



Case History No.37. K502B. Boiler I.D Fan bearing failure.

K502B is an I.D Fan (Induced draught) on a medium pressure (250.psi) 'Package Boiler' system, which is only run occasionally when the main high pressure boiler system cannot meet the required steam demand.

The machine is a simple 6kW motor/fan assembly, with the fan rotor being directly attached to the motor shaft.

The machine is on a vibration based condition monitoring schedule and is visited for checking on a 5 weekly cycle. However, as note above, the machine only runs occasionally so there can be periods longer than 5 weeks between checks.

The trend plot shown in Figure 1 shows a step change at the motor's non drive end, during the vibration survey conducted on November 13th 2007. The overall value of 33 mm/s RMS, was considered as excessively high and is about 4 x the usual amplitude of this machine.

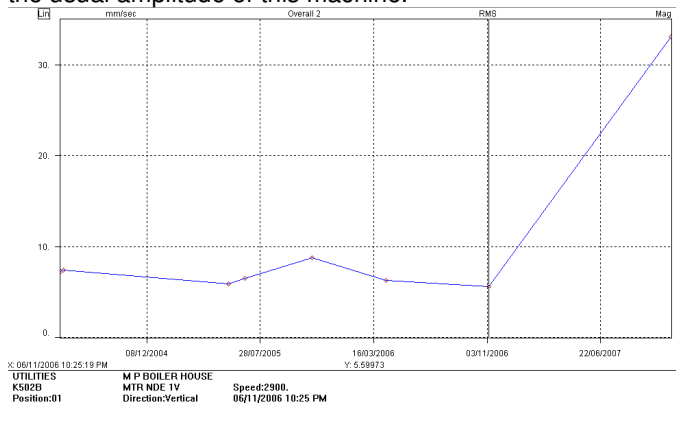


Figure 1

Analysis of the vibration spectral plot shown in Figure 2 shows a dominant peak at a frequency equal to the machines running speed (2,900 rpm) and a number of running speed harmonics. This type of spectral plot is generally indicative of looseness. A visual inspection was carried out at the time of monitoring, but there were no obvious indications of looseness, such as loose motor or plinth holding down bolts or loose ducting. It was assumed therefore, that the fan rotor was loose on the shaft.

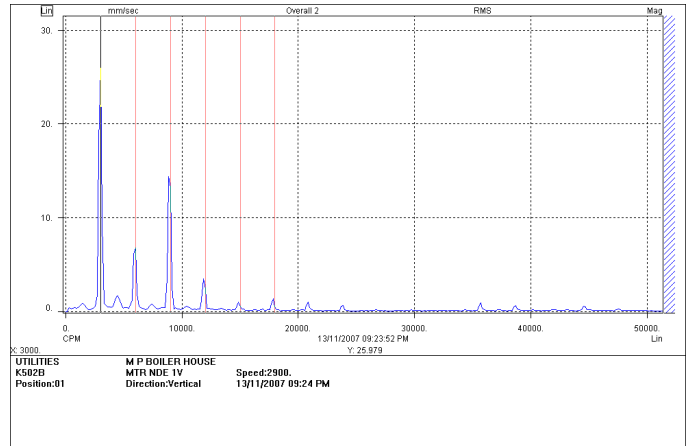


Figure 2

The machine was taken out of service and dismantled in the workshop, where it was found that the motor's drive end bearing cage had collapsed. This allowed the bearing's 'Balls' to all migrate to the bottom of the bearing, causing excessive clearance within the bearing assembly and therefore, looseness of the rotating motor/fan element.

The machine has since been repaired and returned to service and the vibration levels have returned back down to normal (see Figure 3) and there were non of the bearing component frequencies in the spectrum (see figure 4)

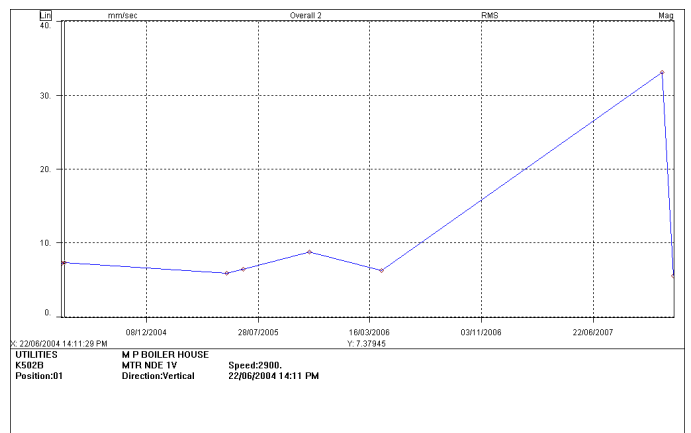


Figure 3

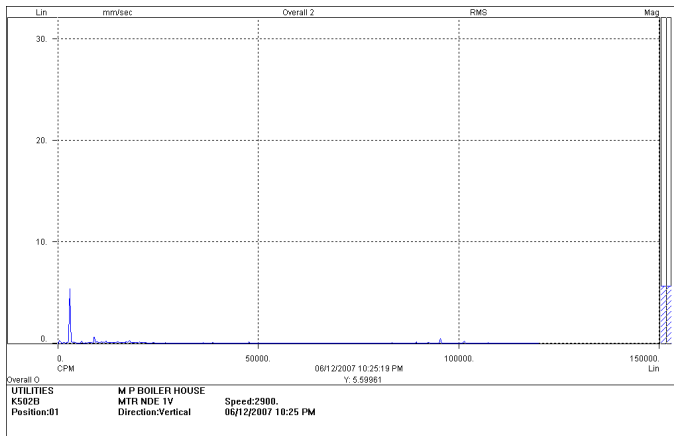


Figure 4

Whilst the early assumption that the fan was loose on the motor shaft was incorrect, the diagnosis of looseness was correct.

The early detection of the problem, resulted in the need to replace only the bearing itself and a quick turnaround. If it had not been detected, more serious damage would have occurred with increased repair costs and extended machine down-time.