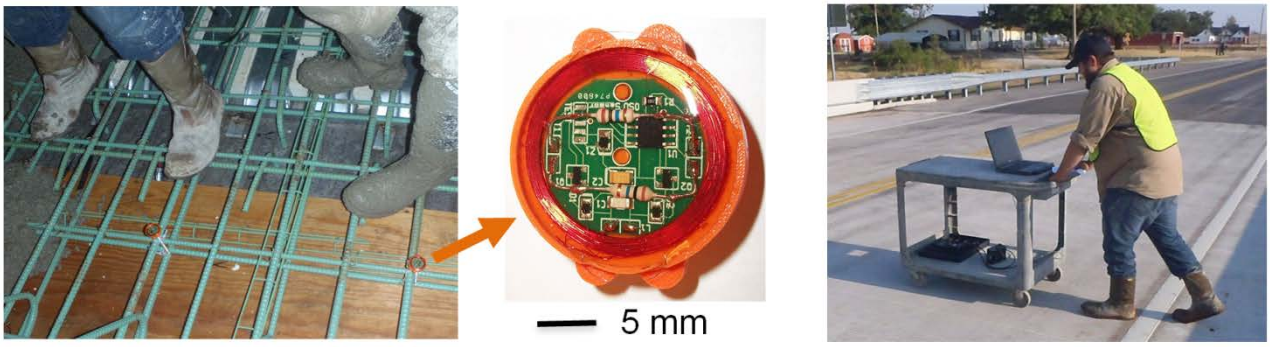
WIRELESS CORROSION SENSOR FOR CONCRETE

These sensors are able to measure the ingress of chlorides into concrete over time without using wires, or batteries. They are about the size of a quarter and are inexpensive ($30 per sensor). The sensors are read with a reader mounted to a cart. In the future the sensors will be able to be measured with a vehicle at highway speeds. These sensors always responds when they are queried and return an ID number that can be used to determine if the egress of corrosive salts have reach a pre-determine distance within the structure.

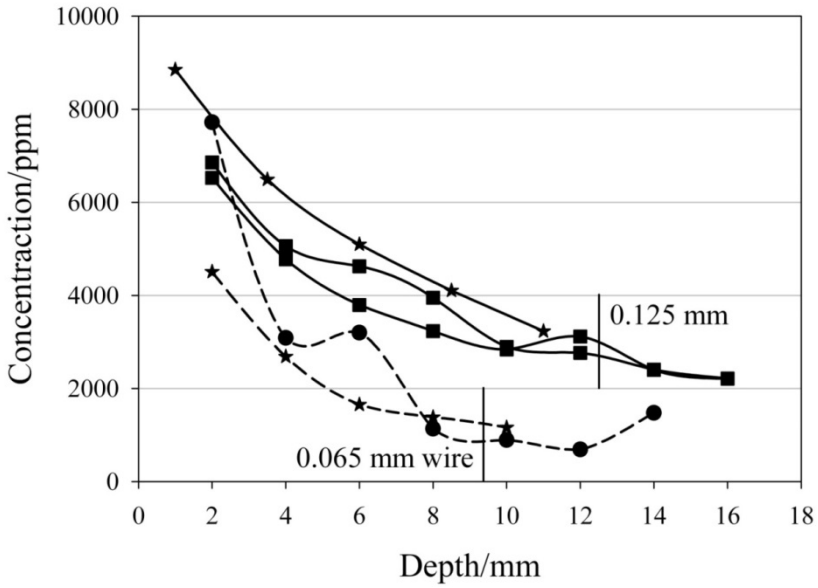


Installation and Measurement of a Sensor on a Bridge Deck in Oklahoma

The sensors are made to be used as an early warning of the ingress of chlorides into concrete. With this warning the owner can change their application rate of chlorides, place sealers on the surface of the concrete, or start budgeting for future repairs. In addition these sensors have the ability to validate service life models of concrete structures and validate the warranty on design/build projects. It has been suggested that intelligent maintenance can save over 46% of the annual maintenance cost due to corrosion. This would save over $1 billion annually in the US.

These sensors have been designed with all DOD grade electronics, epoxies and parts that are supposed to last over 75 years in extreme environments. The sensors have been in place in concrete for over four years and are still performing. The sensors have been used on four different bridges in Oklahoma. Three of these have been on new construction and one on a repair of a bent cap. The sensors have been placed 10 mm from the surface of the concrete in the travel lane and not shown any deterioration or popouts. Furthermore, the sensor has been designed so that the coefficient of thermal expansion is similar to an aggregate and so is compatible with concrete.

The sensors work by using a passive wire in the concrete that will corrode when exposed to the chlorides. These wires have been shown to trigger at known and repeatable values depending on the size of the wire. The depths embedded 0.125 mm and wires 0.065 mm are shown by the solid vertical lines. The solid lines are the chloride diffusion profile for concrete samples with the embedded 0.125 mm wires while the dashed lines are the profile for concrete embedded with 0.065 mm wires.



Please contact Tyler Ley at Oklahoma State University for prototypes of the sensors.

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Sensor cost - $30
Reader cost - $1000
Only one reader is needed for a large number of sensors.

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