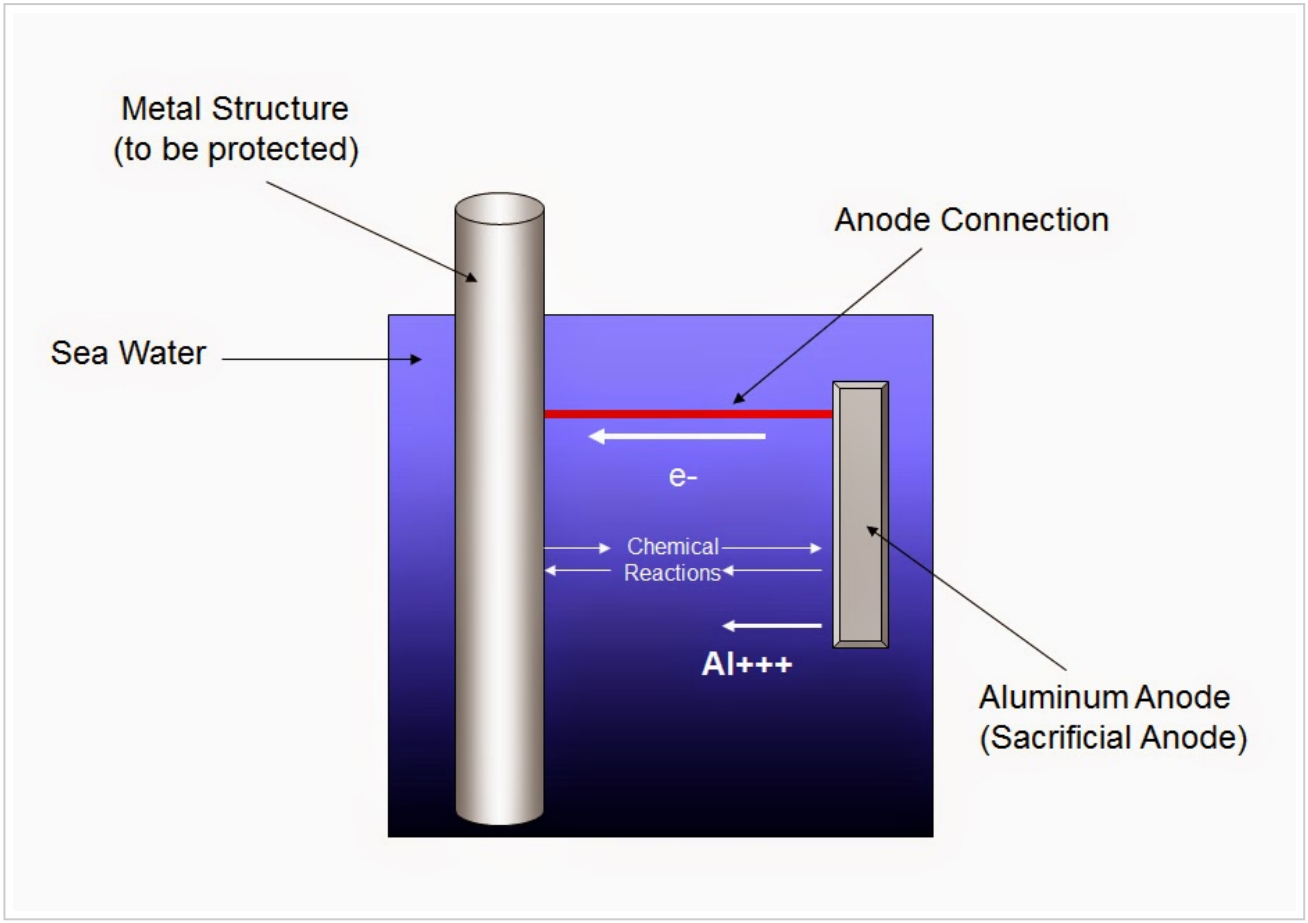
Tuesday, May 20, 2014

Cathodic Protection Using Active Corrosion Control

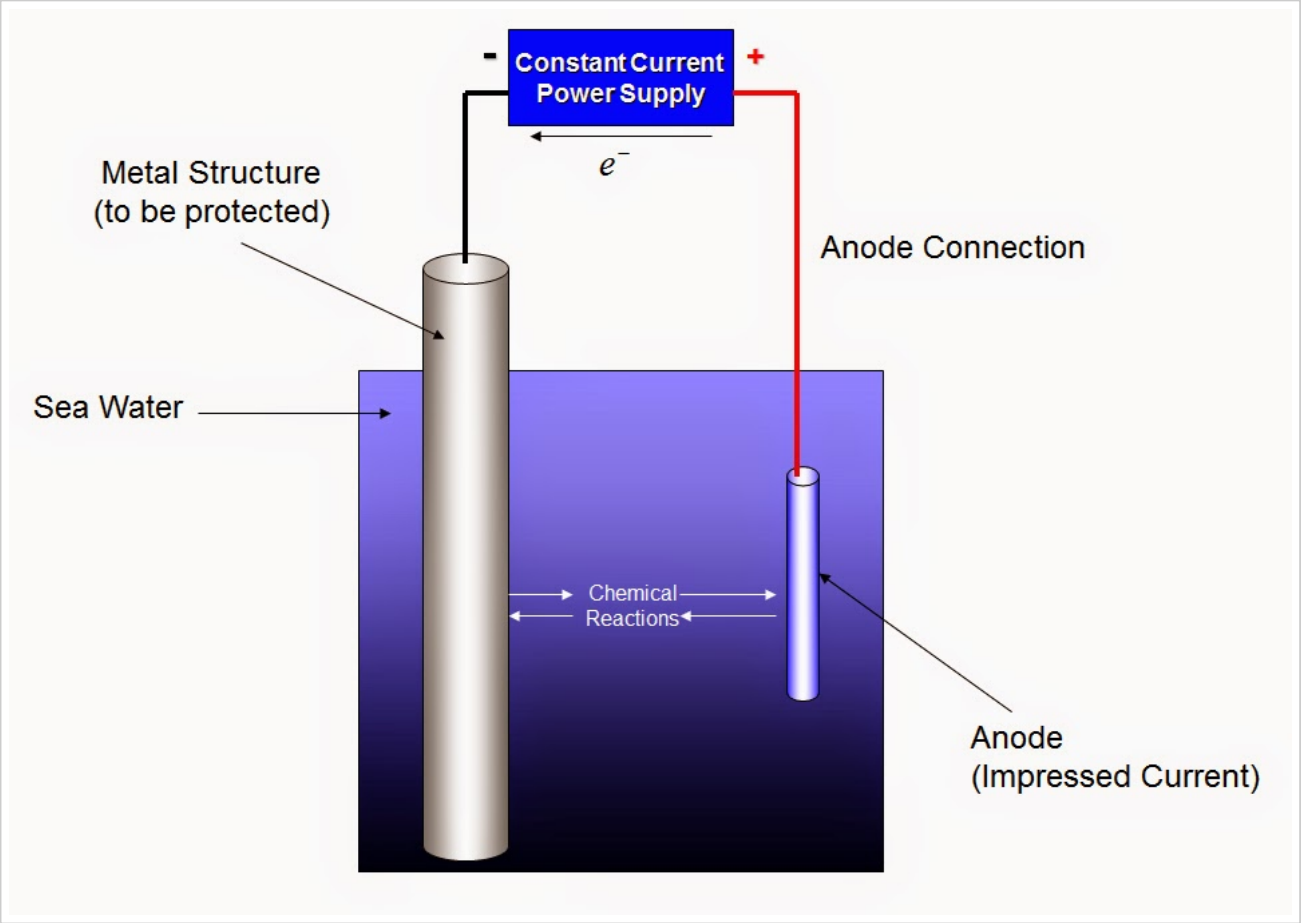
To avoid corrosion in large metallic structures, passive cathodic protection is widely employed. Such structures include steel used as reinforcement in concrete buildings, bridges, piers, pipelines, offshore platforms and ships.

Basically the steel in the structure is made the “cathode” and a more easily corrodible “sacrificial” metal is connected to it, acting as the “anode”. The chemical reaction between the two metals generates an electrical current. The sacrificial metal then corrodes, protecting the original structure. Eventually that metal part has to be replaced, like the rod in most domestic water heaters.

Below is an example of a passive system.



For both environmental and operating cost reasons, the traditional passive protection is being replaced by active corrosion control. In the ‘active’ method, a sophisticated electronic current control system is used to inject a reverse current to that generated from corrosion to protect the structure. Since current flow is closely related to the flow of charge over time (I = dQ/dt), having constant current control allows the user to accurately control the process. This is also known as impressed current cathodic protection (ICCP)



Active corrosion control was initially discovered in the early 1800s, but was unsuccessful due to the lack of suitable materials and current source.

In larger systems like pipelines, the passive anodes cannot deliver enough current to provide protection, and sophisticated monitoring and control is often needed.

The initial cost of an active system is higher, but in the long term, the environmental & maintenance benefits outweigh this.

TDK-Lambda's new Z+ series of 200 to 800W programmable power supplies offer a wide range of models and options suitable for active corrosion systems. The series can operate in constant current mode with currents ranging from 2A to 72A. In addition, the units can be remotely programmed and monitored using a variety of isolated analog and digital interfaces, including RS232/485, IEEE488 and LAN. Up to six units can be paralleled to supply additional current.