Emerson's Triax Accelerometer Speeds and Improves Vibration Data Collection at TVA Plant

RESULTS

- 30 percent reduction in time required to collect vibration data
- More complete data obtained from single collection point
- Saved days of repairs by identifying failure condition in gearbox
- Safer route-collection of vibration data

"The machinery we monitor is common to every coal-fired power plant, so the triax accelerometer could benefit anyone who has to protect essential equipment."

James S. Sparkman, Sr.
TVA Gallatin Fossil Plant, PdM Vibration

APPLICATION

Vibration is measured periodically on many types of rotating machinery including coal pulverizers, gearboxes, forced-draft and induced-draft fans, boiler feedwater pumps, motors, and circulating water pumps, because a change in vibration may be an indication of a developing mechanical problem. When such issues are identified in advance, maintenance personnel can take action to correct the condition or repair the machine in time to prevent a breakdown.

CUSTOMER

The 1056 MW coal-fired power generating station at Gallatin, Tennessee, is operated by the Tennessee Valley Authority. The coal fired facilities of TVA's Fossil Power Group have 15,075 megawatts of capacity, or about 60 percent of the electricity produced by the TVA.

CHALLENGE

Collecting vibration data in the 4-unit Gallatin Fossil Plant is a time consuming job because of the large number of rotating machines that are essential to maintaining the load in each generating unit. There are 32 coal pulverizers, 10 boiler feedwater pumps, 24 fans, and 16 circulating water motor/pump trains to be monitored every month. In each case, vibration data must be collected at several different sites on each machine in horizontal, vertical, and axial directions. The single axis accelerometer used for data collection had to be moved many times just to obtain readings on one machine. Even then, some desired readings were unattainable because the accelerometer could not be mounted in certain locations. In some cases, the accelerometer had to be placed fairly close to rotating parts, creating a safety issue.

In addition, it was difficult to obtain good data from machines rotating very slowly. There was a basic need for more and better vibration data on which to base decisions about the potential for a machine failure, which could affect the ability of the plant to maintain its power output.

SOLUTION

Early in 2008, the Gallatin Fossil Plant began using a new triax accelerometer developed by Emerson for route based vibration data acquisition. This device is attached to a rotating machine by means of two feet that are wider than those of a twopole single-axis accelerometer, providing sufficient holding force to accommodate the desired bandwidth in the z-axis. This makes it possible for data for all three axes to be acquired from one location without having to move the accelerometer from place to place. This information is collected in a Emerson machinery health analyzer and later uploaded to AMS Machinery Manager for comprehensive analysis.The use of this equipment resulted in a 30 percent reduction of the time required to collect data.

James S. Sparkman, Sr., who is responsible for gathering and analyzing all vibration data from rotating equipment in the Gallatin Fossil Plant, said, “We just find one location and get measurements for all three directions, making route data collection faster and easier. It is also safer because there are some places where I had to get close to rotating shafts to make a measurement, and we don’t have to do that anymore. Safety is a very big factor with the TVA.”

Sparkman said he feels the data obtained are better, especially with slow turning machinery. It is useful for the plant’s predictive maintenance program which sets up three alarm levels depending on his analysis of the vibration data. Machines put on the “watch” list are monitored more closely until the vibration changes to “marginal” at which time maintenance personnel are dispatched to determine if corrective action is possible. If a machine’s vibration becomes “unacceptable”, it is shut down as soon as possible, sometimes immediately to prevent a failure that could force a reduction of the load, not to mention damage to the machine.

It was not difficult to implement the new accelerometer, Sparkman said, having used single-axis accelerometers for ten years previously. However, he said the new device helped identify several pre-existing conditions almost immediately. For example, spectral data from the z-axis of the triax accelerometer revealed a high frequency response from a slow speed gearbox of one coal pulverizer. “That machine was on the verge of breaking down,” he said. “If we had not detected that bearing race damage, the result could have been a five or six-day repair. By catching it early, we were able to make a replacement in a number of hours, saving the company a substantial amount of money.

NOTE: *The information in this report is factual, but this is not intended to imply endorsement of any product by the TVA.*

“I was impressed with the ability of the triax accelerometer to acquire good data on slow speed gearboxes.”

James S. Sparkman, Sr.
TVA Gallatin Fossil Plant, PdM Vibration

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