Condition-Based Malfunction Forecasts for Cracked Gas Compressors

Deployment of a Prognostic Asset Management Solution at a Chemcial Plant in GCC

Background: In summer 2015, a GCC-based petrochemicals manufacturer configured, validated, and deployed Cassantec's prognostic solution for its petrochemical asset management. The customer is using the solution for a 4-stage cracked gas compressor (CGC) – seen in Figure 1 – powered by a steam turbine, and equipped with the latest condition monitoring and diagnostic capabilities. The prognostic solution utilizes the CGC's condition and process data – including vibration, temperature, pressure, flow, and speed – to generate and periodically update prognostic reports forecasting CGC malfunction risk and remaining useful life (RUL). After successful integration of the solution into its asset management operations, the customer is considering a further roll-out of the solution.

Figure 1: Cracked Gas Compressor (Source: Hydrocarbon Processing)

Objective: The customer is seeking to utilize its abundant condition and process data histories to better exploit equipment RUL, determine future maintenance needs, and to avoid excessive maintenance action and costly redundancies. The customer is starting to use the prognostic reports as additional basis for longer-term maintenance planning, scheduling, and scoping. Through use of the RUL forecasts at an aggregated level, the operator is seeking to better harness unscheduled downtime risk and thereby achieve competitive technical and commercial advantages. The customer is also targeting a future integration of the prognostic solution into its Meridium asset performance management solution.

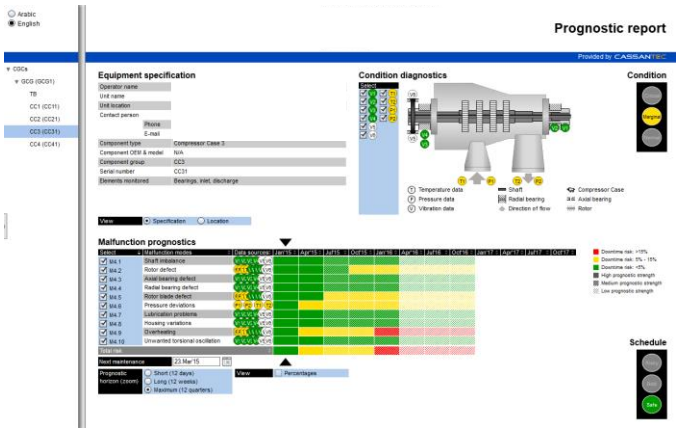

Figure 2: Example Report for a Compressor Stage

Approach: Cassantec's prognostic solution computes CGC RUL distributions and future malfunction risk profiles. In a first step, CGC conditions are forecast on the basis of current and historical condition and process data. In a second step, this future condition is correlated to CGC-specific malfunction modes and end-of-life criteria. In the final step, a prognostic report such as the one seen in Figure 2 is generated, displaying RUL with respect to the different malfunction modes considered. The prognostic reports at CGC component level are aggregated to the CGC unit and fleet level, to enable collective and informed asset management decisions. This approach allows a fleet-wide learning process, where data across components is utilized in a fleet context to determine optimal renewal cycles and to manage fleet-wide RUL of CGC.

Benefits: The customer is targeting benefits in two areas:

- *Reduction of Downtime Cost:* By avoiding unscheduled maintenance and unexpected delays due to spare parts logistics, and by optimally planning service based on deployment schedule
- *Reduction of Maintenance Cost*: By extending scheduled maintenance intervals at constant availability, and by better preparing for maintenance and part procurement based on forecast need

Next Steps: To realize the projected benefits, the customer is planning to roll out the solution to its entire CGC fleet. Given success in daily operations, the customer is considering application of the solution to further petrochemical assets.

Contact: Please contact Dr. Frank Kirschnick (frank.kirschnick@cassantec.com, +49 160 9774 3600) for any technical questions or feedback.