corrosion inhibitors
- Application of surface treatment
- After the rehabilitation a monitoring system was established


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## Saint Nazaire wharf (France)

> **St-Nazaire wharf:**

- Build on 1971
- First diagnostic : 2005 (chloride content at transversal beam)
- Repaired: 2009
- Investigations on the repair behaviour are regularly performed (chloride content and chloride profiles evolution, corrosion initiation,...)



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## Details on Ferrycarrig bridge

> **Ferrycarrig bridge:**



- Built on 1980
- First diagnostic : 2001-2003
- Repaired : 2007-2008
- Rehabilitation of cross head
- Removal and replacement of the concrete for several crosshead : OPC mixt and corrosion inhibitors
- Application of surface treatment
- After the rehabilitation a monitoring system was established



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> **Ferrycarrig Bridge**

- Bridge built on 1980
- In 2002 extensive cracking of crosshead beams discovered
- Repaired in 2007
- Crosshead beam repair involved removal of cover concrete, provision of additional reinforcement and pouring new cover concrete







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> **Ferrycarrig Bridge Repair**

- To gather information on repairs from a real structure a research initiative was undertaken
- Each of the seven crosshead beams were repaired in 2007 using one of five different repair strategies
  - Ordinary Portland Cement (OPC)
  - OPC with increased cover
  - OPC + Silane Surface Treatment
  - OPC + GGBS
  - OPC + Corrosion Inhibitors


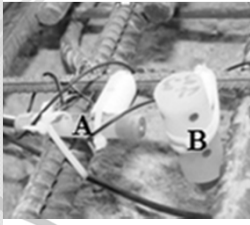




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**> Ferrycarrig Bridge Instrumentation**

- To monitor the relative efficiencies of repair 6 of the 7 beams were instrumented
- The six crosshead beams were instrumented:
  - Corrosion potential probes (A)
  - Chloride-ion penetration depth probes (B)
  - Corrosion rate probes (C)
- Probes were commissioned in Dec. 2007
- Chloride ion ingress is a very slow process
- Consequently there are no results to date



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**WG7.1: Repair systems in structures – Practical cases**


**> Secondary work**

**> Monitoring of Ré Island Bridge:**

- core sampling for chloride profiles on zones where corroded products appeared,
- study of the correlation between non-destructive tests and destructive tests in laboratory (potential measurements, ...).

It involves U. La Rochelle, CG 17 and U. Bordeaux.

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## WG 7.2: Repair systems in small scale samples exposed in experimental sites



**Objective:** study of repair systems in small scale exposed in “natural” experimental sites


Selected sites:

- Peniche (Portugal)
- La Rochelle (France)
- St-Nazaire (France)

**Steps:**

- 7.2.1. Characterization of experimental sites
- 7.2.2. Characterization of exposed concrete
- 7.2.3. Characterization of repair systems/Products
- 7.2.4. Performance evaluation of repair systems

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## WG7.3: Performance evaluation of repair systems and products

**Production of Guidelines on in-situ methodologies for evaluation of:**

- > **the behaviour of repair systems**
- > **performances of products**

Partnership: BEL (Company specialized in repair and maintenance of reinforced concrete structures).

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**Thank you**  
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