

“UptimeAI Expert” Predicts the Root Cause of Compressor Vibration as Fouling in 30 Min to Save Over \$154,000



Operational Challenges

Centrifugal compressors are used in many industries to increase the pressure of a medium. These are typically large machines, and operational issues can be expensive. For example, a bearing failure can cost over \$350,000. However, changes in operating parameters are often not picked by a DCS until they become severe. Even with basic predictive monitoring, detecting issues in performance, and finding the root cause is a major challenge. So, the customer wanted a solution that predicts issues early, diagnoses the root cause, and helps solve them quickly.

Solution with UptimeAI Expert:

UptimeAI used deep learning models to analyze over 200 tags (process and reliability measurements) of the compressor, lube oil system, gearbox, and motor as a holistic system. UptimeAI solution identified the deterioration of compressor discharge temperature and diagnosed the cause as compressor fouling. Further, the solution also diagnosed the implications of fouling on equipment reliability. As the axial position started changing due to more thrust forces on the compressor, it increased compressor bearing vibration, which cascaded to the gearbox and motor over 15 days. The solution also prescribed online water/chemical injection and cleaning protocols for reducing fouling.

Without UptimeAI's early detection and prescriptive diagnosis, high vibrations could lead to shaft unbalance and equipment failure. Moreover, the increased load on the compressor due to fouling required operating near the surge line and was causing higher energy consumption.

Unlike manual threshold-based alarms, UptimeAI uniquely combines AI and subject matter knowledge to mimic experts by continuously learning without manual rules and explaining complex problems to help mitigate issues. While deep learning techniques learn good vs. bad behavior considering all the operating parameters, built-in fingerprints with failure modes, recommendations, and fault-tree analysis enable the solution to diagnose and explain the issues.

Summary

Estimated Savings
\$154,000 / year

Systems Covered

Compressor
(Reliability & Process)

+

Gearbox (Reliability)

+

Motor (Electrical & Reliability)

Deep Learning Models

1

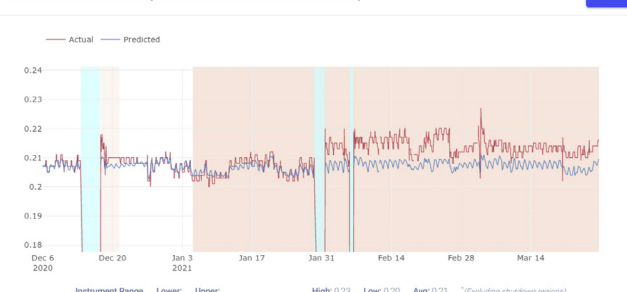
Deployment Time

2 Hours

WG2 STAGEII DIS. TEMP [Asset: WET GAS COMPRESSOR PROCESS]



WG2 COMP AXIAL DISPLACE [Asset: WET GAS COMPRESSOR RELIABILITY]



2. Compressor Fouling (0.454)

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Jan 8, 2021 - Jan 18, 2021 Feb 4, 2021 - Feb 6, 2021

Mar 7, 2021 - Mar 7, 2021 [Show More](#)

Recommendations

- ☐ Try water cleaning to remove fouling
- ☐ Chemical injection to clean the fouling

1. Axial Shift High (0.496)

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Jan 29, 2021 - Apr 16, 2021

Recommendations

- ☐ Check thrust bearing temperatures and plan shutdown to rectify
- ☐ Check the load on the compressor and the DP across compressor to estimate if the change is axial position is due to change in load on compressor.
- ☐ Reduce the load if the axial position varies continuously to avoid any damage to the compressor.

About UptimeAI:

UptimeAI uniquely combines Artificial Intelligence with Subject Matter Knowledge from 200+ years of cumulative experience to explain interrelations across upstream/downstream equipment, adapt to changes, identify problems, and give prescriptive diagnosis like a human expert would.

UptimeAI Expert OEx Platform works as a trusted AI advisor for plant engineers looking to achieve operational excellence.

For more information visit: www.uptimeai.com or email us: info@uptimeai.com