Case History No.12

MOTOR DRIVE PULLEY STEADY BEARING FAILURE

K4420-3 is a two stage in-line reciprocating compressor which is driven by a two speed (960/400 rpm) Laurence Scott electric motor via a 9 belt pulley system giving a compressor speed of either 345 rpm or 144 rpm respectively.
This machine forms part of a monthly vibration monitoring schedule and is one of a team of three identical units that produce CO_2 for the chlorine liquefaction process, Figure 1 below shows the layout of the machine.

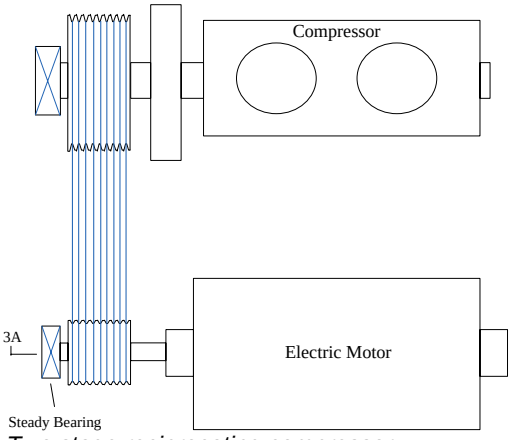

Figure 1 - Two stage reciprocating compressor

Historically, the overall vibration levels throughout the machine had been consistently low (around 1.4 mm/s rms) and had never given any cause for concern, however, the overall vibration levels recorded on the 30th September 1997 at the motor drive pulley outboard steady bearing exhibited a marked increase in the axial direction (position 3A), see Figure 2 below.

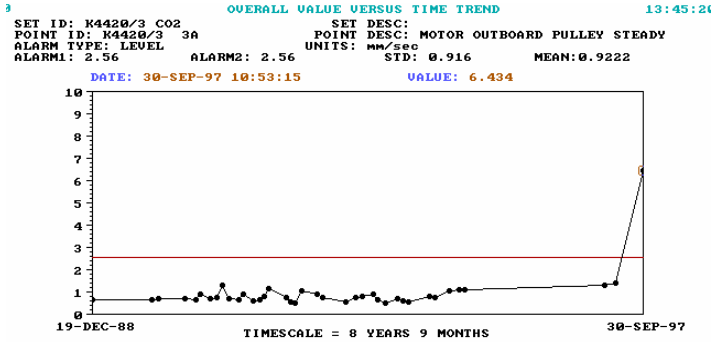

Figure 2 - Motor outboard pulley steady bearing

Examination of the vibration spectrum collected from this location exhibited several harmonic peaks across the 500 Hz bandwidth indicating a possible bearing defect at this location, see Figure 3.

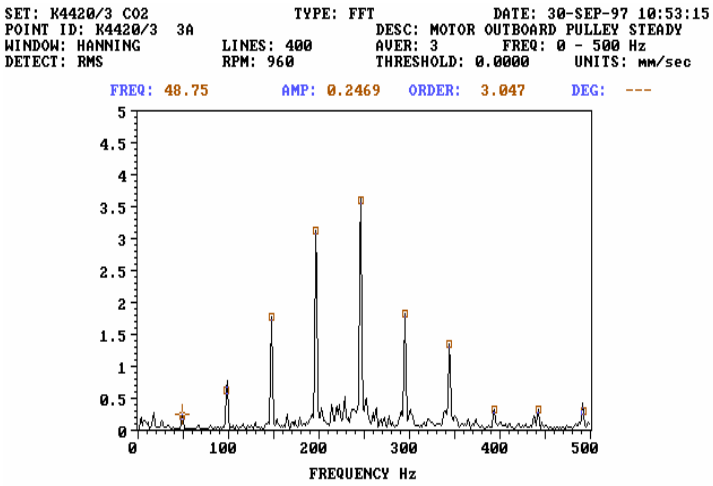

Figure 3 - Vibration spectrum indicating suspected bearing damage

The site Mechanical Engineer was immediately made aware of the change in the vibration levels with a recommendation to replace the bearing as soon as possible.
The machine was subsequently taken off line and the bearing replaced. On examination of the original bearing, a large area of flaking (spalling) was evident on the outer race, see Figure 4.

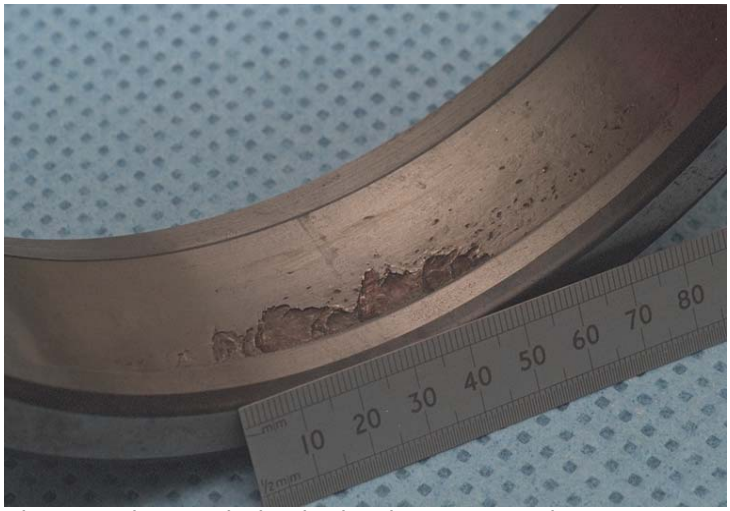

Figure 4 - Photograph showing bearing outer race damage

Due to the accurate analysis and prompt action by the Engineering Department a catastrophic failure had been prevented with a mechanical cost saving of several thousand pounds.

A clear case of 'Machines Talk and it Pays to LISTEN'

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