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WHAT WORKS

FERROUS METAL IN THE OIL

In-house oil analysis helps plant avoid catastrophic failure

The Gorgas Steam Plant is located on the Mulberry Fork of the Warrior River, some 35 miles northwest of Birmingham, Alabama.

Its first unit began operation in 1917. It's the oldest coal-fired plant system at Alabama Power (www.alabamapower.com), a Southern Company subsidiary. Today, units 6, 7, 8, 9 and 10 provide about 1,250 MW.

In 2002, a selective catalytic reduction (SCR) unit for controlling nitrogen oxides was installed on Unit 10, a 750-MW super-critical unit. An Advatech flue gas desulfurization (FGD) system, or "scrubber," was added to the unit in 2007 in the first worldwide attempt to scrub multiple units through one system.

In the plant's Unit 10-B pulverizer, the vertical shaft thrust bearing supports the weight of the mill's rotating parts and the downward grinding force exerted by the grinding rolls. The thrust bearing isn't designed to withstand radial loading.

"Lubrication contamination is a big problem," says James "Pete" Peterson, condition-based maintenance specialist at Alabama Power. "Most of our units are from the '50s, '60s, and '70s. A good lubrication program that includes on-site oil analysis enables you to trend data on your equipment. It provides for a rapid response, if needed, and can save big dollars. When combined with other technologies, it can help a plant be the best that it can be."

A SIMILAR PROBLEM IN 1999 RESULTED IN A CATASTROPHIC FAILURE, WHICH REQUIRED A TOTAL REBUILD AND COST MORE THAN \$400,000.

The plant uses the CSI 5200 Machinery Health Oil Analyzer from Emerson Process Management. It has a microscope attachment for checking wear debris.

"Routine oil analysis revealed a high ferrous index on the 10-B pulverizer gearbox," explains Peterson. "We have six 8-ft gearboxes; one of them is redundant."

The first indication of trouble came during a routine monthly oil analysis. "The software screen that comes with the 5200 went from a zero to a 352 reading for ferrous," says Peterson. "And the next day it read 443. The fact that the



Alabama Power's Gorgas Steam Plant uses an in-house oil analysis system to avoid catastrophic events by checking machinery health.

previous month's analysis showed zero ferrous told me we had a problem."

After calling for help from a more experienced colleague, Harold Dobbins, it was determined that the system owner should be brought into the discussion. "A major outage was to begin in the next day or two on Unit 10, so the pulverizer representative was already on the plant site, and we decided to let him look at the data," explains Peterson.

After draining the gearbox and examining the internals, they found that the thrust bearing had deteriorated to the extent that gearbox failure was imminent and that the 10-B pulverizer would not have made it into peak season.

The bearing was replaced without a major event. Two months after the initial red reading and discovery of ferrous content, the replacement had been completed. The oil was resampled and cleared with a green light.

When Alabama Power had experienced a similar problem in 1999, prior to its on-site lab setup, it resulted in catastrophic failure of the gearbox, which required a total rebuild and cost more than \$400,000. "With the ability to catch this before a catastrophic failure could occur, the cost was only \$30,000 — \$20,000 for the bearing and \$10,000 for the installation," says Peterson. ☐