

# Tucson Electric Power Achieves Substantial Savings with Effective Predictive Maintenance Program

## RESULTS

- Avoided \$1 million in maintenance and replacement costs in 2012
- Saved over \$750,000 in the first three quarters of 2013 alone
- Improved safety by expanding use of predictive capability to hard-to-monitor equipment

## APPLICATION

Critical equipment at Tucson Electric Power's coal-fired generating station in Springerville, Arizona is monitored for early detection of problems and prevention of unplanned shutdowns.

## CUSTOMER

The Springerville Generating Station is a 1560 megawatt coal-fired power plant that supplies electricity to Tucson Electric Power. Tucson Electric Power delivers safe, reliable power to more than 414,000 customers in the Tucson metropolitan area, and into the grid serving Arizona.

## CHALLENGE

Tucson Electric Power's five-member predictive maintenance team is responsible for a wide variety of equipment that varies in complexity and scale. The team needed to improve its ability to identify equipment issues early and safely, allowing adequate time to plan repairs, while minimizing costly downtime. In addition, the team focused on expanding predictive maintenance to equipment that is difficult to access, runs intermittently, or varies by load.



***“We now have the largest wireless vibration network of any power plant in the world. The transmitters automatically gather vibration data on equipment while it’s running and wirelessly send it back for analysis, ensuring safe, accurate data collection.”***

**Gary Gardner,**  
Predictive Maintenance Coordinator II

### SOLUTION

One of the elements of TEP's successful reliability program is its use of the CSI 6500 Machinery Health Monitor to collect high frequency, high resolution vibration data from equipment rotating at or above 10,000 rpm. The CSI 6500 provides advance warning when a motor starts to deteriorate, allowing adequate time to gather the resources needed to complete repairs on the equipment as quickly and efficiently as possible. In fact, such warning is so valuable that the planning group brings the predictive maintenance team in to test high-cost or critical equipment *before* it is even shipped to Springerville, saving the expense of shipping and commissioning equipment that isn't working properly.

In addition to providing advance failure warning on mission critical equipment, TEP has implemented CSI 9420 wireless vibration transmitters throughout the coal yard. Because the rail car, which pulls a train loaded with 31,000,000 lbs. of coal, is not safe to be on or around while it is in motion, gathering predictive diagnostic information was a difficult task. Now, with the wireless vibration monitoring data afforded by the CSI 9420, the team can identify equipment deterioration *before* the machinery fails.

Another critical element of TEP's reliability program is the reporting. When a problem is identified, team members generate a report with the original work order as well as a detailed follow-up report after repairs are made. The final report includes details of the problem, the repairs, and the estimate of lost production activity and money had the problem resulted in an equipment failure. Tucson Electric Power leaders use the reports to inform decision making for future purchases and organizational changes. In addition, the predictive maintenance team uses the reports to track trends in equipment failure, allowing it to efficiently allocate resources to maintenance and repairs.

TEP's focus on reliability has yielded impressive results. Recently, after identifying problematic vibration data in a gear box, the team was able to remove the gear box for repair before functional failure occurred. Post-replacement analysis showed fretting corrosion due to loose bearings and abnormal wear on gear teeth. This data allowed TEP to have the \$250,000 gear box replaced without cost as part of a warranty, all with no unplanned downtime.

***“We’re monitoring more critical assets than ever before. We’ve put documented proof of the value of predictive maintenance in the hands of our leaders. We’ve made a difference in TEP’s ability to prevent unplanned shutdowns and to more effectively plan maintenance work. With the predictive maintenance foundation we have in place, we’re excited to contribute to TEP’s success.”***

**Gary Gardner,**  
Predictive Maintenance Coordinator II

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