

Detect Valve Erosion and Predict Failure



ALL INDUSTRY VERTICALS

Data Sources

- Process Data Historian: OSIsoft PI
- Maintenance Records: SAP

Data Cleansing

- Use Agile Filter to smooth noisy data
- Remove production downtime periods from analysis data set

Calculations & Conditions

- Formula to calculate first principles parameters: Operating Cv (actual) versus Theoretical Cv (expected) based on Flow Rate, Valve Position, and Pressure Drop across valve; also calculate Delta Cv
- Boundaries and Value Search to find areas where Operating Cv is $> +/- 10\%$ if Theoretical Cv
- Prediction to create a regression model to estimate Delta Cv behavior into future based on past historical failures (training window)

Challenge

In the process manufacturing industries, it's difficult to characterize erosion by just monitoring the univariate process variables around valves. This lack of visibility leads to failure incidents, which are a risk to worker health, plant safety, and the surrounding environment. These incidents can also quickly lead to additional costs due to unplanned maintenance and production downtime.

Solution

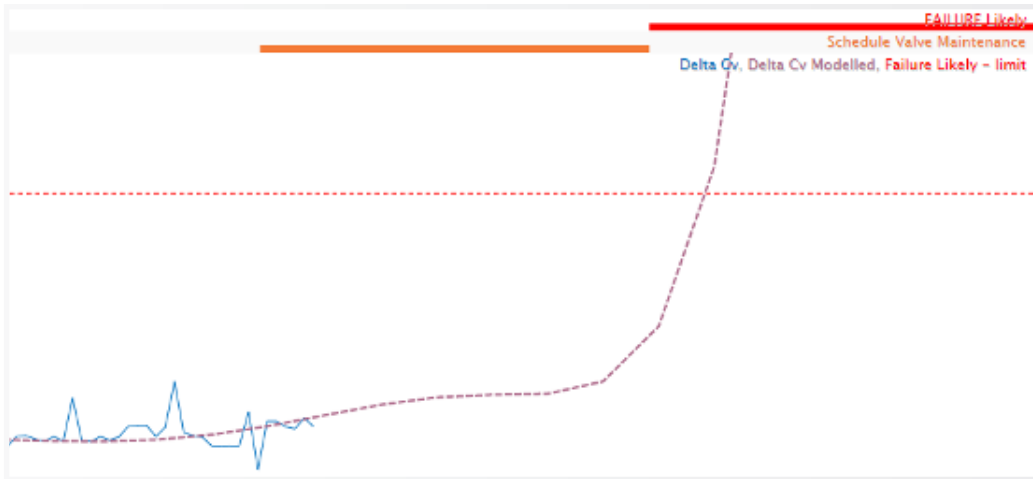
Using Seeq, manufacturers can implement a condition-based monitoring analysis to monitor valve health across their fleet and accurately estimate time-to-failure. Subject matter experts can utilize historical failure data to create a predictive maintenance forecast to preemptively detect valve performance issues before failures occur. Valve health is determined by monitoring its performance with first principles analytics (valve Cv), which leads to identifying bad actors.

Results

The likelihood of unexpected valve failure is significantly reduced, saving costs due to lost production and unplanned maintenance. Implementing this analysis will also decrease health, safety, and environmental risks due to loss of containment if any valve fails.

Reporting & Collaboration

- Prediction monitoring Trend in Organizer Topic
- Tables showing Estimated Failure Date / Recommended Maintenance Date / Time-to-Failure



Shown in the picture: Modelled Delta Cv (purple dashed line) Trend, showing forecast into future exceeding the “Failure Limit” on Mar 31, 2020.

Expected Failure Date	03/31/2020
Initiate Maintenance as of	03/24/2020
Time remaining until Expected Failure	6.0386 d

Shown in the picture: Table showing Estimated Failure date, recommended Maintenance Initiation date (7 days prior to failure), and time-to-failure.

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