



**TUESDAY 17 SEPTEMBER 2009, 12.15 H.- 13.15 H. – ROOM GC A3 31**

## **SUSTAINABLE & EFFECTIVE BRIDGES - CURRENT & FUTURE NEEDS**



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### **SHORT SUMMARY**

The lecture will include a brief presentation of the "Sustainable Bridges" project with special emphasis to the toolboxes that can be directly applied by the railway owners, by consultants and by contractors to ensure the safe and proper behaviour of the bridges for new and higher demands.

A couple of case studies of the use of ground penetrating radar techniques for the inspection of concrete bridges will be presented. These clearly illustrate the availability of this technique to find out the reinforcement and tendon ducts position and check the quality of the construction and materials.

The presentation will conclude with a detailed description of a novel fibre-optic sensor for crack monitoring, which does not require prior knowledge of the crack locations, allowing the detection, location and monitoring of internal and external cracks and measuring the crack opening widths.

### **EXTENDED SUMMARY:**

The public's opinion as well as the administrations' started to understand that there are many causes that can result in a reduction of a bridge life time and that the maintenance and rehabilitation works must be considered before the damages in the structures are considerable.

A significant number of reinforced and prestressed concrete bridges is deteriorating at a rapid rate and needs to be repaired and strengthened. During these rehabilitation processes it is relatively frequent that designers are faced with the lack of original design plans and unawareness of the real position of reinforcement and tendon ducts.

The inspection of bridge decks is a critical task, and, currently, can be successfully carried out using a wide range of NDT techniques. Nevertheless some of these techniques are excessively expensive and time consuming.

The occurrence of some recent accidents highlighted the importance of effective monitoring systems, which are able to identify structural problems at an early stage, guaranteeing in this way the public safety. Because of material inhomogeneities, the exact locations of cracks in a concrete element cannot be predicted. Conventional "point sensors" can easily miss the cracks. On the other hand, integrated sensors, which measure the displacement between two points separated by a relatively large distance, are not able to distinguish between the harmless condition of many fine cracks and the undesirable situation of a single wide crack.

In a recent European project of the 6th framework rational procedures were proposed to improve and simplify the assessment of bearing capacity for bridges, and more refined methods were developed for modelling, monitoring and strengthening. Research has shown that there is a great potential for big steps forward in all of these areas.

The lecture will include a brief presentation of the “Sustainable Bridges” project with special emphasis to the toolboxes that can be directly applied by the railway owners, by consultants and by contractors to ensure the safe and proper behaviour of the bridges for new and higher demands.

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10.9.2009