

Case History No.17 Off-Shore Gas Platform HVAC Pressurisation Fan Bearing Damage.

This case history serves to demonstrate how effective machinery Condition Monitoring (CM) can help in the accurate identification of underlying mechanical component defect(s) thus helping Maintenance Engineering Staff carry out cost effective repairs with minimum machine down time and process disruption.

This case history however, has two stories to tell in so much as the identification and correction of one problem unfortunately ended with the introduction of a different problem which was unforeseeable at the time of maintenance activities.

The machine in question is an overhung HVAC Fan and is one of two which deliver air into a common duct. This fan is used to apply a positive pressure into a main control room and MCC room to prevent noxious/explosive gasses entering the buildings.

Since the application of CM activities on this twinned unit it was identified at an early stage that some underlying bearing defect was evident on one of the fan shaft support bearings on the North facing fan unit. This was demonstrated with a continuing rise in trended overall vibration levels recorded at the fan bearings, see Figure 1 below.

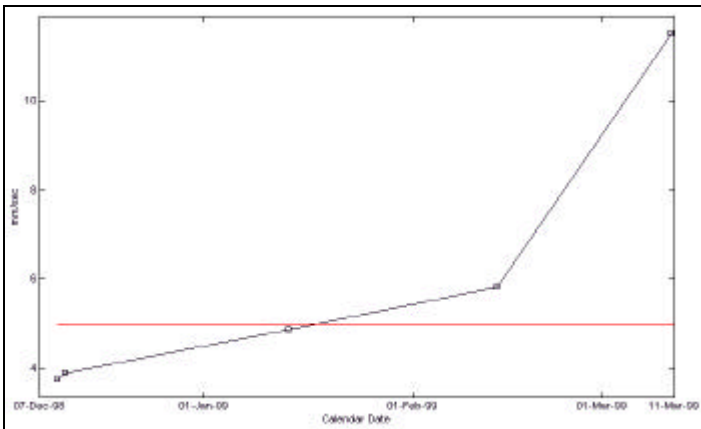


Figure 1 – Continued increase in overall vibration at fan bearing

Examination of the vibration spectrum related to each overall value exhibited spectral activity and harmonic content which coincided with the calculated bearing defect of the bearing outer race (ball pass frequency outer BPFO) indicating some degree of damage to the bearings outer track. Each subsequent survey indicated an increase in this activity see Figure 2 relating to the latest trend reading.

It was recommended that the fan bearings should be changed at the earliest convenience to prevent catastrophic failure of the fan unit along with any subsequent secondary damage.

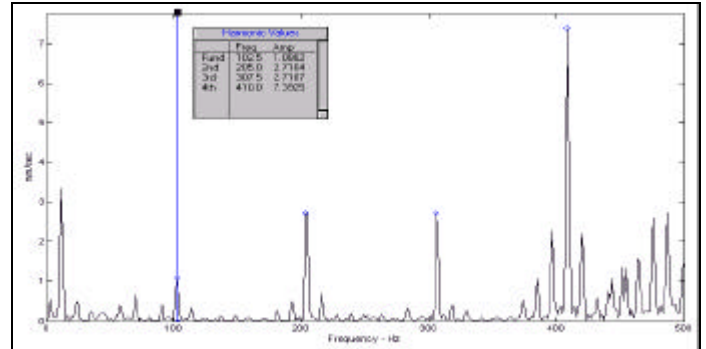


Figure 2 – Vibration spectrum indicating bearing damage.

Examination of the old fan bearing concluded the analysis to be correct, with metal loss evident on the outer track due to wear/fatigue spawling see Figure 3 below.

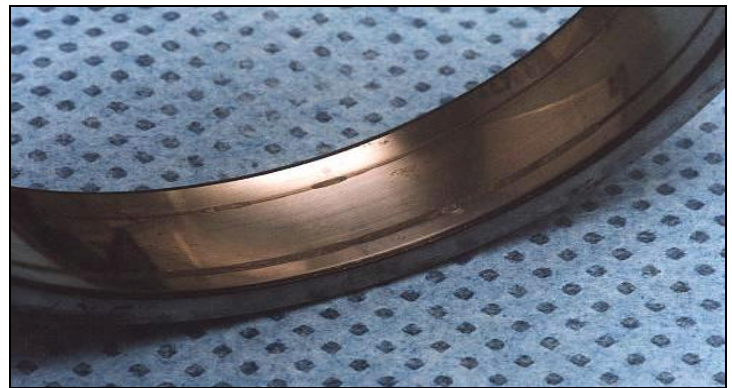


Figure 3 - Photographic evidence of bearing damage.

After bearing replacement a set of baseline vibration data was taken from the machine with the overall vibration levels being higher than before. Spectral analysis indicated the fan was now out of balance and was possibly due to some component loss from the fan rotating element as a result of the disturbance from the maintenance work. The original bearing problem had been corrected, however, due to the length of time this fan has been in service (approx. 25 yrs) and little or no work ever being carried out on the fan rotating element, it is concluded that some component loss has occurred, possibly in the form of corrosion (rusting) or debris from the fan blades. The next stage is to open the fan ducting and examine the fan rotating element with a view to replacement or in-situ balance correction (dependent upon results of examination). The Estimated mechanical cost saving is in the region of £10,000.