

Industry: Petrochemical Refinery

Machine Type: Centrifugal Pumps

History

Large primary pumps were having unacceptably low MTBF (Mean Time between Failure) – approximately less than two years, in spite of a conscientious preventive maintenance program and regular vibration monitoring.

The refinery had at least two pumps per month coming out of service and into the shop for repairs, usually involving wear of bearings or moving components. The shop was so backlogged on major pump repairs that they could not keep up with routine maintenance items in the rest of the plant.

Installation and alignment problems were ruled out through vibration analysis and also by teardown and inspection.

The refinery was using its own lube oil from drummed stock and was sure they were getting the best possible quality lubricant available. Regular product quality tests showed that the lubricant met or exceeded all current specifications and standards for commercial grade lubricants. The refinery tried using lubes from their other company refinery locations, and also tried using a competitor's lubricants. No improvement was detected by changing source of supply.



Lubricant laboratory analysis

An oil analysis program was implemented on refurbished pumps to diagnosis the problem. The laboratory was monitored for contamination, machine wear and oil quality. Laboratory analysis showed oil type and grade was appropriate for the application. However, laboratory analysis showed moderate to high particulates in the new oil and high levels of particulates in the oil in the machine at the first oil sample. As time went on, oil started showing wear particles, both ferrous and nonferrous. When the normally scheduled oil change had been reached, the oil was heavily contaminated with particulates and wear metals.

Evaluation

Oil was collecting dirt from the drums before being introduced into the machines. There was significant amounts of welding slag, dirt, peening shot, metal shavings and general debris left in the oil sumps after refurbishment. The dirt acted as an abrasive, causing high component wear in the bearings and in other moving parts.

Solution

- Refinery cleaned and thoroughly washed all internal lube systems before closing up the pumps.
- All new lubricants were pumped from the drums through a portable filter cart and then directly into oil reservoirs.
- All oil for “topping off” reservoirs was filtered through a portable filter cart directly into reservoirs.
- Weekly oil analysis for particulates and wear metal are conducted.
- Reservoirs that showed high particulates were connected to a “kidney loop” filter with a portable filter cart until particulate levels were down to acceptable levels.

Impact

The refinery reduced primary pump failure from 24 per year to zero. No pump failures has occurred in a year.

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