A V TECHNOLOGY LIMITED

Machines Talk,
And It Pays to
LISTEN.

Case History No.13

K6321 MOTOR NON DRIVE END BEARING FAILURE

K6321 is a Stork centrifugal compressor driven by a 450 kW motor through an epicyclic gearbox increasing the compressor speed from 2970 rpm to 17890 rpm. The machine is responsible for compressing H_2S (Hydrogen Sulphide) and fuel gas a from pressure of 0.5 bar to 7.5 bar and forms part of the 5 week vibration monitoring schedule.

Historically, vibration levels at the electric motor non drive end bearing were typically around 0.8 mm/s rms. However, overall vibration data collected on the 4th November 1997 at the same location indicated a step change, taking it above the pre-set alarm levels of 1 and 1.3mm/s. A further set of data was collected on the following day, which also indicated a further increase, albeit slight.

During this period AVT were carrying out an evaluation of a new hardware and software condition monitoring system, and this was an ideal opportunity to put it to the test in a trouble shooting application. This new system allowed higher analysis functionality in terms of vibration spectral resolution, whereas the current system would only allow a maximum of 400 lines.

A data set for the electric motor was designed with a collection specification of 1000 Hz and 3200 lines of resolution.

Based on the fact that the overall levels were still considered low, and being aware of this increase it was decided to continue to run the machine and re-test the motor in 5 days time during which, provisional plans to remove the motor could be made. On the 11th November 1997 a further set of readings were taken, and again an increase in overall levels was evident see Figure 1.

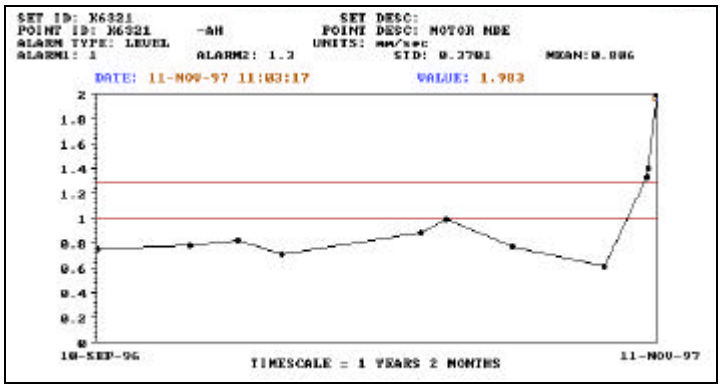

Figure 1 - Continued increase in overall vibration levels.

Examination of the vibration spectrum exhibited a peak at 292.5 Hz and tied in to the calculated defect frequency for the motor non drive end bearing inner race see Figure 2.

Based on this information, a recommendation to remove the machine was made. As this machine was not spared, the production unit had to shut down. The motor was removed and sent away for bearing renewal, the old bearings were returned to site and an inspection into their condition carried out. The drive end bearing was found to be in good condition with a plentiful supply of lubricating grease evident. The non drive end bearing however, had as predicted from the vibration spectral analysis, a fatigued area of 10mm by 8mm on the inner race see Figure 3.

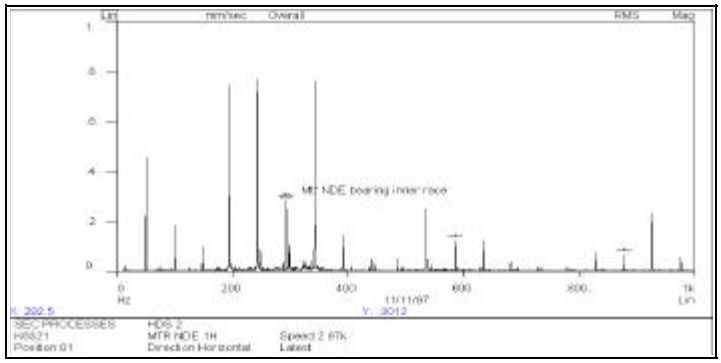

Figure 2 - High resolution spectrum indicating bearing damage.

After the bearing renewal, the motor was re-installed and aligned with the gearbox, with a further set of vibration readings being taken during run-up, and again after 10 minutes on line, recorded overall vibration levels at the motor non drive end were seen to have returned below 1 mm/s rms.

Figure 3 - Photographic evidence of bearing inner race defect.

Due to the accurate analysis and prompt action from the Production Unit it is felt that catastrophic failure of the electric motor had been prevented with an estimated mechanical cost saving in the region of **£75,000.**

A clear case of “Machines Talk And It Pays To Listen”.

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