Southwest Research Institute®

KEYWORDS

Low-Power Wireless Corrosion Sensing

Integrated Corrosion Evaluation System

Pipeline Corrosion Monitoring

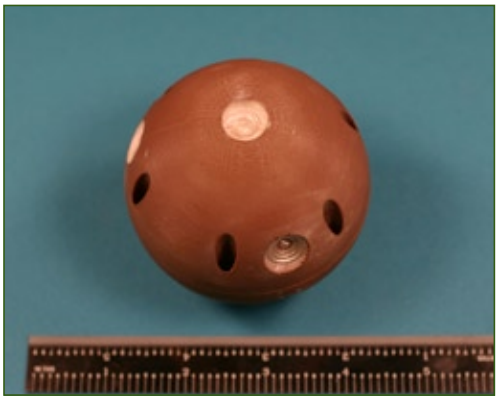
Infrastructure Corrosion Monitoring

Corrosion Monitoring Sensor Technology

Southwest Research Institute® (SwRI®) is an internationally recognized center for material development, characterization and monitoring. Monitoring corrosive environments and material loss in real time is critical for reduction in overall maintenance costs associated with routine inspections. For the past five years, SwRI has been working to develop corrosion sensors for commercial and military applications to facilitate the design and implementation of prognostic health monitoring tools.

Wireless Fluidized Sensor Technology

Although the internal corrosion direct assessment (ICDA) approach provides valuable information for pipeline integrity management, there is no current method to validate model predictions. SwRI engineers have developed and tested a robust and inexpensive fluidized sensor designed to flow with the gas stream and can be used in non-piggable lines. The low-power electronics allow the detection of water and its potential corrosivity toward steel as the sensor travels through the pipe. Position detection and data transmission are accomplished with a low-power Wi-Fi radio chip. Originally developed for natural gas transmission pipelines, the concept is also applicable for natural gas distribution systems and liquid pipelines.

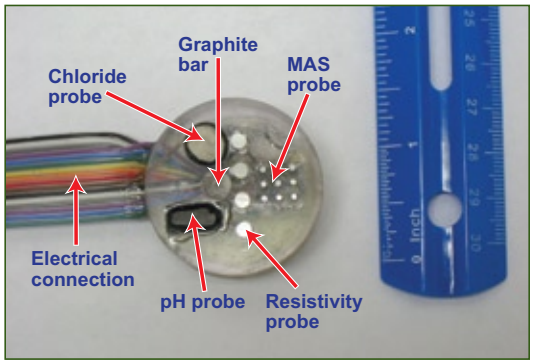


D0 17408

Wireless fluidized sensor

Concrete Corrosion Monitoring Technology

SwRI engineers have developed an integrated concrete transducer prototype for monitoring the probability of corrosion in concrete structures. The transducer is capable of measuring chloride ion concentration, pH, localized and uniform corrosion rates, and resistivity. Its miniature size simplifies installation into new or existing structures. The transducer is integrated with a low-power electronics package capable of wireless data transfer using Wi-Fi protocols through a gateway unit with connectivity to a cell phone network.



D0 17410

Prototype transducer for monitoring corrosive conditionsin concrete

Integrated Corrosion Evaluation Technology

Using patented corrosion sensor technology, SwRI engineers have developed the integrated corrosion evaluation (ICE) system for transmitting sensor data through a wireless Wi-Fi or USB cable connection to PC software. The system is capable of broadcasting sensor data to a web portal via a local Wi-Fi network where it can be viewed on a laptop computer. Data associated with time of wetness, corrosivity in immersed and atmospheric environments, fluid conductivity, coating impedance, temperature and relative humidity can be acquired.

D0 17411

ICE system with 3 wetness sensors (W), 2 coating degradation sensors (CDS), 3 corrosivity sensors (C), and a dual probe for temperature/humidity.

Coating Degradation Sensor Technology

SwRI engineers have developed a multi-sensor system for *in-situ*, real-time monitoring of the degradation of protective coatings and incipient substrate metal corrosion on steel bridges and vehicles. The system provides maintenance engineers with automatic warnings of the onset of coating/structure problem conditions prior to visible indications. This facilitates proactive maintenance decisions which result in low-cost repair/rehabilitation actions.

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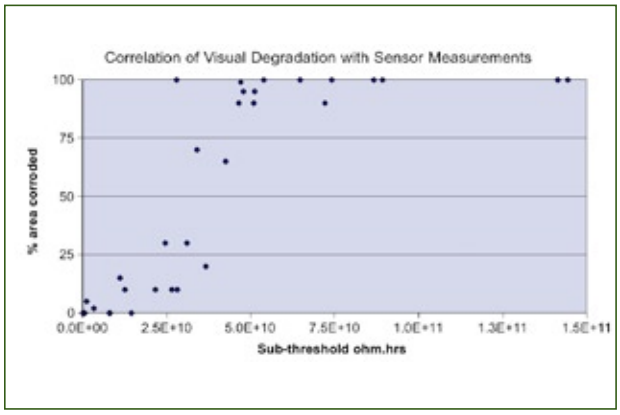
Coating degradation sensor



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Correlation of sensor output with corrosion

Southwest Research Institute is an independent, nonprofit, applied engineering and physical sciences research and development organization using multidisciplinary approaches to problem solving. The Institute occupies 1,200 acres in San Antonio, Texas, and provides more than 2 million square feet of laboratories, test facilities, workshops and offices for more than 3,200 employees who perform contract work for industry and government clients.

We welcome your inquiries.

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