Online Vibration Monitoring Gives Power Cooperative Time to Replace Rare Motor

RESULTS

- Saved more than $400,000 by preventing unplanned downtime
- Enabled predictive maintenance of critical machinery
- Improved reliability of critical motor/fan units

APPLICATION

Axial flow constant speed fans, each driven by 2000 HP AC motors, are critical to the operation of a single coal-fired boiler that provides 2.7 million pounds of steam to a 425 MW generator 24 hours per day throughout the year. These motor/fan combinations normally receive routine maintenance during short scheduled outages in the spring and fall.

CUSTOMER

The power plant is operated by a mid-western power generation and transmission cooperative. This group provides wholesale electric power and other services for several electric distribution cooperatives and municipal utilities. More than half a million people throughout the service area depend on them for electric power.

CHALLENGE

The unique 2000 HP motors driving forced draft (FD) fans that supply air to the boiler were built on specification for this plant in the early 1970s and never replicated by their manufacturer. Finding a replacement motor became a pressing issue after a bearing fault was identified in the motor for one FD fan. This motor was going to be very difficult, if not impossible, to replace. Yet, it could not be allowed to run to failure, possibly shutting down the entire plant for several weeks and costing millions of dollars to obtain power from other sources. In order to predict just when the motor had to be replaced, the plant needed to obtain reliable information on its condition more frequently than was provided by periodically collecting vibration data using a handheld unit.

"That fan motor might have run for another six months, but you never know! It could have been very close to a catastrophic failure costing thousands of dollars in downtime and equipment damage."

Maintenance Technician
Mid-western Energy Cooperative

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SOLUTION

To facilitate online vibration monitoring of the motors, the plant installed AMS 6500 Machinery Health™ Monitors, which delivered a continuous stream of predictive data to the AMS software. This enabled personnel to watch the performance of the critical motor/fan units on a daily basis. Trend lines produced by AMS software were very important in tracking the condition of this machinery.

The motor remained relatively stable for more than two years. Then, a growing level of vibration on the outboard horizontal bearing of one old motor provided evidence that it was entering a new, more critical phase. Increases in peak velocity at different frequencies as compared with earlier trends provided additional proof that the machine might fail soon.

Finally, a potential replacement motor with the same frame design was located. However, it was wired to operate in a different voltage range and had to be completely rebuilt before it could be used.

"It could have cost hundreds of thousands of dollars if the plant had been forced to shut down for an extended period," said one plant official, who was working with the AMS 6500 data and watching the peak velocities grow. "However, we had confidence from the data that the motor vibration had not yet reached a critical level. Still, we were greatly relieved when the new motor arrived."

Later inspection of the old motor showed badly worn and broken rotor bars as the cause of the problem. That motor has now been repaired and is a ready backup whenever online vibration monitoring indicates degradation of the other original motor.

"Data produced by the AMS 6500 online monitors is giving us a whole lot higher reliability. That is where we have really benefitted."

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