PULSE OF THE INDUSTRY

Performance service center: Remote eyes, ears that help you avoid failures

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Knowledge management sounds like another one of those all-embracing corporate initiatives that drive plant people nuts, but it nevertheless may be taking on a life of its own. As a recent example, I attended the Utility Working Conference last August, a meeting specifically focused on nuclear plant owner/operator issues, and knowledge management permeated the content. There are many aspects to knowledge management—some practitioners focus on the people aspect, some on what in an earlier time might have been called artificial intelligence.

Pearl Street Inc, St. Louis, has been working with several clients over the years to integrate digital and human asset intelligence and communications technologies into a comprehensive plant knowledge management capability. Pearl Street and KurMeta Inc, Calgary, Alta, recently published a white paper, "Brains and Brawn," that elaborates on this subject (access at www.pearlstreet.com). But breaking down the vision into narrower slices of value that plant people can actually "see" is a tall order.

A light bulb went on in my head when I was talking with Phil Flesch, manager of Smart Signal Corp's, Availability and Performance Center (APC), Lisle, Ill, when he said, "More than one of our customers bought us as a backup to the LTSA." Phil and I were discussing the application of predictive analytics, a key component of digital asset intelligence, to combined cycles and how his firm is now remotely protecting assets by providing real-time diagnostics for some customers. When he mentioned long-term service agreement, I found a different appreciation for the value of this fast-growing technology.

Many utilities with large and geographically dispersed fleets of generating assets are deploying predictive analytics through centralized performance monitoring facilities managed by the utility or owner/operator. More recently, several of the nation's modern combined cycles have deployed predictive analytics through the services-center model. Instead of buying the software per se and being responsible for it, the capability is made available as a service on a subscription-fee basis.

Phil tells me that two 2 × 1 combined cycles have partnered with Smart Signal for the "full service" approach; another seven facilities will become part of this family over the next month or two. The APC provides a "maintenance" level service to five other plants. Thirty facilities worldwide have installed the software.

One of the two full-service sites is Salt River Project's Desert Basin plant, which has been mentioned in several CCJ articles because of its proactive involvement in gas-turbine (GT) user groups. Another owner/operator had four combined cycles being protected but had to drop the service when the parent company ran into severe financial difficulties.

What is full service? According to Phil, this typically might include 30-40 components in the plant—including the GT, heat-recovery steam generator (HRSG), steam turbine, electrical generators, feedwater and condensate pumps, feedwater heaters, condenser, and cooling-tower components. He finds that as a facility gets comfortable with the service, it adds components. "For example," he said, "we had a plant add the ammonia evaporator for the SCR (selective catalytic reduction) unit.

For the most part, the services-center model requires few resources from the plant. It takes from six weeks to three months to get up and running. Says Phil: "We have to decide which components to monitor and which sensors (or measurements) and data points are available in the historian, we need a few hours of time from the site experts, and that's about it. We generally hold a kick-off meeting to determine how to customize the implementation and communications—and graphics—for the site."

At my urging, Phil got real academic about how the software does what it does—at one point uttering something to the effect of "complex interpolation among parameters in n-dimensional space, up to 230 of them. . . ."

But essentially the technique—thanks to the stupendous increases in computer processing power available today—simply correlates historical data for multiple parameters (for which a digital data stream is available, usually from a PI historian), and then compares that information to current operating data to find anomalies. Unlike other software, this one does no thinking on its own, and no calculations; it simply looks for patterns and flags deviations.

Phil's team, consisting of veteran powerplant personnel and newly minted engineers with a flair for new software technology, monitors the output of the software, and communicates with the plant in three ways: (1) through a weekly report with line items for review, (2) a teleconference call to discuss the weekly report, and (3) ad hoc communication when the team identifies something it thinks the plant needs to know about immediately.

"It's something like the opposite of hindsight," Phil stresses, "it would be a stretch to call it 20-20 foresight, but

we do help plants see through the fog of data, identify potential problems that could presage failures, and then shine a brighter and brighter light on the situation to determine the best course of action."

I began to think back to my days working at power stations. One of my first responsibilities was stack emissions testing. My boss told me to be effective at stack sampling you had to understand the entire combustion process. I said to Phil, "If I had a new recruit at my plant, I'd assign him or her to be the Smart Signal liaison. I can't think of a better way to force the person to learn about all the major components and how they are all related." He agreed, as long as a senior engineer was looking over his or her shoulder.

Phil gave an example of a "good catch." During a post-outage startup, one of the fuel supply valves was sticking a little, and the other valves were compensating. This wasn't seen by the operators and didn't show up as a performance deviation or as an alarm. But it was identified as an anomaly by the plant's service-center team and the plant staff fixed it right away.

The APC has detected fuel supply problems, casing leaks, wear on GT hot-gas-path parts, combustion liner damage, problems in the GT exhaust, transition failures, bearing failures, lost balance shots, HRSG leaks, attemperator-valve leaks, cooling-tower basin control problems, and plenty of sensor issues—among others.

Phil believes that predictive analytics is complementary to what the OEM provides in the way of service, vis-a-vis the LTSA. "We generally find indications of a problem very early," he says. This allows the plant to initiate discussions with the vendor. "We're agnostic," he continues. "We don't have any spares to sell or equipment to repair."

In closing, Phil recounts how the APC started in January 2006. "We started protecting 29 coal-fired plants for a customer. After one year they told us we had missed nothing when we were looking (monitoring was only conducted on one shift). This meant that a failure did not occur, on a monitored component, that we were not able to provide early warning of impending problems. And you know, we never walked through the door of any one of those plants." It's almost a little eerie, for a guy who started his career at coal-fired plants, to hear this, but this is today's world of predictive analytics, digital asset intelligence, and plant knowledge management. CCJ