

**\$80,000 SAVINGS**  
plus elimination of  
unscheduled down time.

Power Condensate Pump  
Industry: Power Plant  
Case Study No. 37308

## CASE STUDY

### Further analysis prevents equipment shutdown.

The equipment being discussed in this case study is a vertical pump with two stacked thrust bearings on the motor free end.

This unit has been monitored by Ferrographic analysis and Used Oil analysis for 6 years. The ferrographic and used oil analysis has been performed by Trico.

During the routine monthly testing, the wear particle concentration has steadily increased. Analytical ferrography is performed monthly due to the criticality of this equipment to plant operations.

Upon examination of the ferrogram (wear particles deposited upon a glass slide for evaluation), fatigue spheres were observed (as seen in Figure 1).

Figure 1



Fatigue spheres are often indicative of bearing fatigue prior to a spalling condition, which are generated in the bearing fatigue cracks.

Accompanying the fatigue spheres were high alloy steel bearing wear particles (as seen in Figure 2).

Figure 2



Bearing wear particles indicate rolling contact failure due to improper load, speed, and/or poor lubrication of equipment's mating surfaces.

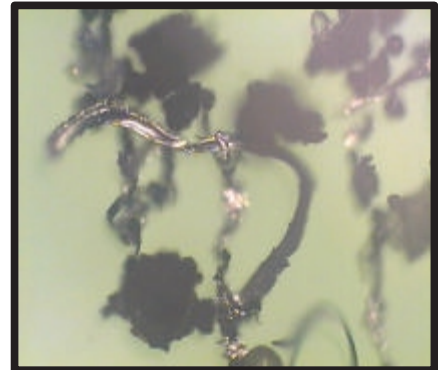
A subsequent sample was taken to confirm the diagnosed abnormal wear mode that revealed a slight increase in the wear particle concentration along with an increase in the size and quantity of severe sliding and cutting wear particles.

Severe sliding wear is generated due to excessive speed and/or load on surfaces in contact. Cutting wear (as seen in Figure 3) is an indication of abrasive particles in this lubricant.

The continued presence of these large particles indicated that a CRITICAL wear mode was in progress and maintenance was required.

An inspection was performed on this pump and showed spalling of the inner race and rolling elements (as seen in Figure 4).

Figure 3



The timely identification of this failure mode minimized the repair cost to under \$10,000.00, with no secondary damage to the equipment. According to the customer, the motor was cleaned and reassembled with new thrust bearings and made ready for operation, savings \$80,000.

Figure 4

