Advanced Pattern Recognition Transforms Electric Power Utility Operations

Every month, Kristin C., a Predictive Maintenance Manager at a U.S.-based electric utility, logs more than 900 miles of road time on the job in her pursuit of operational excellence. At each of the seven power generation sites under her supervision, Kristin methodically takes vibration readings of the equipment that serves the utility’s coal, natural gas, and wind turbine operations.

Kristin has driven this route each month for the past three years, collecting and analyzing the data as part of the time-based management system the company relies upon to reduce costs, minimize risk, and maximize productivity.

Nevertheless, there was a growing consensus at the company that more needed to be done. With the many thousands of assets her utility employed – from furnaces to cooling towers, from turbines to turnbuckles – the company was awash in sensor data. Yet the data languished, unused.

“We were data rich but action poor,” says Kristin.

Taming the Data of Hundreds of Thousands of Assets

From its headquarters, the utility manages hundreds of thousands of asset tags. Paradoxically, the enormous volume of data this creates had led to both information overload – alarm rates of fifty to sixty per hour were typical under normal conditions – and poor visibility of emerging issues.

In early 2016, a company reliability team set out to define the company’s requirements in a data-driven Monitoring and Diagnostics solution, and solicited bids from several companies. The management team ultimately selected a solution that bundled Atonix Digital™ ASSET360® Monitoring & Diagnostics (M&D) with Black & Veatch’s Remote Monitoring and Diagnostics services.

AT A GLANCE

COMPANY
- U.S.-based electric power utility
- Total Assets: Over $1 billion
- Atonix Digital customer since 2016

CHALLENGES
- Unmanageable volume of alarms
- Underutilization of copious asset data
- No early detection of issues

SOLUTION
- Atonix Digital Monitoring & Diagnostics, powered by ASSET360
- Black & Veatch Remote Monitoring & Diagnostics Services

BENEFITS
- $1 million in savings from failure avoidance
- $20,000 in halted revenue losses
- Weekly telephone meetings and quarterly onsite reviews with Black & Veatch

Since implementing ASSET360 we’ve discovered three more issues...those failure scenarios combined would have cost us around $120,000.

Kristin C., Predictive Maintenance Manager
A Crisis Averted During Pilot

While analyzing historical asset data in preparation for the pilot, ASSET360 algorithms uncovered an unusual pattern. Data pulled from the utility’s data historian indicated an increase in vibration, too low to trigger an alarm, yet troubling enough to warrant further investigation. Indeed, closer inspection by company engineers found a dangerous development: early-stage delamination of a cooling tower fan shaft.

“We had just taken vibration data on that equipment,” says Kristin, “and found no issues. This was about a month before a twelve-week outage we planned for Spring.”

Had Black & Veatch not detected the issue using Atonix Digital ASSET360, the fan assembly would have failed during the peak Summer season. In other words, there would have been an unscheduled outage of four to six weeks at a time when the utility’s customers needed it most.

Further, the unscheduled outage would have cost the company the materials and labor to replace the fan, shroud, and motor, as well as to repair certain damage to the cooling tower. The company would undoubtedly have faced safety risks and the very real prospect of a plant derating. “Since implementing ASSET360 we’ve discovered three more issues, nearly identical,” says Kristin. “We estimate that all those failure scenarios combined would have cost us around $120,000.”

Losses Halted From Wind Turbine Defects

Another significant issue arose in 2018, this one at one of the utility’s wind farms. After connecting to each of the site’s 33 turbines, the Black & Veatch M&D team found that two were underperforming. Upon investigation, company reliability analysts found that defective anemometers had been overreporting wind speeds, causing the turbine blades to overpitch.

Kristin recounts, “This equated to $20,000 a year in lost revenue, starting in 2012 for one turbine and 2014 for the other.”

A Data-Driven Time-Based Management Strategy

Company engineers have since woven Atonix Digital’s Monitoring & Diagnostics deep into the fabric of their operations.

“We can email directly from ASSET360,” explains Kristin, “and attach any graphs or reports we want. Then recipients can click ‘Reply’ and respond to everyone, while posting back to the ASSET360 thread.”

The newly enhanced time-based management model has already begun to influence the utility’s plans. Company managers have begun to evaluate more advanced sensors, capable of providing even richer performance data and enabling alarm banding.

This will enable us to see when an issue’s actually happening,” says Kristin. “When we get that, we’ll want to feed it all into ASSET360 as well.”

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Kristin C., Predictive Maintenance Manager