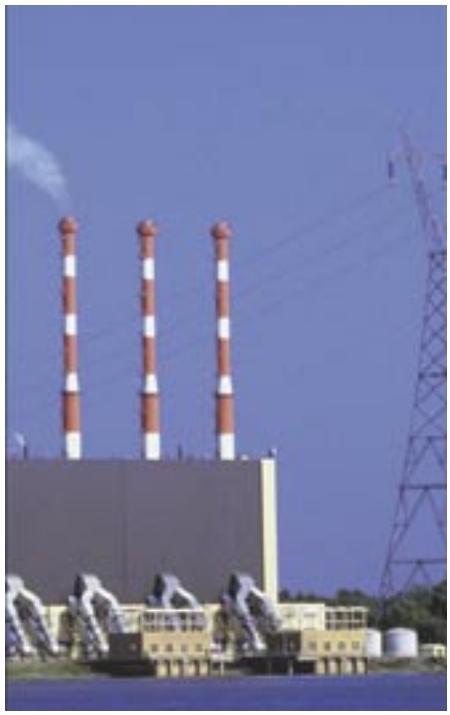
LUBE OIL PUMP REPLACEMENT REDUCES MAINTENANCE INTERVALS FROM 8.000 TO 25.000 HOURS

A major electric utility was experiencing excessive maintenance costs on pumps for the lubrication oil system on its gas-turbine fleet. The pumps' unscheduled major maintenance every 8.000 operating hours resulted in lost plant operating revenue and additional maintenance costs. Premature failing of the pumps bearings was determined to be the root cause. The plant maintenance department decided to test a replacement pump.



The NSSV pump from Allweiler. Installing centrifugal pumps of this design decreased minor maintenance interventions from five times to once per year and major maintenance intervals from 8.000 to (an estimated) 25.000 operating hours.

The electric utility first signalled the problem to the original system manufacturer and service provider of the lube oil system with an ongoing maintenance issue on a number of lube oil pumps, which had initially been installed with its fleet of gas-turbine power plants. About the same time, representatives of Allweiler (member of the Colfax group) began discussing the problem with the system manufacturer of the gasturbines and offered the utility company a solution: replacing the original pumps with Allweiler NSSV centrifugal pumps. With the originally chosen pumps in place, the utility company faced a recurring maintenance requirement of replacing the bearings every 8.000 operating hours on each of the system's four lube oil pumps. That meant bearing replacement about once per year for a base-loaded plant, possibly between the gas turbine's scheduled maintenance outage interval.

This labor-intensive process involved removal of the pump from inside the lube oil skid tank, disassembling the pump and rebuilding it with a replacement set of bearings. The frequent maintenance requirement was having a negative impact on the utility company's operational performance and budget.

Time-consuming repairs

Since the pumps are located inside the lube oil reservoir, the change-out is a time-consuming process. It was estimated that two to three hours would be required to remove the roof enclosure, disconnect the piping, strap and unbolt the pump and then lift it out. The rebuild of the original pump could be completed on site in an estimated five hours; however, depending on the availability and skill of the utility company's on-site maintenance team, the pump may have required rebuilding at the original equipment manufacturer's (OEM's) facility. After completing the rebuild or the return from factory service, another two to three hours would be required to reinstall the rebuilt pump. Not all four pumps would be repaired at the same time. If one were repaired every 4.000 operating hours, then all four would be repaired within two years for each gas turbine at the plant, if staggered service and repair were allowed. After the maintenance

staff experienced a few rebuilds, they expressed their concern over the problem to the utility company's management.

Extended maintenance intervals

The original lube oil system utilized centrifugal pumps with an upper thrust bearing located above the oil line of the tank. The lower sleeve bearing was self-lubricated (below the oil line), but the upper thrust bearing was a greased bearing (above the oil line). Minor maintenance, such as replacing and repacking grease, had to be performed on-line every 1.500 operating hours, or about five times a year, and major maintenance was necessary every 8.000 operating hours, or about once a year, while the unit was shut down.
The utility plant decided to install NSSV centrifugal pumps from pump manufacturer Allweiler. As a result, the required minor maintenance decreased from five times per year to once per year, a five-fold reduction. Even better, major maintenance intervals went back from 8.000 to (a suggested) 25.000 operating hours, a three-fold reduction. Instead of major maintenance once per year, the in-service duration was extended to three years. Also, the maintenance interval matched the scheduled maintenance interval on the gas turbine, which eliminated additional unscheduled outages and the downtime costs associated with lost plant revenue, maintenance-staff time and replacement parts.

Zero maintenance

The NSSV pumps continually flush, cool and lubricate the bearings, significantly reducing wear and extending the maintenance interval. Another source of lower cost proved to be the design of the NSSV pump: only the pumps have to be replaced during installation. The original motors can simply be remounted to the replacement pumps, further minimizing the effort and costs associated with the retrofit. In addition, the improved design utilizes an internal lubed bearing with zero maintenance and extended bearing life, plus an array of other features and benefits, including:

- Oil-lubricated upper bearing (no grease requirements)
- Internally fed design
- Low-pressure (0,2 bar, 3 psi) feed
- Pickup for feed behind impeller (centrifugal force reduces chances of contamination in upper-bearing feed line)
- Feed line pressurized as soon as pump begins to spin
- Flow-control orifice 2mm in diameter
- Flow rate to upper thrust bearing through orifice of approximately 1 GPM at 45 mph, which should preclude any significant varnish accumulation.

As a result, 40 Allweiler "plug-and-play" replacement lube oil pumps were delivered, that have extended the required maintenance interval by three times, saving the utility company almost 12.000 euro per year per pump. In fact, the cost of replacing the pumps yielded a payback in less than one year. <<