The Proper Tool for The Proper Job

Utilities of every size depend on automated software tools to evaluate mechanical condition and improve overall plant reliability, creating improved labor efficiency and generating legitimate cost savings in the process.

The modern electrical utility certainly doesn't look anything like it did even twenty years ago, and fortunately the costly run to failure (RTF) maintenance practices of that era are nearly extinct today, thanks to predictive maintenance (PdM) tools. In the past, the inherent limitations of RTF or periodic maintenance could quickly turn a single component failure between time-based inspection cycles into an expensive problem — as well as creating hundreds, or worse thousands, of unhappy customers.

Utilities also have been feeling the effects of market forces unleashed by the 1978 Public Utility Regulatory Policies Act (PURPA), which allowed certain non-utilities to enter the wholesale market, grow and compete against the traditional utilities. PURPA drove these utilities to adapt new technologies, decrease costs, and increase overall efficiency and reliability.

A solution to this pressure is available from software specifically designed to help facility engineers evaluate the machine's condition through trending of periodic tests — such as vibration, oil analysis and infrared thermography. The new software simplifies the periodic testing, automates processing and analysis of the data and uses today's connectivity to distribute the latest condition assessment information to key decision makers.

Joe DeSoto has witnessed the changes in maintenance practices and the tools of the trade while helping care for Tri-State Generation & Transmission's Escalante generation station over the last sixteen years.

"The Escalante facility was owned by a rural cooperative until it merged with Tri-State Generation & Transmission recently, but we first started using PdM tools as far back as the mid-eighties, when the plant first opened," he explains. A Results Specialist at Tri-State, DeSoto is responsible for vibration analysis, IR thermography and unit performance testing on the facility's turbine generator sets.

According to DeSoto, Tri-State took a significant step forward from their early PdM efforts in the mid-nineties, when the plant manager assigned an engineer to evaluate the entire market of expert analysis tools available for plant equipment maintenance.
The Tri-State survey found that the ExpertALERT\textsuperscript{T}M for Voyager (EAV) system from DLI Engineering provided the most efficient and comprehensive automated vibration diagnostic system. EAV can process hundreds of measurements in just a few minutes, leaving you with a fault diagnosis, severity indicator and repair recommendations on each machine. The diagnostic engine uses an empirical, rule based, logic system that uses a wide variety of data types, a few advanced "proprietary" methods and previous machine history to formulate its conclusions.

Pioneers in the field of vibration analysis since 1966, the Seattle-based DLI Engineering's automated machine diagnostic technology has become a de facto standard. DLI serves a wide list of commercial and military clients offering a complete range of PdM products and services.

DeSoto describes Tri-State's present PdM philosophy as "quite aggressive," stating that PdM has proven itself many times over, saving the company money by helping them take machines out of service for necessary repairs based on their condition instead of waiting until they fail. "We're using EAV on a stand-alone office PC right now," he adds, "but the direction we're heading is using the DLI Diagnostic Data Collector (DCX) that includes EAV on a tablet-style computer platform that you can take out of the office. It shows your maintenance people what's happening to the machine in real-time and helps explain where the problem is and why."
DeSoto says that while it's important to demonstrate the system's value to management, what's even more crucial is gaining the confidence of the maintenance staff. Showing them ExpertALERT's diagnostic capabilities in action has helped develop trust in the tool throughout the facility and has boosted the credibility of the entire PdM program.

According to DLI Vice President Mark Libby, creating equipment histories that establish baseline values for trending is the first component of PdM, and essential to recognizing a developing problem at an early stage. "Predictive maintenance is the cornerstone of the larger reliability-centered maintenance philosophy; our software tools help facilities of every size to understand the condition of their assets, whether they're using it as a stand-alone PC system like Tri-State or as an enterprise-wide system like many of our larger customers," he continues.

One of the enterprise customers is a large electric utility in the Eastern United States that has operated an active PdM program for over fifteen years, initially to maintain their turbine generators. They began using DLI's vibration analysis tools in 1994, and the product's automated processing and machine fault recognition immediately saved enough data analysis time to allow them to begin monitoring other auxiliary equipment.

A recent conversion to Voyager®, an integrated environment, using ExpertALERT to manage vibration test results and Predict Passport™ to manage oil analysis results, allows them to store all of their decision support data in a central database at their research & testing laboratory; here oil and vibration analysts review the machine condition information, diagnostic findings, repair recommendations as well as add their own comments and machine specific guidance. Voyager combines multiple types of equipment test data into a comprehensive snapshot of overall machine health. Incorporating data from vibration, ferrography and used lubricant analysis as well as infrared thermography, and visual inspection notes, Voyager provides the comprehensive cross-technology outlook essential to highly effective monitoring of the equipment's physical condition.
According to the Senior Test Engineer responsible for the vibration data, a twenty-five year industry veteran and a Level Two Vibration Institute certified analyst, Voyager is performing exactly as he had hoped. "The most important thing about Voyager is the combination of the multi-technology data not only from our vibration and oil software but also from the motor current and thermography testing as well. All data is stored together in a single place, so the system comes up with the most comprehensive maintenance recommendations," says the engineer.

The automated analysis of data and multi-user access to results have dramatically increased the "speed of information distribution" among the utility's maintenance group. The ability to get complete results to the right people quickly to support timely maintenance management decisions is another favored benefit since the senior test engineer is personally responsible for reviewing all machine faults and repair recommendations.

"The biggest maintenance savings come from the reduction in total maintenance work made possible by avoiding unnecessary maintenance. With a limited number of maintenance hours available, being able to 'work smart' and optimize our maintenance hours is crucial. Managing our equipment this way will help us stay competitive and ultimately to offer the best possible service for our customers," reports the engineer.
"The primary objectives of predictive maintenance are to reduce unscheduled downtime and channel limited maintenance funds where they are most effective. The Voyager family of products provides a utility with accurate and timely information about the condition of each machine, helping them get the maximum benefit from each maintenance dollar," Libby concludes.

PdM programs designed and supported by DLI Engineering and using our automated diagnostic system are among the most successful in the industry today. Our experienced staff is a key element to our client's continued success.

For more information about DLI and their complete line of predictive maintenance products and services, visit them on the web at www.DLengineering.com or contact them directly by mail at: 253 Winslow Way West; Bainbridge Island, Washington 98110; by phone: (206) 842-7656 or (800) 654-2844 toll free; by fax: (206) 842-7667.