

# CORROSION SENSORS

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A corrosion sensor can be generally defined as a device that shows a response that can be recorded upon corrosion of an object. Corrosion sensors can be either embedded in the object to be monitored or placed in the environment to be monitored. Ease of handling and corrosion monitoring of inaccessible objects provided by the corrosion sensors is an important advantage of a corrosion sensor. Moreover, low cost, rapidness, reproducibility and sensitivity are some other important disadvantages of corrosion sensors. Considering these, scientists moved towards the production of corrosion sensors, which can be used as systematic corrosion monitoring tools. Corrosion sensors are now used in many instances, where corrosion is a serious concern for the quality or the strength of objects, such as aircrafts, oil refineries, bridges and some buildings made up of concrete.

Use of traditional corrosion sensors are still applied, even though there are modern sensing techniques. The simplest traditional corrosion monitoring technique is the use of sacrificial anodes placed at different depths. This is commonly used for corrosion monitoring of reinforced concrete structures, where anodes are externally connected to a suitable cathode and the currents generated are monitored. Ion meters or ion sensitive electrodes placed in the surrounding area of a metallic object is another type of simple and conventional corrosion monitoring technique. Oxygen transport technique which involves the determination of the rate of oxygen transfer on the object is another important sensing technique. Humidity sensors are a different type of traditional sensor which measures the humidity of an environment in which a metal is corroded. In most cases, these traditional corrosion sensors are used to detect corrosion of metal bars in concrete structures (Broomfield, 2002).



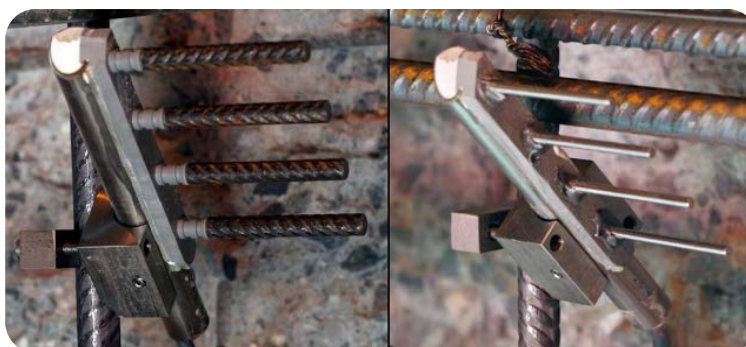
Corrosion sensor embedded in a concrete structure



Chip type corrosion sensor

With the need of advanced corrosion sensors, more sophisticated methods have been developed which result in modern corrosion sensors. In every year, a number of corrosion sensors are introduced into the market by researchers. These include novel magnetic corrosion sensing methods and fiber optics based sensing methods, which are more efficient than conventional corrosion sensors (Gupta and Verma, 2009). Superconducting Quantum Interface Devices (SQUIDs), hall sensors and magneto-resistive sensors are examples of magnetic corrosion sensing devices.

Most modern corrosion sensing techniques are occupied to monitor corrosion of aircrafts, marine transportation, oil refineries and mineral oil power plants. As the above mentioned objects are exposed to highly corrosive environments, monitoring of corrosion is a major concern. Corrosion resulted on the wings



Corrosion sensor placed on a bridge.

and the body of aircrafts is more rapid as the aircrafts are subjected to more corrosive medium in the atmosphere (Wilson *et al.*, 2008). Loss of strength of the body of aircrafts results in aging. Therefore, aircrafts may have to be kept out of service even before their expected life time is reached, if corrosion has taken place. Further, many sulphur and chlorine containing compounds are generated among the combustion products of coal and mineral oils, causing oil refineries to undergo severe damages due to corrosion. The damage could be severe that the breakdown of the structure of oil wells is possible. Wireless corrosion sensors have also been developed to monitor corrosion in such situations, especially at places which are not easily accessible.

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#### **References:**

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