

APM Integrity Event Forecasting – Wall Loss Prediction

Overview

In the oil and gas industry, many operators still struggle in their attempts to become less reactive to asset integrity-related issues like corrosion. Relying on manual inspection, they have limited visibility into dynamic corrosion rates on piping due to variations in feedstock, process fluctuations, and corrosion inhibitor programs. Today, artificial intelligence-based models and cloud-based computing are enabling operators to more easily make better use of their data to predict and proactively manage corrosion.

Solution

BHGE has developed a wall loss prediction model as part of its predictive corrosion management capabilities, offered as a component of the APM portfolio. This model enables operators to predict an integrity event, such as piping interior wall loss, based on metallurgical properties, operating conditions, feedstock properties, and wall loss measurements. It can also predict wall loss based on anticipated future variations, and thereby support better decisions that can lead to less unplanned downtime, more effective use of maintenance resources, and increased refining margin.

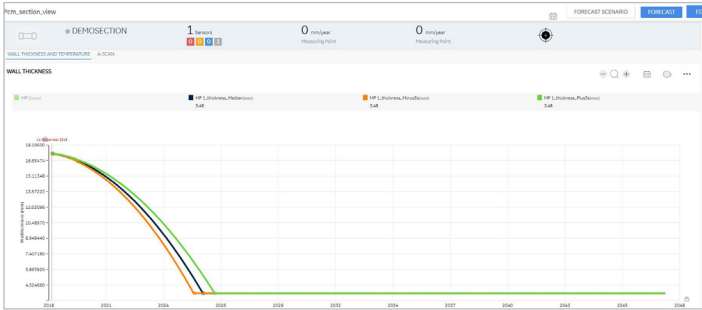
Key Benefits

- Predict piping interior wall loss
- Tailor data streams and analytics to customer-specific environments and systems
- Improve visibility by providing information that is typically costly to obtain
- Improve understanding of the risk associated with diversifying feedstock
- Make better maintenance and operating decisions affecting critical assets
- Improve understanding of how operations impact asset life



Wall Loss Prediction Model

The model uses physics coupled with probabilistic machine learning techniques. It is first calibrated with measured data to validate the usability of the model for predicting wall loss and corrosion rates. Once the model is validated, it can project thickness loss over time and quantify the uncertainty of its forecasts for each thickness measurement point. Additionally, the model supports the generation of “what-if” scenarios driven by anticipated future values for contaminant composition and operating conditions.



Wall Loss Prediction Input Values

Typical data requirements for the model are listed below. BHGE assesses additional inputs during an exploration and discovery workshop with each operator in order to ensure the model addresses the unique conditions of each facility.

Equipment properties

- Metallurgy
- Pressure rating
- Pipe diameter

Maintenance and inspection history

- Historical wall thickness data
 - Manual inspection
 - Permanently installed sensors
- Maintenance history

Process/operating conditions

- Pressure
- Temperature
- Flow rate
- Starts/stops

Contaminants

- Hydrogen sulfide
- Hydrochloric acid
- Carbon dioxide
- Ammonia
- Naphthenic acid
- Other

To learn more about BHGE predictive corrosion management capabilities, visit <https://www.bhge.com/digital/predictive-corrosion-management-pcm>



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