Honeywell offers technology, services and software to provide a comprehensive solution to help manufacturers detect and solve corrosion problems that can hinder their abilities to operate at optimal levels.

**Benefits**

Honeywell’s field-proven corrosion solution offers measurable improvements and benefits:

- Increased plant uptime due to improved reliability of assets
- Reduction in maintenance costs by moving from scheduled to reliability-centered maintenance
- Maximized production throughput while protecting plant assets
- Improved safety by minimizing the effects of process upsets and excursions
- Significant reduction in inhibitor costs

**Corrosion as a Process Variable**

Through integration with Honeywell’s Experion® Process Knowledge System (PKS) or any DCS, operators can transform corrosion monitoring data into high-value process knowledge. Operators can correlate corrosion data with process data to gain an awareness of plant conditions, make critical business decisions quickly and take proactive actions to optimize short-term and long-term plant performance.

The use of advanced applications like Honeywell’s asset, control, operations and simulation applications with real-time corrosion data is a further source of high-value process knowledge to help process engineers make the right decision at the right time.

**Honeywell’s Corrosion Solutions**

Detecting corrosion is just the first step toward solving a plant’s corrosion problems. Honeywell offers an integrated approach to corrosion problem solving with a solution that includes products, services and software.

**Systems**

Honeywell’s SmartCET® corrosion transmitter embeds proprietary corrosion measuring technology to provide a convenient and efficient method to bring corrosion data online to the process control system. SmartCET provides four corrosion measurements from a single device, enabling a more complete understanding of the physical corrosion process that is occurring.

**Services**

Honeywell’s corrosion experts can complement in-house resources and are fully capable of solving tough plant corrosion problems. Our corrosion expertise ranges from lab services for metallurgical failure analysis to inhibitor screening to materials consultation with an emphasis on specific plant operating conditions to analysis of a plant’s real-time corrosion conditions.

**Software**

Honeywell software products reflect over 20 years of corrosion expertise derived from our laboratory research benchmarked with actual field data and experience. Engineers have found tremendous value in our software products that aid in materials selection, corrosion rate prediction within pipelines and process equipment, and analysis of plant asset integrity and risk.

**Real-time, Online Corrosion Measurement**

The patented SmartCET transmitter forms the foundation of Honeywell’s corrosion solution, uniquely providing online, real-time corrosion information. SmartCET gives plant operators access to current, actionable process variable information including a time-trended general (uniform) corrosion rate. It uniquely provides an indication of corrosion modality (localized or pitting) detection. This information is critical as localized corrosion accounts for approximately 70 to 90 percent of all corrosion-related equipment failures.
SmartCET delivers online corrosion diagnostic data and improved accuracy of corrosion rate data previously unavailable to the process control system. Embedded within SmartCET is Honeywell’s proprietary implementation of the standard LPR technology. Linear Polarization Resistance (LPR) is a proven method for measurement of corrosion trends. Honeywell scientists discovered a better, more accurate method to measure corrosion effects and developed a superior method to calculate corrosion. Honeywell’s technology couples LPR with two other technologies for quicker and more accurate corrosion rate measurement and assessment of localized corrosion propensity. The result is that SmartCET is fully capable of accurately monitoring localized corrosion.

SmartCET measures corrosion through a sensor or probe that is exposed to the process environment. Our experts can help in the proper selection of the probe to suit the specific process environment, which is essential to ensure accurate corrosion detection. The unique design of SmartCET enables it to connect to a range of different off-the-shelf and custom probe designs, each configured to provide the most accurate and reliable measurement of corrosion activity.

SmartCET allows corrosion monitoring to be available to virtually all plant equipment, regardless of material or operating conditions. Examples include aqueous environments, oil-water or multiphase mixtures, vapor phase and high temperature applications. Honeywell corrosion specialists can review existing corrosion monitoring system and provide input for optimizing and updating the system for online, real-time monitoring.

SmartCET communicates via the industrial standard HART protocol and can easily connect to existing control systems. As an input to the process control system, corrosion data can be trended, historized, alarmed and assigned to process groups. Corrosion data can seamlessly correlate with other process variables allowing the corrosion specialist and plant operator or engineer to work together with a broader view of plant operating conditions and methods of mitigation.

The original SmartCET is a 4-20 mA HART-compatible transmitter, featuring an industry best update rate of seven minutes approximately. Improving on the performance of the industry-leading design, Honeywell introduced the OneWireless™ SmartCET corrosion transmitter. This transmitter not only features wireless communication over the Honeywell OneWireless network, which can greatly simplify the implementation task and reduce the overall installed cost, but it features a dramatically reduced update rate, an astounding 30 seconds. Improved update rate performance allows users to react to corrosion changes in real time and to correlate exact process changes to the corrosion event. Another benefit of faster update rates is that corrosion variables are able to serve as inputs to a control loop such as automated loop for chemical inhibitor addition.
H2S exposures
Hydrogen embrittlement
Naphthenic acid corrosion
Simulated service tests
Electrochemical testing
Mechanical testing

Honeywell can also design and deliver customized corrosion and metallurgical testing equipment including proof rings, CERT machines, high pressure reference electrodes, autoclaves, flow loops and more. Our research specialists have an excellent track record of designing test equipment to meet specific needs of our customers in all industries.

Engineering Services
With over 30 years of practical work experience in troubleshooting corrosion problems, Honeywell corrosion experts have assisted customers by augmenting their in-house corrosion capabilities and functions. In addition to engineering services we can also develop and implement cost-effective corrosion control procedures that are tailored to the unique needs of your process plant. Services include:

Plant Corrosion Surveys
- Review and analysis of historical corrosion data, failures, maintenance records, asset replacement
- Corrosion monitoring location recommendation
- Probe specification and electrode configuration
- Process-correlated analysis
- Plant diagnosis

Expert Consultation
- Plant material selection
- Inhibitor screening
- Failure investigation and analysis
- Process and corrosion simulation

Corrosion Testing and Modeling
- Corrosion prediction
- Operating condition analysis
- Sensitivity studies
- Process projections
- Simulation of service environments

Software
Honeywell’s comprehensive set of software applications facilitates effective decision-making with efficient and robust solutions to critical problems in corrosion, cracking and materials selection. Additionally, Honeywell offers software solutions for corrosion prediction in pipelines and production systems, and provides comprehensive services supported by the CorrosionAnalyzer™ modeling framework. Our corrosion software applications include:

Predict®-SourWater 2.0: Assessment of corrosion and flow effects. Materials optimization and risk reduction for refinery sour water systems (REAC, strippers, etc.).

Predict-Pipe 3.0: Automated Internal Corrosion Direct Assessment (ICDA) for gas transmission pipeline systems.

Predict 5.0: Assessment and prediction of corrosion rates for steels exposed to corrosive oil and gas production environments.

Predict Amine: Prediction and assessment of corrosion in amine systems for increased throughput and process optimization.

Socrates® 9.0: Provides comprehensive selection of corrosion resistant alloys for oil and gas production environments.

Socrates-B 3.0: Provides comprehensive selection of corrosion resistant alloys for non-production environments (injected water, stimulation acids, completion fluids).

Strategy™ 3.0: Provides assessment of sulfide stress cracking and hydrogen induced cracking in steels, and prioritization of inspection in oil and gas production environments.

Strategy-B 3.0: Provides assessment of sulfide stress cracking and hydrogen induced cracking, and prioritization of inspection in steels in refinery sour water systems.

Risk-IT™: Provides risk and integrity analysis for plant equipment and evaluates common forms of corrosion degradation.

CorrosionAnalyzer: Provides the ability to thermodynamically simulate and kinetically characterize corrosion in most industrial process environments; including interactions of over 2,000 chemical environments and alloy combinations.

Each individual software package provides a unique solution to a corrosion problem. Additionally, many end users and Honeywell corrosion experts have combined the use of these packages, like Predict, Socrates and CorrosionAnalyzer, to perform rigorous and complete corrosion and material characterizations for virtually any corroding system.
Joint Industry Programs

Honeywell’s Joint Industry Programs provide specialized corrosion engineering and research services for the investigation of common industrial corrosion problems. Each Joint Industry Program targets a specific industrial corrosion problem. The sponsoring members of the specific program share equally in the results of the research study. Sponsors have the option to have additional tests conducted on their behalf under similar conditions on a proprietary basis. Sponsored programs include:

- Prediction and assessment of corrosion in amine systems (Phase 2)
- Titanium alloys for high pressure, high temperature (HPHT) wells (data and experience survey)
- Corrosion prediction and assessment in sulfuric alkylation units
- Sulfide stress cracking (SSC) limits for sour service and deepwater offshore applications
- Prediction and assessment of ammonium bisulfide corrosion under refinery sour water service conditions (Phase 3)
- Predicting crude oil corrosivity, effects of velocity, interactions of crude oil composition, temperature and alloying
- Guidelines for coiled tubing in corrosive workover and production environments

The final reports from concluded programs are also available for purchase for customers that were not able to participate as sponsors. In addition to completed phases of the programs listed, some of the reports available from concluded programs are:

- Minimizing refinery crude oil corrosivity
- Assessment of corrosion in lean amine
- Remote monitoring of deep water pipelines

More Information

Learn more about how Honeywell’s Corrosion Solutions can solve your corrosion problems, visit our website www.honeywellprocess.com, or contact hpsmarketing@honeywell.com.

Honeywell Process Solutions

Honeywell
1250 West Sam Houston Parkway South
Houston, TX 77042

Honeywell House, Arlington Business Park,
Bracknell, Berkshire, England RG12 1EB UK

Shanghai City Centre, 100 Junyi Road
Shanghai, China 20051

Experion®, SmartCET®, Predict® and Socrates® are registered trademarks of Honeywell International Inc. OneWireless™, Risk-IT™ and Strategy™ are trademarks of Honeywell International Inc.

CorrosionAnalyzer™ is a trademark of OLI Systems, Inc.

SO-09-06-ENG
March 2009
© 2009 Honeywell International Inc.