DURABLE TRANSPORT INFRASTRUCTURES IN THE ATLANTIC AREA

NETWORK

ACESSIBILITY & TRANSPORTS

PROJECT 2008-1/049

newsletter 01
Feb 09

PROJECT CONTEXT

The aggressiveness of the marine environment found throughout the Atlantic Area has resulted in many problems related to the degradation of the structural materials used in transport infrastructure. The problems encountered include the corrosion of structural steel and reinforcement, leaching and expansive chemical reactions in concrete, as well as chemical and biological attack. This deterioration results in a reduced level of safety which is very difficult to quantify. Additional difficulties also occur due to loss of serviceability and the unacceptable appearance of structures leading to loss of confidence by both infrastructure owners and users.

Most transport infrastructure in the Atlantic Area is exposed to a marine environment. This exposure is particularly aggressiveness for coastal infrastructure such as ports, road and rail bridges over river estuaries and other maritime structures that are in direct contact with seawater. However, structures located away from the coast are also subject to attack by chlorides from sea mists, seawater carried by vehicles and de-icing salts. Many of these structures, even those less than 30 years old, have shown signs of extensive premature deterioration.

Owners and managers of ports, highways and railway infrastructure in marine environments, both public and private, are faced with increasing maintenance costs for their structures. The deterioration of transport infrastructure across in Europe poses not only technical difficulties for the owners and managers but also a great economic and environmental impact to society as a whole. The economic cost associated with the maintenance and repair is very high and projects are often significantly constrained by limited annual budgets, leading to the need to prioritise the required works. This is of particular relevance in the current economic climate where public finances are coming under close scrutiny. In this prioritisation process, however, the costs associated with the social and environmental impact are very often overlooked but are no less significant than the initial capital outlay.

The managers of transport infrastructure have common technical questions concerning maintenance/rehabilitation: these include, for example, the identification of most appropriate repair or rehabilitation methodologies, the extent to which these actions should be carried out, the optimal time to implement the preventive or repair measures, and consideration of the cost-effectiveness in terms of the future maintenance requirements. To address these questions, the owner/managers of structures must continuously improve their knowledge of the tools required for the adequate diagnosis of material damage and for optimising the repair and rehabilitation costs, as well as for estimating the evolution of damage in their structures, so as to allow them to decide on the most cost-effective repair methodology and time of intervention.

Experience has demonstrated that, unfortunately, the transfer of knowledge within the framework of the durability of transport infrastructure has not been carried out effectively. Studies of structural repair projects has shown that their performance have not lived up to expectations. Questions have arisen, not only from the point of view of the performance and durability of individual repair systems, but also on the appropriateness of particular repair techniques in given situations. Case studies suggest that the required knowledge of the design, construction and maintenance of repair systems is not being adequately transferred along the supply chain. Effective exchange transfer of knowledge within the industry is vital, not only to improve the adoption of harmonised strategies in maintenance and repair, but also to encourage the application of preventive measures thus delaying or even avoiding the deterioration of structural materials. Implemented effectively, a co-ordinated approach will result in a reduction in life cycle costs.

It is recognised that construction and maintenance activities are associated and intensive use of natural resources. In particular, the production of cement and steel is responsible for producing high levels of CO2. It is clear that action must be taken to raise awareness and to encourage more sustainable construction. This can be achieved by improving the technical and scientific development of structural materials and repair techniques, with a view to reducing the energy and environmental impacts associated with both construction and maintenance activities. The use of “green and smart structural materials” is very relevant subject for R&D cooperation projects in the European framework. These includes, for example, sustainable concrete that incorporates by-products and recycled aggregates, new repair materials that utilise industrial waste materials (from power, waste and quarry activities), and the use of nanotechnologies to design new materials with specific improved durability properties.

The main goal of this project is to create the DURATINET network to facilitate an efficient exchange and transfer of knowledge between R&D centres, infrastructure owners and managers, the various bodies responsible for commissioning maintenance works, repair contractors, as well as the manufacturers that are developing products. It is only through co-operation between these stakeholders that the durability, sustainability and safety of transport infrastructure will be achieved. In this way DURATINET hopes to contribute to improving the living, working and economic conditions of the Atlantic Region.

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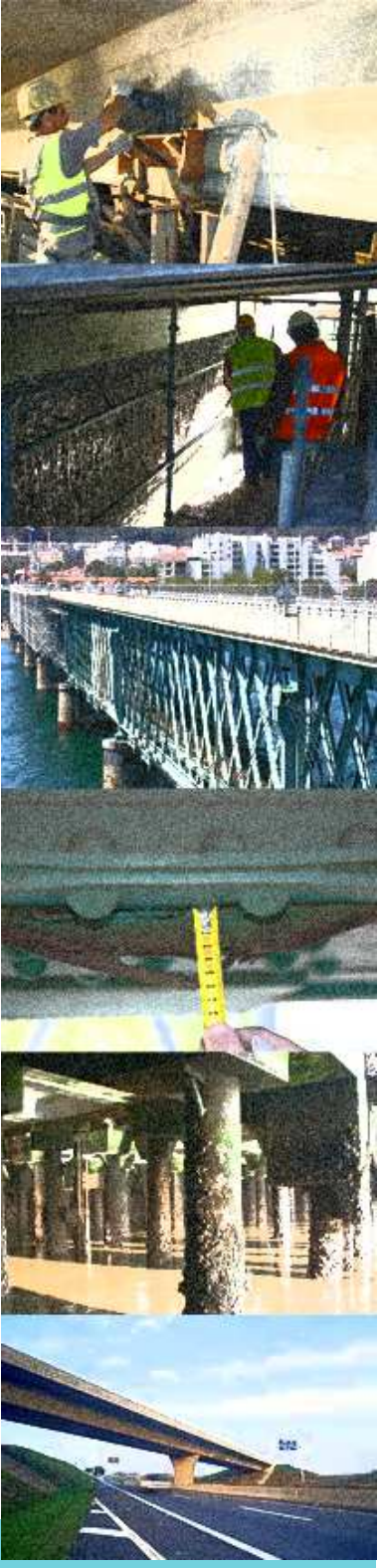

OBJECTIVES

Five main objectives have been defined in the transnational context of this project, with a view to improving both the durability and the optimisation of maintenance methodologies applicable to the transport infrastructure in the Atlantic Area. These objectives will stimulate the cooperation between the different agents, as well as encourage the development of new R&D fields leading to more sustainable construction and maintenance. The DURATINET objectives are:

1. To produce guidelines on the durability requirements of reinforced concrete and structural steel, the inspection and diagnosis of damage, the repair of materials and methodologies for optimising maintenance.
2. To create new competencies at the level of infrastructure maintenance for agents with different skills, through the creation of knowledge dissemination actions and the organisation of courses and workshops within the theme of the project.
3. To stimulate the application of harmonised European standards on repair and to identify the requirement for applied research, in particular research topics concerning the quality control of repair products and the rehabilitation processes resulting from their application.
4. To promote the development and use of "green and smart" structural materials and repair products incorporating waste, recycled materials and by-products, with reduced energy needs during production and application and with increased long-life performance without being hazardous for application technicians or users.
5. To create the DURATINET Website and a Web Platform to facilitate the exchange of information within the technical and scientific community. The platform will help to generate and disseminate knowledge on the performance of materials, on the diagnosis of damage, on service life prediction and on the ageing of repair materials. A database (DB-DURATI) will be also created to store information on the performance of materials obtained from real structures and from large scale specimens under natural exposure. The database will be used for the benchmarking of service life models and for aiding decision-making relating to the selection of reliable structural maintenance and repair strategies in marine environments.

DELIVERABLES

Guidance manual on reinforced concrete and steel durability requirements, inspection and diagnosis of damage, repair of materials and methodologies for optimising the maintenance of infrastructure.

Web Platform on the maintenance of reinforced concrete and steel in transport infrastructure.

Database on the performance of materials for modelling service life.

Atlantic Area Cluster "Green and Smart Materials".

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EVENTS

19th FEB
1st WORKSHOP
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Design: Helder David — LNEC

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