

AIGC Solutions – Artificial Intelligence & Data Analytics

Case Study: Predictive Analytics on Steam Turbine for Oil & Gas Plant

The Opportunity



Steam turbines driving large size gas compressors, in an Oil & Gas Company, are among the few critical pieces of equipment. Any sudden failure would result in high-priced maintenance and huge production loss. The data that is being collected from condition monitoring plus the process of these machines are stored on the central historian server. These are used by the plant prominent console operators to respond to abnormal alarms or by the engineering team to troubleshoot equipment following failure.

The Approach

AIGC uses Data Modelling and Analytics for developing advanced software systems and can generate intelligent

decisions in real-time that improve the performance plus profitability of operations & maintenance. These applications comprehend analysis and the data is collected into actionable information in real-time. AIGC, with the precise volume of data to the appropriate personnel, minimizes any inefficiency by enabling accurate decisions at the proper time, resulting in tangible profitability. To make real-time decision support, we are also equipped with providing the most necessary data processing and modelling toolkits, as well as heuristic modelling toolkits. Our well-trained data and domain experts can deliver large scale programs in:

- Data Acquisition – Collection of data from sources (Current & Temperature)
- Data Modeling- Includes defining the platform; configuration of the model, and running the model.
- Visual Analytics – where results in the reports are displayed with alarms.

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We also offer various types of analysis, including Identification of Outliers; Performance Variation Analysis and Pattern Analysis. Our domain experts were a part of a predictive maintenance analytics program at Oil & Gas plants that were established to monitor steam turbines driving large size gas compressors. The analytics model was designed to correlate the operations of Steam Turbine (ST) over various loads and ambient temperatures. The solution was created, correlating all ST parameters (Steam Flow, Pressure, Temperature, RPM, Isentropic efficiency, etc.) using a broad set of historical reference data covering a full operating range of the ST. The analytics were designed to send advisories (alarms) for investigating the moment any parameter deviated from the predicted model at the working conditions.

machines before they actually fail, resulting in a plant shutdown. The anomaly was detected by analytics by noticing an efficiency drop of these giant machines by about 5%. This isotropic efficiency degradation was associated with a deviation in Exhaust Steam Temperature and Exhaust Pressure.

Predictive alerts corresponding to possible breakdowns

The predictive analytics indicated a probable cause of premature seal failure and a possibility of seal contamination.

Advanced warning of impending issues

With the thrust bearing temperature trending at points higher than usual, AI solutions indicated that the gearbox shaft was slowly moving axially, thus flagging early warnings of impending issues.

The Benefits

More meticulous planning of machine maintenance

By detecting a possible machine failure, AIGC solutions help with planning a scheduled shutdown to repair these