Corrosion considerations for underwater vibration monitoring

by Renard Klubnik

Underwater monitoring solutions

Many customers install Wilcoxon sensors on submerged equipment such as pumps and platform support structures. In these applications, in addition to the normal vibration requirements, consideration must be given to the very real problem of galvanic corrosion. Galvanic corrosion can occur any time two dissimilar metals are brought into contact and immersed in an electrolyte solution such as seawater.

Wilcoxon's model 746 sensor is the best option for monitoring vibration in submerged applications in either seawater or fresh water. The 746 uses a titanium case and polyurethane integral cable for submersion to pressures up to 650 psi (45 bar).

Protecting against corrosion

Titanium-cased units are less likely to pit and corrode in most circumstances, due to titanium's ability to easily polarize in seawater. However, the structure being monitored may still experience galvanic corrosion. It is important to note that galvanic corrosion is a complex process, and the installation engineer should fully understand the metallurgy of and coating on the structure, the type of mounting technique used for the sensor (stud, adhesive, mounting pad), as well as the chemical makeup of the seawater.

Methods

The addition of a metallic coating is one commonly used method to protect the structure from corrosion. Oftentimes, zinc coatings are employed as a means of protecting steel in a marine environment. Because zinc more easily gives up electrons when compared against other metals in a seawater solution, it will corrode first, thereby protecting the base metal.

A second method of mitigating corrosion is to electrically isolate the sensor housing and the surrounding area from the electrolyte solution. This can be accomplished by applying a coating of epoxy or synthetic paint over the sensor and surrounding area after installation of the sensor, but before submersion. A synthetic paint suitable for this method would be one made out of a fluoropolymer elastomer such as Viton®.

A third solution is to electrically isolate the sensor from the mounting structure. In this case, plastic or ceramic washers between the sensor and the mounting location can be used, but their effect on the frequency response of the sensor should be considered.

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