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Monitoring dynamic network for existing structures of concrete Cultural Patrimony

DURATION
1/12/2013 - 28/02/2017

BUDGET
241.820 €

PROJECT DESCRIPTION

Content

The goal of this project is to improve the conservation of protected concrete buildings. These monuments represent technological progress or architectural demonstrations and appear as witnesses of the history of this material throughout the centuries. As the majority of the concrete structures these buildings can present several pathologies. The most common is the corrosion of the rebars due to a carbonation of the cement matrix. These damages are often associated with to execution- or formulation defects (armatures close to the surface, …) which are not more accepted in the modern concrete structures.

Unlike traditional structures, the aspect of the protected buildings has to be conserved in a state as close as possible to the original state. These demands make that the repairs are very delicate and are often an important challenge for curators, architects or contractors concerned in the restoration projects.

Consequently, the usual repair techniques and predictions models of the evolutions of the damages have to be adapted to the restrictions linked to these buildings.

Figure 1 – Porch roof of Building M of the VUB (architect: Renaat Braem)

Objective

At a European level, the project aims to lay the foundations of an inventory common structure of the protected concrete buildings and of their most important damages. Another goal is to establish protocols for the monitoring and the control of the degradations which are adapted to the monuments in order to develop predictive models for the authorities in charge of their maintenance. Finally the possibilities of treatment of the corrosion degradation processes by a projection of water repellent will be investigated. These impregnations may, indeed, represent a sustainable alternative with a limited aesthetic impact to the traditional repairs techniques.

Partnership

The project involves 5 partners from different European laboratories with complementary skills. These laboratories are mainly specialized in the characterisation of concrete (formulation of new concrete and concrete repair), in the conservation techniques of protected monuments and in the development of scientific instrumentation.

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Method and interdisciplinary character

Contacts with various national agencies managing historical buildings will first be established. A survey will also be conducted in order to identify the protected buildings and assess their conservation state.

Meanwhile, different diagnosis techniques including those for measuring the moisture in concrete will be evaluated. Several old monuments will also be instrumented. The climate parameters and the measurements of the corrosion activity of the reinforcement will be recorded throughout the project.

In the laboratory of the Belgian partners, the efficiency of the water repellent treatments will be characterized. The influence of these treatments on the corrosion rate of the rebars will be investigated by tests in climate chamber and under natural conditions. The durability of these treatments will also be estimated in association with the different climatic factors (frost, rain, UV, …).

Following these measurements, predictive models have to be developed as well as tools to assist architects, managers or study offices in the management of the cultural heritage.

Figure 2 – Diagnosis of the police tower Oudaan in Antwerp (architect: Renaat Braem)

CONTACT INFORMATION

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