Corrosion Monitoring for Cooling Water Applications

Until recently, measuring corrosion rates in industrial cooling water systems has relied on the use of weight loss coupons that reported average corrosion rates. This approach could not indicate periods of high, intermittent corrosion rates. The introduction of SmartCET can solve this problem.

Where can the application be found:

Cooling Water Systems can be found in:

- Refineries,
- Power Plants,
- Pulp and Paper Mills.

Each of these facilities has one or more cooling water systems that can benefit from online real time corrosion monitoring.

Who is interested by this solution?

- Plant Manager
- Corrosion Engineer
- Maintenance Manager
- Utilities Manager

Equipment provided:

- SmartCET Corrosion Transmitter
- HART Interface Monitor.
- Galvanic isolator.

Process description:

The function of the cooling system is to remove heat from processes or equipment via a heat exchanger using water as the cooling fluid.

Efficient removal of heat is an economic consideration in the design and operation of the cooling system. Corrosion control is also an important consideration. Every open recirculating cooling system will include some form of corrosion monitoring.

The most common method for measuring corrosion is the weight loss coupon. This is a reliable way to monitor average corrosion rate, but cannot be used for online real time corrosion measurement. Typically these weight loss coupons give an average corrosion rate over a fixed period, but cannot indicate any abnormal increases.

Results from this approach can take weeks before they are reported. Therefore any action needed to be taken to control corrosion is usually too late.

Key Business Issues:

- Are you looking for better corrosion control of your cooling tower?
- Do you want to optimize your chemical program?
- Do corrosion problems increase in critical exchangers in “HOT” weather?
- Are you interested in saving money and improving asset reliability?

You need to know when this is happening NOW! Not 3 months from now,
Problem:

In cooling systems corrosion causes two basic problems. The first and most obvious is the failure of equipment with the resultant cost of replacement and plant downtime.

The second is reduced plant efficiency due to loss of heat transfer resulting from the deposition of corrosion products. These two problems together can cause millions of dollars of lost revenue.

This can also be used in critical heat exchangers that are subject to increased corrosion during the summer months when cooling systems are usually severely stressed.

Honeywell has introduced the SmartCET Corrosion Transmitter. The SmartCET multivariable transmitter measures BOTH general corrosion and localized, pitting corrosion. The output can be connected to a DCS, PKS, SCADA, HC 900 and Honeywell's paperless recorders via a 4-20mA signal and compatible HART protocol. The transmitter utilizes state-of-the-art algorithms and data analysis techniques to accurately measure corrosion rate and pitting.

Sketch showing typical locations of SmartCET Corrosion Transmitters

### CET5000 Supplemental

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
<th>List Price</th>
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<tbody>
<tr>
<td>Galvanic Isolator – 1 Channel</td>
<td>50022364-001</td>
<td>**</td>
</tr>
<tr>
<td>Galvanic Isolator – 2 Channel</td>
<td>50022364-002</td>
<td>**</td>
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<tr>
<td>Remote Probe Cable – 6 Ft</td>
<td>50022365-001</td>
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<tr>
<td>Remote Probe Cable – 12 Ft</td>
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<td>Hart USB Modem</td>
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<tr>
<td>Hart Interface Module – no relays</td>
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</tr>
<tr>
<td>Hart Interface Module – two relays</td>
<td>50022367-002</td>
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** Consult Honeywell Order Entry Systems for current parts pricing.
Description of the solution:

- Honeywell CET5000M multi-variable corrosion transmitter which can be either direct or remote mounted. A connecting cable is included, that needs to be specifies either as 6' or 12' (50022365-001 or -002, respectively).
- For cooling water applications the transmitter has a standard epoxy probe - Honeywell model number is CEP5000L-LP3-2-7EH-0-3-11-000-HW-XXX. This is an 11" probe. This probe is adjustable length.
- The standard configuration will have carbon steel electrodes, CS 1018 - Honeywell model number is CEP5000E-EL525-3772800800-XXXX.
- A Galvanic Isolator is required to eliminate unwanted current. The recommended product is a 1-channel galvanic isolator 50022364-001.
- For the galvanic isolator and HIM, a 24v power supply is also required.
- The wall bracket and safety bracket for CET5000M are included.
- If the output from the CET5000M is to be sent to a system that can only accept 4-20mA input a HART Interface Module (50022367-001) is required. All software required to configure the HIM is included.
- The SmartCET transmitter can be connected directly to a HART enabled DCS system or directly to Honeywell Experion PKS.

If required the output can be connected to a standard SCADA system, Honeywell’s paperless recorders, Mini-trend QX and Multi-trend SX, as well as the HC 900.

Configuration

Corrosion reading: update time 7.2 min (fixed)
The adjustments and scaling can be done using a hand held HART® calibrator. The tables below contain scaling information.

### General Corrosion

| Maximum Range | 250 mils/yr (6.35mm/yr) with electrode area approx 1cm². Consult factory for applications in higher corrosion environments. |

### Localized Corrosion (Pitting Factor)

| Default Range | 0.001 – 1.0 |
| Low Pitting | 0.001 – 0.01 |
| Average Pitting | 0.01 – 0.1 |
| High Pitting | 0.1 – 1.0 |

### B-Value

| Expected Range | 0.005 to 0.06 volts |

### Corrosion Mechanism Indicator

| Expected Range | -2 to +2 µA/cm². |

Values are dependent on material and environment.
For More Information
Learn more about how Honeywell's Corrosion products
can improve your plant performance, visit our website
www.honeywell.com/ps or contact
your Honeywell account manager.

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