

Case History

531E706 - NASH VACUUM PUMP NON DRIVE END BEARING FAILURE DETECTION

Vibration is probably the most important indicator of the mechanical integrity of rotating machinery. Overall vibration levels when trended, give immediate indication of change in the condition of that machine, however, the overall vibration levels are only a numeric value and do not allow identification of any specific underlying fault type or types. Vibration spectral information allows identification of any offending frequency component(s) thus enabling the analyst to determine the fault type and severity.

Riaupaper operates eleven NASH vacuum pumps at Paper Plant. These pumps are critical equipment, as when this pump is out of service all process related to paper machine should be stopped. One of pumps (531E706) was getting high vibration level at pump side. In order to find out root causes of high vibration level, condition monitoring team conduct vibration analysis.

Examination of the vibration spectrum exhibited a peak at 3225 CPM, along with harmonic activity and tied in to the calculated defect frequency for the pump non drive end bearing outer race (see Figure 1)

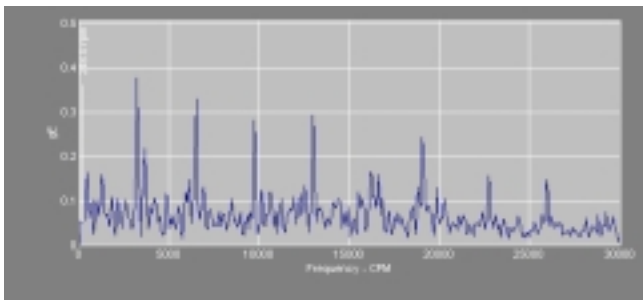


Figure 1 - Enveloping spectrum indicating bearing damage

Based on this information, a recommendation to remove the bearing was made.

As this machine could not be stopped during paper machine running, it was decided to replace the bearing during paper machine planned shutdown on July 17, 2003.

Figure 2 below shows the vibration spectrum taken from the same test point on the pump after bearing renewal.

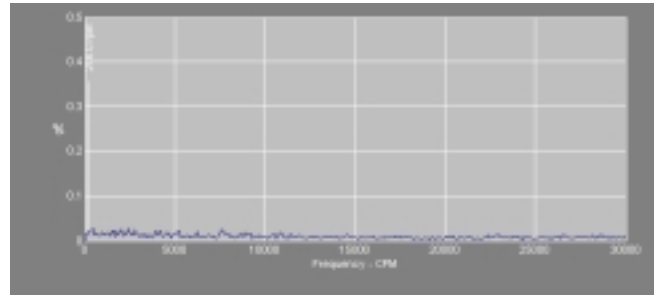


Figure 2 - Spectral activity recorded from the new bearing.

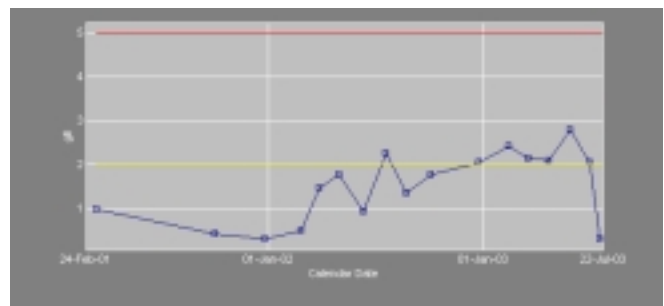


Figure 3 - overall vibration levels clearly show an improvement to the operation of this machine after bearing replaced.

Examination of the pump bearings highlighted an area of flaking on the outer race. The photograph below is clear evidence of this damage.



Figure 4 - Damage to roller bearing outer race.

The pump was subsequently brought back into service with no disruption to the process, baseline vibration recorded at the pump bearings indicated levels had returned to previous values.

If left uncorrected, would have resulted in the paper machine shutting down for a minimum of **6 hours**.

The production cost saving due to early fault detection was estimated to be **US\$ 60,000**

(6hours * 50 ton/hour = 300 tons * US\$ 200).