Paper mill saves millions using SKF motor analyzers

Northeastern U.S. operation reduces costs of unplanned downtime while extending motor service life using Baker AWA-IV static motor analyzers

A pulp and paper processing company in the Northeastern United States had a costly, befuddling problem. The company was dealing with excessively high maintenance costs and unplanned downtime at a number of its mills. In the highly competitive paper and pulp industry, cost and downtime minimization are top priorities for management. A thorough analysis of costs and unplanned failures led maintenance management at the company to focus on reduction of electric motor failures in each of its mills. Each mill has from hundreds to several thousand motors, so the probabilities for motor failures were high, particularly given a prevailing "run-to-fail" mentality at the company.

A reliability engineer at the company was given an objective to reduce mill downtime and overall maintenance costs.

"Our goal was simply this: improve unplanned maintenance downtime due to motors," the engineer said. With five paper machines running at one particular mill, he calculated that the cost of downtime for any of those machines ran as high as $10,000 per hour. "You multiply that by 18 hours per day, it gets costly real quick."

The engineer evaluated current motor maintenance processes and test practices to get a clearer understanding of the existing maintenance program. He set out to document what motor tests were being performed, determine the test coverage they yielded, and identify motor faults that repeatedly eluded detection with the equipment being used.

He also discovered that, in many cases, motor testing was performed ad hoc. The testers in use at the time (not SKF's) "provided us information that was way too open to interpretation." He was convinced the equipment in use did not have the ability to test for all motor faults, and so the motors were failing due to this lack of visibility afforded by those testers.

For example, the organization's existing testing programs would merely test motor coil resistance and perhaps the condition of ground wall insulation, but there was no ability to test winding insulation in the motor. There was limited testing of feeder cables and motor connections, and that was the extent of it.

With knowledge of the situation in hand, the engineer was given an SKF Static Motor Analyzer - Baker AWA-IV to perform the kinds of tests for problems he suspected were routinely missed. The new analyzer provided exactly what the organization needed to find any electrical issues that were causing motors at the mill to prematurely fail: the ability to perform low- and high-voltage tests to assess the condition of motor winding insulation, ground wall insulation, connections, and feeder cables.

The reliability engineer said he also values the ease of use of the Baker AWA-IV, which allowed him (or anyone he wanted at the plant) to automatically perform the exact same tests on specific motors time after time with the same 100 percent reliability of results. This is because the Baker AWA-IV is an automated, user-programmable tester; a given motor can be identified and saved on the analyzer, and the unit can be programmed to perform a specific set and sequence of tests on that motor.

The Baker AWA-IV is a static motor tester (meaning that it only tests motors that are powered down, or off-line), so it can be optimally used to test motors during periodic planned maintenance shutdowns at each of the mills. The engineer established a rotating schedule at the mill to ensure each motor in the plant was tested at least twice every twelve months (there are two one-week planned maintenance shutdowns per year). Opportunities to test suspect motors came with each of 20 planned one-day maintenance shutdowns in a given year.

The company subsequently deployed Baker AWA-IV testers at six of its sites, including the mill where the analyzers were initially used. During the first six months of use of the new analyzers, 31 unique motor problems were detected. These motor problems ranged from poor connections at the motor terminals to winding insulation faults to motor feeder cable faults, all of which were problems that could not be detected by equipment the company had used before the Baker AWA-IV.

Many of these motors were presumed to be operating correctly and without problem. In one particular case, a governor lube oil motor had failed surge tests performed by a Baker AWA-IV via a motor control cabinet. This motor was tested and found to be dangerously close to succumbing to a phase-to-phase fault; this motor was positioned directly beneath a 12,000 gallon lube oil tank for a turbine. Had this motor failed – and especially if it failed catastrophically – it could have caused an extended and very costly outage at the mill.

The pulp and paper company estimates its use of the Baker AWA-IV in the first six months saved more than $3 million in reduced maintenance costs and averted unplanned downtime. "The SKF analyzer's simplicity and consistency, along with its full complement of motor tests, were critical to our achievement of such dramatic cost savings. We plan to extend use of the Baker AWA-IV to our testing processes to our remaining mills as well."

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