platts ENERGY BUSINESS & TECHNOLOGY

July/August 2002

Data Collection/Analysis Wizard Harmonizes O&M

By Jon Arnold

Way back in 1993, managers at Southern California Edison Co. (SCE), Rosemead, Calif., decided they wanted an information system that could wear two hats. Under one, it would serve as a repository for historical and real-time digital data from the utility's 15 nuclear, coal-fired, and hydro plants. Under the other, it would integrate data from the plants and headquarters as well in real time, allowing executives and engineers to make better decisions about predictive maintenance, load forecasting, and a host of other analytical functions.

As a solution, SCE selected Chicago-based InStep Software's eDNA (distributed network architecture) product. The eDNA real-time data historian captures, stores, and archives by time-stamping huge quantities of historical and real-time data from disparate plant equipment and systems operations. SCE implemented the system in 1994 and has been expanding and upgrading it ever since. End of story? Hardly.

In this day and age, a system installed eight years ago is usually considered a legacy system ripe for replacement. But at SCE, the eDNA is behaving in ways that the dinosaurs never did. It is adapting to a changing business environment and yielding new nuggets of information about forecasting and maintenance that SCE is using to boost plant performance and reduce plant and system downtime.

The best example of the benefit SCE continues to derive from eDNA can be seen at its San Onofre nuclear generating station (also known as Songs). Located in northern San Diego County, the plant's two units produce 2,200 MW, enough to serve up to three million households. Implementation of eDNA at Songs began in 1994.

In the old days

Before eDNA came into the picture, all Songs operations and maintenance (O&M) data were stored for only nine hours. So if engineers or managers wanted to take a close look at anything that happened at the plant, they had a nine-hour window to query the system that preceded eDNA and ask it to print it out the relevant information and/or put it into a spreadsheet for deeper analysis. The data's short shelf life posed problems, explains Lloyd Pentecost, supervisor for performance monitoring at SCE. "For the most part, you want to track and trend a plant function over a long period of time. The old system would give you sub-second data, but having only nine hours worth made it impossible to do a good job of sequencing events and analyzing plant data for trends."

By contrast, eDNA can collect 6,000 data points and store them for decades in its data base. The newer system was also more flexible than the older one. The eDNA architecture is modular and distributed, and it uses TCP/IP messaging to communicate with other systems. That makes it easy for SCE to change the system configuration to reflect changes in the plant environment. "Time-sensitive data are accessible, via a client server or the Web, throughout the enterprise and integrated with other systems for preventive maintenance, forecasting, and other reporting and analytical functions," Pentecost explains.

Through eDNA, SCE's O&M personnel can instantly retrieve, in real time, volumes of detailed information about the status of plant equipment--whether any of hundreds of valves is open or closed, for example--as well as trend data on heat exchanger and reactor cooling pump performance. "Our reactor cooling pumps are huge--about 10,000 hp--and each has a protective seal whose integrity must be monitored constantly," says Pentecost. "Tracking and trending the performance of those seals--through data like flow rates, which indicate where on its curve a pump is operating--is critical not just to the operation of the pump; it's a big deal as far as the operation of the plant is concerned. Engineers need to be able to monitor the performance of the reactor pump seals from their desks at all times, in real time," he explains.

Continued

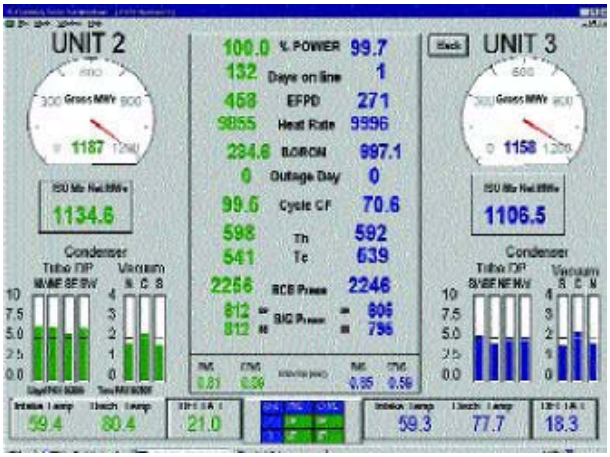
Predicting problems
Besides its ability to store O&M data and serve them up in real time, another neat feature of eDNA is its calculation server. According to John Kalanik, president of InStep Software, the server allows users to perform fairly detailed analysis of trends and create "pseudo points" within the system. At Songs, SCE engineers have set up the calculation server to identify impending equipment problems and the actions needed to pre-empt them.

For a good example of how the calculation server benefits Songs' maintenance work, one need look no further than the plant's cooling-water pumps. Like all plants cooled by seawater, Songs often encounters problems with fouling of the pumps' condensers; at San Onofre, the culprit is a particular kind of mollusk. To address the problem, SCE hires marine biologists to keep tabs on the mollusks' growth rate. Then, Songs personnel put the growth rate data into the eDNA system. Explains Pentecost, "eDNA's calculation server tells us when we should heat-treat the condensers to kill the mollusks before they get large enough to cause problems."

More data points wanted
Pentecost says SCE is constantly striving to increase the number of data points the eDNA system collects at Songs. But doing that is neither easy nor inexpensive, because it is a nuclear plant, and the U.S. Nuclear Regulatory Commission rules require that all nuclear plant wiring be in conduits.

A solution that Pentecost devised was to install an 802.11 wireless local-area network (LAN) and dedicate it to eDNA data collection. For the plant's circulation pumps, the network provided a fully automated solution. After engineers added wireless sensors to the pumps, eDNA began collecting their operating and environmental data (such as ambient temperature) in real time--a process that used to be done periodically and manually by plant engineers as they made their rounds.

For other systems and equipment, plant operators still collect information manually. But now they put that information into handheld computers and upload it later into the eDNA system. "One of the great things about eDNA is that we can and do license it on an enterprise basis," says Pentecost. "If we had gone with a product we had to license on a per-seat basis, it would really limit our deployment, as well as our options for finding new ways to collect data points."



The eDNA dashboard at Southern California Edison's San Onofre station

Well down the learning curve
Because SCE has been using eDNA at Songs for eight years, it has learned plenty about making the most of the system. According to Pentecost, "We've spent and continue to spend lots of time educating people about its strengths and weaknesses. It's important that our O&M staff realize how data are collected and what they really mean. Since eDNA has so many analytical tools, it's too easy to overanalyze a problem and draw incorrect conclusions about how to correct it. More data are not necessarily more information," says Pentecost.

Going forward
A major project at Songs that will affect the eDNA system is a long-overdue upgrade of the plant's desktop computers from 286-based to Pentium-based machines. The project is already under way, and when it is completed, eDNA will become an integral--rather than a tacked-on--part of the plant's enterprise computing system. Because the new configuration will allow it, SCE may ask the eDNA system to wear a third and fourth hat--quality control manager and decision-support wizard.

In terms of its value and indispensability to the plant, the eDNA system is comparable to e-mail, explains Pentecost. "Slowly but surely, the system has become woven into the fabric of SCE's operations for plant predictive maintenance, forecasting, and other analytical functions. It has completely changed the way people work. If you tried to take it away from the engineers and managers, they'd probably shoot you.".