

Effective, Real-Time Monitoring of Corrosion in Amine Units



Identifying and managing corrosion issues in amine units is a critical task facing refineries, chemical and gas processing facilities around the globe. Damage resulting from corrosion can be a complex problem that is difficult, if not impossible to solve using only traditional corrosion monitoring techniques.

Problem

Exploration and production of deeper, lower quality oil and gas reserves has challenged refiners and gas processors to handle feed stocks with significantly higher sulfur content. Increased levels or changing ratios of H₂S and CO₂ in the gas entering an amine unit can have a significant impact on the corrosion rates and overall unit performance. Common methods of combating this situation include changing regeneration rates or temperatures, changes in the amine solution/solvent type and changes in piping or vessel metallurgy. Integrity and reliability personnel are often tasked with predicting or evaluating the effect of proposed or implemented process changes on corrosion rate while also ensuring that the overall performance of the unit is not compromised. This task is becoming increasingly difficult to manage using traditional monitoring or inspection approaches due to the time and effort required to obtain meaningful, available and useful data.

- Has unexpected internal corrosion damage in your amine unit resulted in an unplanned shutdown, leak or lost production?
- Do you wonder how the quality of the amine solution impacts your corrosion rates and mechanism?
- Would you like to optimize your amine regeneration conditions, but are worried about causing a corrosion problem in the process?
- Do you know which process conditions influence corrosion behavior and how?
- Do you currently experience or anticipate frequent shifts in your H₂S/CO₂ ratios and need to know how those shifts impact corrosion rate and mechanism?
- Are you considering a material change to combat a corrosion issue in the amine unit?

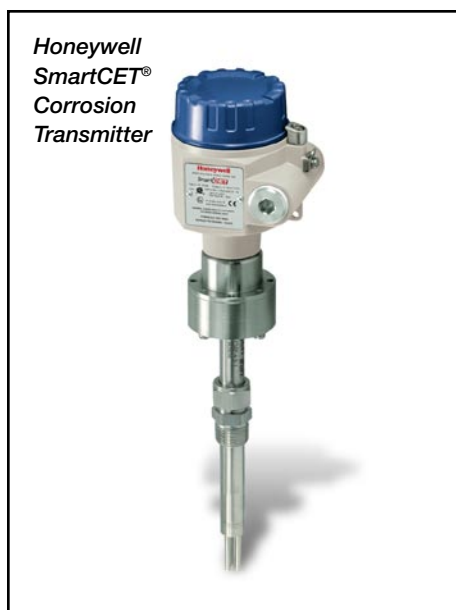


These are just a selection of the corrosion issues facing amine plant operators today.

In addition to eating away at vessels and piping, corrosion in an amine unit can also result in costly problems that extend beyond the physical integrity of the equipment. Excess solids formed as part of the corrosion process can result in plugging of filters, foaming, loss of amine solution, increased antifoam usage, and off-spec gas. All of these issues can have a significant impact on the operating cost and overall profitability of the unit. Without better tools to monitor and ultimately control the source of these problems on a real-time basis, Process, integrity and reliability personnel are often forced to make operating decisions without any reliable, real-time supporting corrosion data.

Honeywell Solution

Honeywell's recent release of the SmartCET® line of corrosion transmitters helps fill the corrosion data gap by providing operations and engineering groups with a tool to collect virtually instantaneous corrosion information within their plant. This information can be used to actively manage corrosion issues proactively instead of the reactionary approach that is used with older monitoring and inspection methods. SmartCET technology utilizes a combination of three, industry established evaluation techniques to provide accurate and easy to understand data on corrosion rate, and type. This approach provides the most complete analysis of corrosion available in an electronic monitoring product and gives remarkably improved insight into when and why corrosion is occurring.



One of the unique advantages that SmartCET offers is its ability to easily and seamlessly integrate into the process monitoring infrastructure within the amine unit. The transmitter will run on standard instrument (24 VDC) loop power and the measurement outputs are communicated directly into any DCS, SCADA or PLC system via HART and/or 4-20 mA communication protocol. Real-time performance can be evaluated in minutes and hours, rather than days or months. Instead of one data point from a corrosion coupon providing a historical average corrosion rate, SmartCET can provide over 200 data points each day providing the kind of resolution required to see how corrosion rates and mechanisms change with process conditions.

With all corrosion monitoring techniques, location and design of each monitoring point will determine the accuracy of any data collected. As internal corrosion experts, we understand the importance of these influences and work closely with our customers to ensure that location and

More Information

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design are appropriate for the intended application. Honeywell also has the expertise to design custom probes that can be applied in challenging locations (such as amine unit overheads), and can assist in the engineering and installation teams to ensure a smooth implementation of the monitoring system. Once implemented, Honeywell's support (for the purpose of data evaluation, validation, and integration with the site control or SCADA system), help users realize the maximum value and benefit from online, real-time corrosion monitoring.

As a compliment to our best-in-class monitoring technology, Honeywell can also provide a suite of predictive and consulting services to help troubleshoot any corrosion issues or streamline inspections within an amine unit. Utilizing our amine corrosion modeling tool for assessment of corrosion rates in MEA, DEA, DGA and MDEA, we can evaluate operational scenarios, identify problem areas in operating units, prioritize inspections and identify materials for new design or revamp. Our corrosion experts are available to provide consulting services to select monitoring locations, review monitoring data or develop and perform customized laboratory tests aimed at solving specific problems.

Key Features

- Output variables are: Corrosion Rate, Pitting Factor, Stern-Geary constant, Corrosion Mechanism Indicator (CMI).
- Updates corrosion information every seven minutes.
- Selection of probe designs to allow application in many different environments.
- Ability to integrate with Honeywell XYR Wireless to save on wiring costs.
- Complete technical support for integration, data analysis, and troubleshooting.
- One-stop corrosion shop with prediction, monitoring, and consulting services.

Benefits

In today's market where losing 50 MMSCF of natural gas production can cost upwards of \$400,000 per day of downtime, it is critical for these units to be online as much as possible. A rigorous corrosion monitoring and inspection program that includes predictive analysis and real-time monitoring can significantly contribute to maximizing uptime by minimizing failures and reducing inspection frequencies.

On top of losses that result from plant shut-downs, the corrosion damage itself represents a significant expense that an amine unit can incur. Failure patches, replacing absorber trays, installing or replacing liners in reboilers and replacing piping can cost millions of dollars in repair costs. Improved management of corrosion within the amine unit enabled by SmartCET technology is capable of extending the expected service life of the unit by several years.

Significant savings can also be realized through optimizing utility consumption within the unit. Online corrosion monitoring can quickly help define the optimal lean acid gas loading windows which can prevent wasting steam by regenerating an amine solution further than required. An average sized (100 MMSCF) amine plant can spend up to \$48,000 per day to generate the steam required to run the process. A two percent reduction in the steam consumption enabled by online corrosion monitoring would result in a \$350,000 per year savings.

In addition to directly impacting costs and profitability in the plant, predictive assessment and online corrosion monitoring can play a vital role in Management of Change processes within the facility. Changes in process conditions, gas conditions or chemical products can significantly impact corrosion rates within a facility. Utilizing SmartCET corrosion monitoring tools or our consulting services, plant management has the flexibility to quickly see and quantify the effects of any changes on corrosion and make more informed decisions based on the information.

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