A V TECHNOLOGY LIMITED

Machines Talk,
And It Pays to
LISTEN.

Case History No.10

PUMP DIAGNOSIS (Overall v Spectrum)

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.

This case history highlights the importance of vibration spectrum data by allowing identification of two totally different fault types between two identical machines.

K510 is a liquid ring vacuum pump and is directly driven by a 18½kW, 1460 rpm motor. During April 1997 the compressor section of the machine was replaced due to planned maintenance scheduling. Baseline vibration levels recorded from the non drive end bearing of the new compressor were in the order of 18 mm/s rms, indicating an increase of 72% above the previous average levels and were clearly not acceptable see Figure 1.

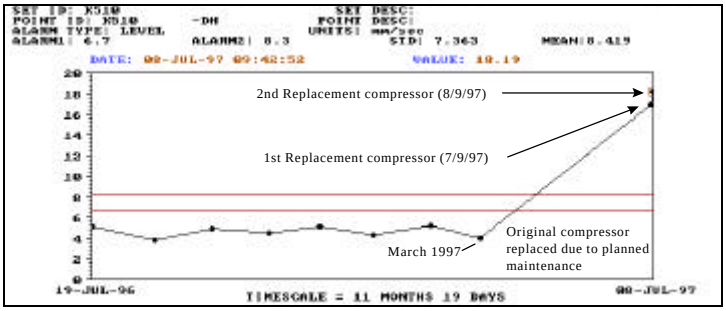

Figure 1 - Compressor non-drive-end vibration levels.

Investigation of the vibration spectrum indicated broadband activity up to 2 kHz suggesting a damaged bearing, see Figure 2. Based on this information a recommendation was made to replace the compressor bearings,

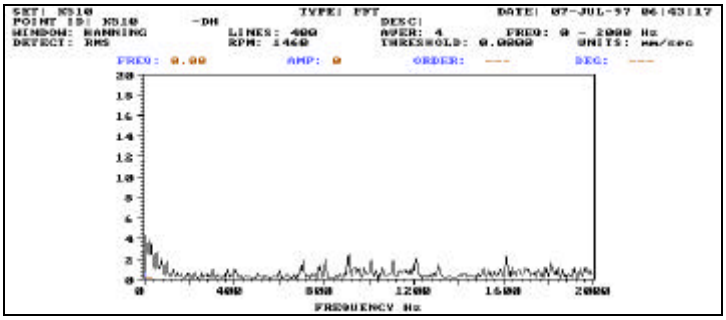

Figure 2 - Vibration spectrum indicating bearing damage.

The compressor was removed and a 2nd replacement compressor fitted. On start-up of this machine (8th July 1997) the vibration levels at the compressor non drive end bearing were also in the order of 18 mm/s rms. On examination of its vibration spectrum, the dominant component was that of the rotational frequency indicating an imbalance condition see Figure 3.

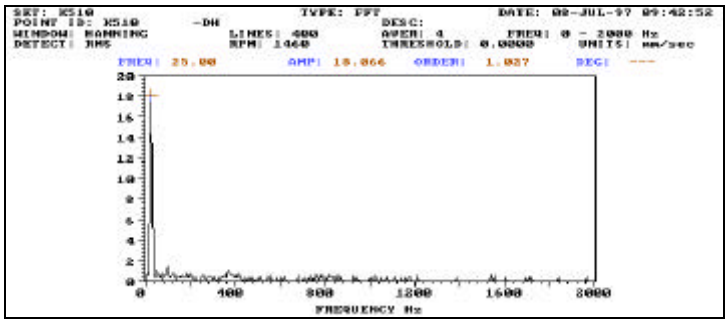

Figure 3 - Vibration spectrum indicating imbalance condition.

This compressor was also removed for overall and balance correction. On examination of the bearings from the 1st machine it was evident that they had suffered water ingress during storage. The lubrication film between the bearing surfaces failed causing severe water etching (galvanic corrosion) of the rollers and bearing races. see Figure 4.

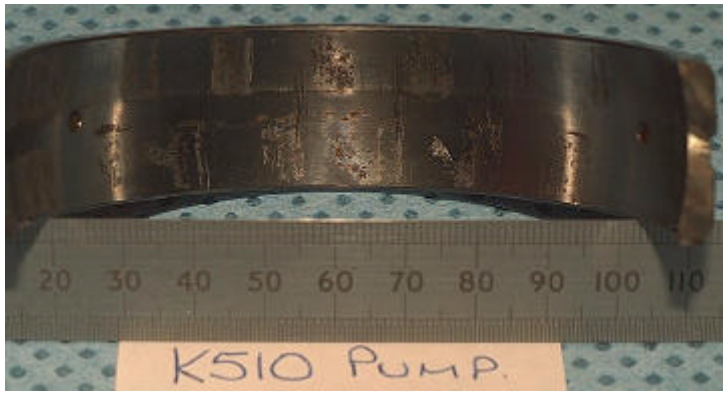

Figure 4 - Galvanic corrosion of the roller outer race.

It is estimated that a repair cost saving in the region of **£2500** was made in preventing catastrophic failure of the 1st compressor. However, the 2nd compressor, with the balance related problem, with continued monitoring, could have remained in service had the process demanded until either a replacement compressor was available or component damage became evident.

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