

## Software for Predicting General and Localized Corrosion of Advanced Materials and Fabricated Components is Now Commercially Available

A new software tool for prediction of general and localized corrosion is now available for use by industrial plant engineers and operators. OLI Systems, Inc., Southwest Research Institute, and the Industrial Technologies Program (ITP) have partnered to develop Corrosion Analyzer™ software that can accurately predict corrosion in advanced materials and fabricated components that have been welded or heat treated. The software works as a lab on the computer to predict the effect of specific chemical environments on localized corrosion of process equipment including fabricated components and base alloys.

Many new advanced metallic materials have recently been developed for use in severe corrosion and erosion industrial environments. However, these materials are not yet widely used because it is difficult to evaluate the material's performance in new applications, and because component fabrication may effect material properties. However, this new software incorporating technology funded through the Industrial Technologies Program (ITP) Materials Portfolio project "Prediction of Corrosion of Advanced Materials and Fabricated Components" combines fundamental understanding of mechanisms of corrosion with focused experimental results to predict the corrosion of advanced, base or fabricated, alloys in "real-world" environments encountered in the chemical, petroleum, and other industries.

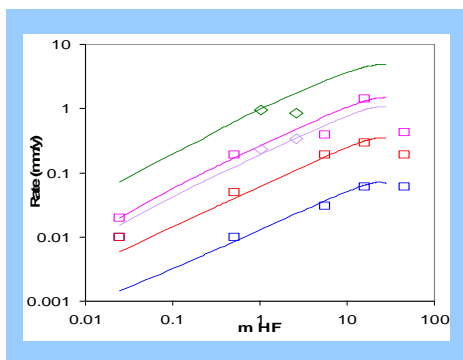
APPLICATIONS	CAPABILITIES
Alloy Screening for lab and plant tests	Automatic inclusion of corrosion and redox chemistry
ID "hot spots" for Sensor locations	
Predict useful remaining service life	Kinetic parameters of corrosion
Process changes and corrections action testing	
Lab and plant screening sensitivity tests	Electrical conductivity and oxidation-reduction potential (ORP)
Model pH, composition and temperature effects	
Failure Diagnostics and avoidance	Real-solution calculations

Corrosion Analyzer™ software reduces the barriers to the use of advanced materials in industry by allowing process designers and operators to evaluate these materials under realistic conditions of fabrication and in-service chemical environments. Users can identify process changes, corrosion inhibition strategies, and other control options before costly shutdowns, energy waste, and environmental releases occur. These innovative corrosion mitigation measures can be tested in a virtual laboratory without risking valuable equipment. The useful remaining life of installed equipment can be predicted based on operating experience and projected operating conditions so that catastrophic failures can be avoided, and well-planned corrosion control and maintenance actions can be proactively scheduled.

### Project Development:

Project team members OLI Systems and Southwest Research Institute developed theoretical models for the corrosion and repassivation potentials that dictate the occurrence of localized corrosion, and developed correlations between local

compositions in the alloy and these parameters. The theoretical models were extended to predict the occurrence of localized corrosion of base materials and heat-treated components in a variety of chemical environments.



Comparison of calculated (lines) and experimental (data points) corrosion rate of alloy 22 as a function of HF concentration at various temperatures

The project will include development of the Extreme Value Statistics Software that is expected to be released this summer. This add-on will enable the prediction of the extent of corrosion damage as a function of time.

#### **Applications:**

This project provides materials engineers, chemical engineers and plant operators with both a design and troubleshooting tool by:

- Prediction of corrosion events and rates
- Selection of an optimum alloy for a given environment.

In existing plants, the software enables users to

- predict the remaining life of equipment, and
- helps in scheduling maintenance activities.

A wide range of alloys of interest to the chemical, petroleum and power generation industries are supported. The product has 25 users across a range of industries.

#### **Energy Savings:**

By enabling the use of advanced materials the project could generate at least \$0.7 to \$1.0 Billion annual cost savings, annual energy savings of 8.8E13 Btu/year, and significantly reduced environmental impact.

For a fact sheet about the ITP project:

[http://www.eere.energy.gov/industry/imf/pdfs/16950\\_pred\\_corrosion.pdf](http://www.eere.energy.gov/industry/imf/pdfs/16950_pred_corrosion.pdf)

For more information about the software:

<http://www.olisystems.com/SoftwareProducts.htm>

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