

Condition-Based Malfunction Forecasts for Mining Equipment

Deployment of a Prognostic Asset Management Solution at ARG's Frontier Mine

Background: The Eurasian Resources Group's (previously ENRC) African subsidiary ERG Africa operates a diversified portfolio of natural resource assets worldwide, including iron ore, copper, and cobalt mines in Africa. Due to increasing cost pressure on its mining operations, ERG seeks to strengthen its asset management through innovative and efficient digital solutions. In early 2015, ERG configured, tested, and deployed Cassantec's prognostic solution at its Frontier Mine in Katanga, DRC, seen in Figure 1. In a first release, the solution scope comprised the mine's main crusher, two cyclone pumps, and the SAG mill. In a second release, the operator is adding the ball mill, pebble crushers, and conveyors.



Figure 1: Frontier Mine (Source: ERG)

The prognostic solution is based on condition and process data recorded for all crucial mining assets. This data includes load, vibration, and lubricant data, recorded by Cassantec's partner WearCheck onsite in monthly intervals, as well as vibration and temperature data taken from the operator's online monitoring system.

Objective: ERG is seeking an accurate, consolidated, and transparent reporting solution at the core of its mining asset management, providing substantial insight and foresight for strategic and operational decisions. Given equipment-specific maintenance plans with much flexibility around schedule and scope, the operator wishes to minimize maintenance cost and effort at constant levels of reliability and availability. While ERG is initially using the solution on a stand-alone basis, the prognostic reports will be rendered through IBM Maximo at a later stage.

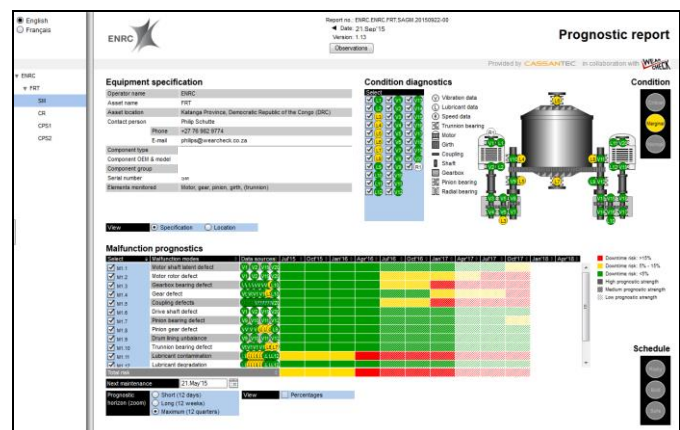


Figure 2: Example Report for a SAG Mill

Approach: ERG is applying Cassantec's prognostic solution for periodical reporting of future malfunction risks and maintenance needs. In a first step, the solution forecasts equipment conditions on the basis of current and historical condition data subject to various operational scenarios. In a second step, future conditions are correlated to equipment-specific malfunction modes, yielding end-of-life forecasts. In a final step, prognostic reports are generated on the basis of end-of-life forecasts, as illustrated in Figure 2. The reports are computed at component level and then aggregated, supporting collective asset management decisions.

Benefits: ERG is targeting benefits in three main areas:

- **Reduction of Downtime Cost:** By avoiding lost production from unscheduled delays and by bundling maintenance tasks based on malfunction risk profiles
- **Reduction of Maintenance Cost:** By extending scheduled maintenance intervals at constant availability and safety levels, and by better preparing for maintenance and replacement tasks
- **Transparent Decision Basis:** By integrating condition data from different sources, and aggregating insight and foresight at different management levels

Next Steps: The prognostic solution is currently being used at ERG's Frontier Mine for the aforementioned types of mining equipment with monthly updates of prognostic reports. The operator is considering an extension of the solution to further equipment, as well as a roll-out of the solution to further mining assets.

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