



Success Story

WIND TURBINE GEARBOX DEFECT

Gearbox faults are one of the major causes for wind turbine downtime. This case story demonstrates how an effective remote condition monitoring strategy avoided costly downtime and consequential damage.

MACHINE/INDUSTRY/PROCESS

Machine	Wind turbine gearbox
Company/Process	Wind turbine operator
Monitoring System	Brüel & Kjær Vibro Wind Turbine Monitoring System: Second stage part of gearbox by an accelerometer
Monitoring strategy	Detection: first and second order gear mesh frequencies Diagnosis: Signal analysis, gearmesh frequency side bands

OBSERVATION/DIAGNOSIS

As shown in Figure 1, the gearbox second stage gear mesh frequency (first order) exceeded the Alert alarm limits. Detailed analysis shows sidebands around the first and second order gear mesh frequencies of the gearbox second stage, which confirm a gearbox fault.

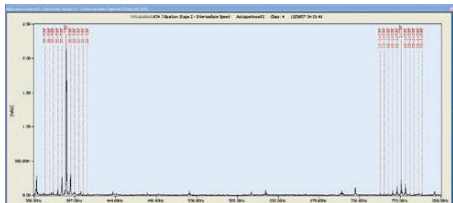


Figure 2. Spectrum of the damaged second stage of the gearbox.

Metal shavings, presumably from the second stage gear teeth (see Figure 3), were seen in the oil filter, so the gearbox was removed for further inspection and replaced by a new one with minimal downtime. After replacement, the reduced first order gearmesh amplitude of the new gearbox is seen in Figure 1.

BENEFITS

The damaged gearbox actually required minimal repair since the fault was detected at an early stage of development, but what is most important is that an expensive catastrophic failure was avoided.



Figure 1: The trend plot showing the gear mesh frequency trend before and after servicing the gearbox.

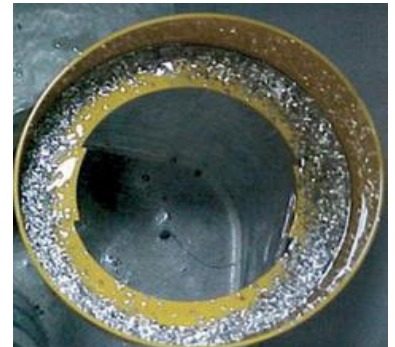


Figure 3. Metal shavings in the oil filter coming from the damaged second stage of the gearbox.

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