

Socrates® 10.0

Product Information Note

Comprehensive Material Selection System for Corrosive Oil and Gas Applications

With over 20 years of industrial use, Socrates® has become the leading material selection tool in the oil and gas industry. This comprehensive material selection tool provides access to the material decision logic of a domain expert, and contains significant Joint Industry Program (JIP) data as well as pooled experience and expertise from a distinguished group of operating companies, equipment manufacturers and corrosion resistant alloy (CRA) material suppliers.

Socrates, part of Honeywell's Predict® corrosion software suite, extends the functionality of prior releases with new data and enhanced capabilities. CRA usage in oil and gas production, transmission, downhole, wellhead, and flow line applications has revolutionized the industry in terms of providing appropriate metallurgical solutions to address challenging applications where carbon steel is not a valid solution. Recognizing the need to help with the complex tasks involved with CRA selection, Socrates aids in making decisions related to the evaluation of different CRA materials in oil and gas production environments based on proprietary JIP data, extensive field experience, and the latest NACE MR0175/ISO15156 regulations.



Socrates' program interface shows a list of acceptable materials based on specified environmental conditions and application requirements

BENEFITS

- Reduce Capital Expenditures
- Optimize metallurgy selection for assets
- Compare costs of potential material choices to help optimize their selection
- Improve safety and reliability
- Identify unsafe operating conditions for selected materials
- Prevent failures during design through systematic material selection
- Reduce operating risk
- Identify conditions where potential failures are possible
- Run what-if scenarios analyses to identify critical components for varying environments
- Simplify and standardize material selection process
- Consider material selection for different phases of asset lifecycle: Production, Acidizing, Completion, and Water Injection
- Consider cracking, pitting and corrosion as part of root cause and failure analysis

Features and Enhancements



Concurrent analyses module facilitates simultaneous analysis of a select list of materials for specific environments and applications

Socrates 10 builds upon the previous versions by adding a rich set of new features, including:

- Updated pH prediction module based on ionic analysis for accurate pH computation
- Adaptive rules module facilitating modification of system rules to accommodate company-specific data and requirements
- Extensive data on the most commonly used CRA materials
- Integrated selection rules for production environments, as well as acidizing, completion fluids and injected water systems
- Advanced alloy analysis, including ability to create groups of user-specific alloys
- Advanced user interface to facilitate concurrent analysis of multiple environments and alloys
- Enhanced safe use limits module for stainless steel
- Find optimum CRA materials for critical, high-corrosivity applications (including high H₂S, high chloride oil and gas production and transmission systems)
- Validate the use of CRAs for existing applications through material and property analysis
- Reveal the potential for CRA equipment failure due to corrosion and cracking mechanisms
- Perform comprehensive risk assessment and reliability evaluations through sensitivity analysis, and material and environmental studies
- Quantify and compare costs of CRA choices to help determine the best material option for new equipment
- Perform steel and inhibitor evaluation alongside CRA assessment to determine the appropriate material choice
- Find materials for non-production applications (acidizing, completion fluids, injected waters) while simultaneously enforcing production application requirements

Simplify Corrosion Resistant Material Selection

With over 160 different corrosion-resistant materials to select from, the task for an engineer to maintain knowledge on currently available CRAs, unify the information from different manufacturers, understand the correct applicability of the corrosion-resistant material, and apply the information to real-life production conditions can be quite overwhelming and time consuming. Socrates helps users select the most appropriate CRA for their specific oil and gas production environment, as well as non-production situations such as acidizing, completion fluids and injected water systems.

Building a Standard Work Process for Corrosion-Resistant Material Selection

Socrates enables a methodology for making consistent, optimized material selection choices based on real engineering corrosion data and rigorous materials engineering guidelines. Its user interface presents the critical process variables to consider, such as gas production rate, water production rate, oil production rate, total pressure, H₂S and CO₂ mole percentages, and total flow rate. Engineers making material selection decisions do not have to remember the critical factors to consider as Socrates' user interface automatically lists those input factors. In addition, they do not have to remember which materials are suitable for the specific physical situation as Socrates can filter out materials that are not suitable for the specified application, such as tubing, liners, wellheads, flow lines and others.

Socrates also enables individual engineers to become more consistent in their approach to corrosion-resistant alloy material selections. Expanding beyond the frame of a single engineer, CRA material selection choices made by all engineers at an engineering site or across an entire company are uniform and consistent when based on the same sound corrosion evaluation and material selection methodology.

With Socrates' ability to support the creation of custom rules for alloy evaluation, engineers can further create a company-specific application capturing corporate proprietary knowledge or insight into material selection decisions.

- Create customized rules for alloy evaluation and compare with standard

system rules for effects and behavior

- Use the welding effect analysis module to facilitate the immediate incorporation of welding effects into corrosion performance evaluation
- Consider rules and data on over 160 corrosion-resistant materials, including information from the latest corrosion literature, Honeywell's proprietary laboratory research data and field experience
- Access utilization limits for stainless steel obtained from Honeywell's comprehensive JIP (over 2,000 data points) on safe use limits
- Use the context-sensitive help for guidance on both system utilization and technical queries
- Exchange data seamlessly with other Honeywell corrosion applications

Honeywell Predict® Corrosion Suite

Honeywell Predict Corrosion Suite provides next generation corrosion management solution for oil and gas and refining industries seeking to move from reacting to corrosion damage to a more proactive and effective approach. Honeywell Predict® Corrosion Suite provides the next generation of corrosion management solutions. Unlike conventional corrosion management methods, we employ unique prediction models that encapsulate deep expertise and extensive process data to correlate corrosion rates to specific process units, damage mechanisms, and operating conditions. Using Honeywell's tools, global major companies have achieved significant operational and business benefits.

The Honeywell Predict Corrosion Suite is a unique solution for today's industrial facilities, driving a paradigm shift in tackling difficult corrosion problems, and enabling efficient and safe operations. These software tools help users move away from a reactive response to corrosion based on qualitative, manual inspections, to a proactive, reliability-centric predictive approach based on quantitative information from soft sensors, sound process deviation management, and "what-if" scenario analysis tools.

Why Honeywell?

Your operation can benefit from partnering with a proven leader in corrosion asset integrity and preventive/predictive corrosion management. Honeywell has extensive intellectual property in the corrosion field, including unique corrosion prediction and material selection models, and patented corrosion monitoring technology. Our deep expertise includes an in-house team of experts with decades of experience in developing corrosion solutions. Honeywell's IP-based models are licensed and used by many global oil & gas majors, and our company has a recognized track record of world-class execution of projects.

Honeywell has also established a unique corrosion knowledge community through our Center of Excellence (COE). We assist customers with expert local and remote support. Our state-of-the-art corrosion and materials research and engineering laboratory provides a host of standard and tailored services. Utilized in Joint Industry Programs and customized testing, this facility can simulate any service environment.

For More Information

Learn more about Honeywell's Corrosion Solutions, visit www.honeywellprocess.com/Corrosion or contact your Honeywell Account Manager.

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