

## **A NEW SYSTEM OF SENSORS FOR THE FAST, NON-DESTRUCTIVE DETECTION OF CORROSION**

### **DESCRIPTION OF THE INVENTION**

Researchers from the Universitat Politècnica de València have developed a new system of sensors that allows for the fast, non-destructive detection of corrosion in the concrete structure of buildings from the moment that a building shows symptoms of corrosion.

The information offered by the system, which has been patented by the UPV, is of particular relevance for building safety. It allows for any intervention necessary to be planned, while reducing the costs of maintenance and repair.

The system also incorporates pulse voltammetry

equipment which allows researchers to ascertain the intensity of corrosion at each point in the network of sensors of the structure being analyzed and specific software for the analysis of the electric response of each sensor.

Currently, the most common means of determining the speed of corrosion in the frame of a reinforced concrete structure is based on destructive techniques which mean that the frame needs to be uncovered at different distances in order to apply the electrochemical measurements of corrosion intensity. Such techniques require subsequently need to be recovered using repair mortar.

### **SECTORS OF BUSINESS APPLICATION**

The target sector for this invention is the construction industry.

The system can be installed in new buildings, or as interventions to restore existing ones. In the first instance, the system can be incorporated at the moment the concrete is put into place in those areas that are more exposed to corrosion caused by the effects of humidity, carbon dioxide or chlorides, among others. In building repair, it allows for the no-destructive control and monitoring of the effectiveness of the repair.

### **TECHNICAL ADVANTAGES AND BUSINESS BENEFITS**

The advantages of the multisensor under patent are as follows:

- It allows for continuous monitoring through non-destructive techniques
- It does not require the use of guard rings to obtain the information
- Data gathering is fast, precise and in real time
- The sensors used are characterized by their low cost, as they can be mass produced, deriving in higher levels of reproducibility in the construction of these devices.
- The sensor is connected to the structure, and therefore participates in the same corrosion reactions as the frames located nearby. This fact allows for the reliable detection of the existence of localized corrosion currents between the different areas of the structure.
- It allows the precise measurement of the speed of corrosion (as the surface of the sensor is known) as opposed to the other methods used, which give an approximate estimate of the rate of corrosion.
- Besides corrosion intensity, the Rp value, and the local electrical resistance value of the system, it can obtain kinetic parameters related to the anode and cathode process and open the application of this method to other areas of corrosion (underground conduits, recesses of water, liquids, gas, oil pipes, etc.)
- The device and the technique proposed here allow for cost reduction both in the diagnosis time to evaluate the structure concerned and needed to do so.

### **STATE OF DEVELOPMENT OF THE TECHNOLOGY**

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A laboratory test model has been designed on which researchers have been able to test the correct functioning of the proposed solution and a made-to-measure prototype is being constructed.

**INDUSTRIAL PROPERTY RIGHTS**

On 6<sup>th</sup> May, 2015, the Universitat Politècnica de València requested protection via patent to the Spanish Office for Patents and Brands, with the reference number P201530614. An extension via PCT is planned.

**COLLABORATION NEEDED**

Licensing agreement for usage, manufacture or commercialization

**RELATED IMAGES**



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