HITACHI ABB POWER GRIDS

Condition-based malfunction forecasts for commercial energy operations

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• CASE STUDY
• Deployment of a prognostic asset management solution at a fossil-fired power plant

The customer

A leading global commodities merchant complements its energy trading activities by operating a variety of power generation assets. These include dual-fired (oil & gas) generating units and cogeneration units, ranging from 77 MW to 600 MW, covering peak demand in metropolitan areas. As a power generator primarily focused on commercial energy operations, the company needed to factor in market forces and risks in its daily generation operations.

The challenges

The company needed to ensure that it had sufficient power generating capacity in stable operation to meet ongoing commercial commitments, and to supply power during forecast peak demand periods. To avoid downtime early, it needed a solution to provide daily updates on the expected future health of critical generating assets. This would allow plant operators to anticipate and proactively mitigate serious malfunctions and failures that would cause unscheduled downtime in the future.

This solution had to allow plant managers to effectively schedule and scope maintenance activities to minimize financial and operational impact, while avoiding the risk of unpredicted asset failures. In parallel, it had to allow traders to adjust their early commercial commitments to the power market based on the expected availability of power generating units in the different market regions.

To meet their needs, the company selected Lumada Asset Performance Management (APM).

The solution

Having a data-driven culture, the company's generating assets were already fully equipped with condition monitoring and diagnostic systems, which recorded and archived condition and process data for all crucial asset components. The Lumada APM team was able to access a wealth of data, including current and historical parameter values for critical assets such as gas and steam turbines, power generators and transformers, boilers and heat recovery steam generators, induced and forced draft fans, and boiler feed pumps.

The Lumada APM solution combines historical asset condition data collected from manual inspection rounds and process data from online SCADA systems to calculate each component's probability of failure in a given future time horizon. Each asset's overall risk of malfunction or failure is calculated by aggregating component-specific (bearings, gears, belts, etc.) malfunction modes. This way, the operator can not only tell when an asset will fail, but can also partly narrow down the root cause. The information is summarized in a user-friendly prognostic report that offers component-, unit- and fleet-level views.

The results

Prognostic results from Lumada APM are now used alongside the company's propriety market power price forecasts to determine future risk indices. For units that will be "in the money" at any future point in time, risk-mitigating action can be taken,if necessary. Possible actions include preemptive component maintenance or replacement (ideally during idle periods or scheduled revision cycles), or running assets at a reduced load, or pre-purchasing power to cover predicted generating shortfall. This insight has allowed the company to adjust trading and hedging strategies, mitigating both market and generation risks in its business.

For reliability managers and mechanical engineers on site, the availability forecasts have been a welcome companion to the condition monitoring and diagnostic systems in place. The solution consolidates data from different sources, adding time-based insights that were previously unavailable, and providing standardized and conclusive reports. The forecasts also serve as a valuable planning tool when coordinating schedules with equipment vendors, service providers and insurers.

With its state-of-the-art prognostic functions, Lumada APM has delivered many benefits:

- **At the fleet level**, the company gained competitive commercial advantages by being able to make informed commitments in power trading and hedging.
- **At the unit level**, asset uptimes and utilization rates have greatly improved due to better maintenance planning, scheduling, and scoping.
- **At the component level**, faulty or at-risk parts were successfully identified and repaired before issues became severe, lowering the overall cost and time of maintenance.
- **In total**, savings are estimated at several million dollars through downtime risk mitigation of power generating units "in the money."

"While we use proprietary power demand and price forecasts on the market side, [Lumada APM] is filling an important gap with availability forecasts on the generation side. We are intrigued by their prognostic technology and excited about their overall value proposition. We expect their solution to become a standard tool in the power industry, especially for technologically progressive and commercially ambitious unregulated utilities."

SVP of Power Trading

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