

COST TU1402: Quantifying the Value of Structural Health Monitoring



SELECTION OF DURABILITY INDICATORS FOR THE MONITORING OF STRUCTURAL DETERIORATION

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OBJETIVE

The concept of Performance Indicator has been used by the team in several national projects (DYNAPORT and DYNACAR) whose results are summarized in present work. The concept of performance Indicator is taken as the key properties which inform on the level of Safety or the degree of deterioration –durability- with the specific particularity that these properties should allow their monitoring by in-situ sensors. The results aimed into identifying that the Performance Indicators have to be selected in each structure in relation to their limit states and the funcionality regarding the users. In present work some examples are presented applied to railway and road bridges.

Time of wetness in

metallic structures

IDENTIFICATION OF SAFETY AND DURABILITY INDICATORS

- Monitored through in-situ sensors
- Giving friendly-to-users information
- Informing on key properties related to fulfilling of structural erquirements.
- Serving to check the complying of the material specifications
- With a reasonable range of sensitivity in teh critical values

Meteorological

stations

- Respecting the classical design procedure of safety, service and explotation.

Rebar corrosion and

concrete resistivity





Measure of displacement

(deck with respect to

abutment) due to climatic

actions, creep or variable

Potentiometric

transducers for

local strain









DESCRIPTION OF CORROSION SENSOR

Senapres	de velocidad de comosión,
potencial	de corrozión y resistividad
an is gain	ris del astribo.









RESULTS – SOME EXAMPLES OF MONITORED STRUCTURES

1) **Pilot demostrator** placed at the garden of the IETcc in order to calibrate and verify the systems.



air temperature Data of concrete (green) and (blue resistivity and yellow).





Gráfico a dos escalas / múltiples secciones Gráfico a dos escalas / múltiples secciones ATOS ENTRE: 2013-06-01 y 2013-09-04 |< < > >| DATOS ENTRE: 2013-06-01 y 2013-09-03



DYNACAR: Técnicas para el Diseño Dinámico de infraestructuras de carreteras.





Dovelas en Colector de Pinos

2) Displacements deck-abutment in **railway bridge**

Sensores de velocidad y potencia le conozión en la viga del tabler solo Alleente - Honmige Sensores de velocidad de corros potencial de corrozión y resistivida an la galería del astribo

Sensorez de potencial de corrozi enzorez de temperatu

Anterior Sigulante

Una sección de tipología mixt cajón de acero y loza de hormi rmado, con una longitud de 21

y lass de harmigón ermedo de 250

m de longitud. Instrumentació

seleccionada

fensores de velocidad de l Sistema de tres electrodos anzons de resistividad horm Sensor de detección de llegada o pruros, a través de potencial de

orrozión o de velocidad de



3) Leakings monitoring in the deck of a **road viaduct**



Sensors of RH/T are placed in the interior of the concrete deck at different distances from the concrete-asphalt interfase to detect through concrete saturation degree possible leaks from the upper part of the road

Data of temperature (blue), displacement bracket-abutment (red) and bracket-deck (green).

CONCLUSIONS

"Performance indicators" are defined those key parameters which can inform best on the degree of damage or anomalous behavior which can impact in the structural performance and safety. The Indicators have the property of being monitored through cheap and simple sensors placed on the structure in order that these measurements could replace the need of visual periodic inspections.

In the several case studies in railway and road bridges tested in DYNACAR project, it was clearly identified the key performance to be monitored related to user needs. In the application of Indicators monitoring, it resulted critical the selection of the places where placing the probes in order to save resources and being economical. Friendly interpretation of results should be developed for the maintenance team and defined actions have to be previously planned when the alert level of an Indicator is reached.