

Delta-Sensor

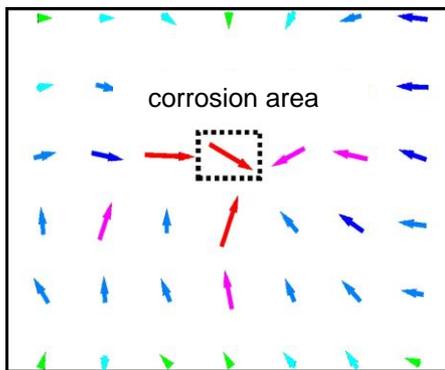
Corrosion compass for reinforced concrete and pipeline diagnostics

Invention

Corrosion of steel in concrete or steel pipelines embedded in the ground is a global problem, leading to billions of dollar of consequential losses. A reliable diagnosis of the condition is the basis for an effective life cycle management. The novel technology allows a detection of critical areas where steel corrosion processes take place resulting in a charge transfer in a surrounding electrolyte. Concrete reinforcement corrosion leads to an electrochemical potential distribution at the concrete surface.



Conventional Potential mapping allows a location of areas with a high risk of corrosion. Typically, a half cell potential is measured with a high resistive voltmeter between an external reference electrode and the reinforcement. However, this method requires the local destruction of the concrete cover to establish a galvanic contact between steel bars and the measurement device. The novel Delta-Sensor overcomes these disadvantages by measuring without a reinforcement connection through a direct measurement of the surface potentials between three CuSO₄ half cells. The results can be plotted in a corrosion map, showing precisely the position of critical areas in the concrete structure. Typically coatings protect steel pipelines embedded in soil against corrosion. The effectiveness of the protection can be monitored by impressing a current pulse into the steel pipes and measuring the potential pulse on top of the ground. The Delta-Sensor allows a fast detection of critical areas with imperfections directly on site without exposing the pipelines.



Prototype of Concrete Corrosion Analyzer and corrosion map

Commercial Opportunities

The Delta-Sensor allows a non-destructive localization of critical areas in reinforced concrete structures. The method is also suitable for older buildings and other structures without electrically connected reinforcement bars as well as for analyzing the corrosion protection of embedded pipelines. The avoidance of dust and dirt, a fast and convenient analysis of the condition and less down time for the user of the building and pipeline offers significant advantages over the established methods.

Current Status

Patent applications have been filed in Europe, USA and Canada. The US Patent is granted. A prototype of the Delta-Sensor Concrete Corrosion Analyzer is available and has successfully been tested. We are seeking a partner for further development and the view to license this technology.

An invention of RWTH Aachen University.

Competitive Advantages

- Nondestructive analysis of reinforced concrete structures
- Reliable detection of corrosion
- Time and cost savings for users
- Fast and precise diagnosis of embedded pipelines

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