

PROBLEM SOLVING APPLICATIONS

Paper Mill Gearbox

A paper mill's Farrell Gearbox was coupled to a large 400 HP drive motor. The gearbox failed and the replacement was over \$40,000.00 plus installation costs. The company then asked PRES, Inc. to monitor the gearbox to find out what caused the failure and how to prevent the occurrence from happening again.

The speed at the gearbox input was $1052 \text{ rpm}/60 = 17.53 \text{ Hz}$, the gearbox output was $309 \text{ rpm}/60 = 5.15 \text{ Hz}$. The Gear Mesh Frequency (GMF) was $24,150 \text{ cpm}/60 = 402 \text{ Hz}$. The gearing was 3.336-1.0, 23/78 teeth. Utilizing the Sentry System Technology, PRES, Inc. was able to come to these conclusions.

Figure 1: Illustrates the mechanical stresses being impressed on the drive train. Channel 1 data collected in the vertical direction at high-speed input to the gearbox clearly depicts a mechanical looseness that generates numerous peaks, separated by 17.5 Hz, the input operating speed. The presence of so many multiple peaks indicates severe mechanical looseness.

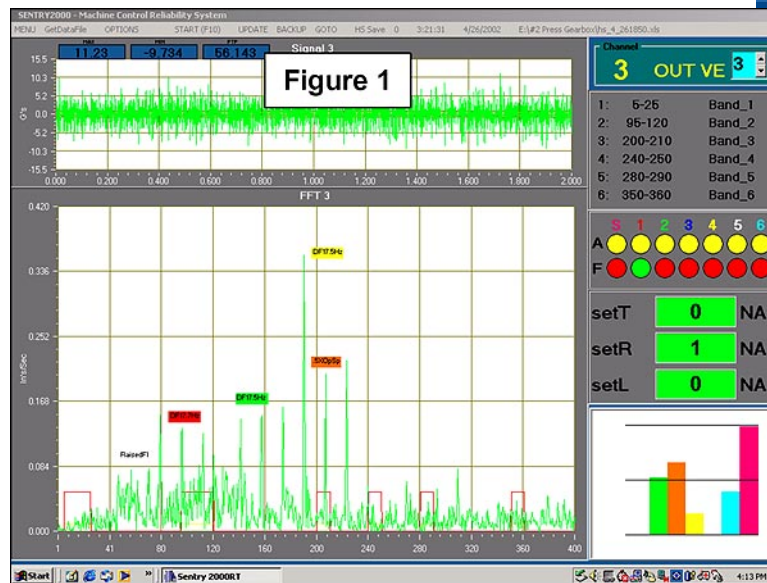
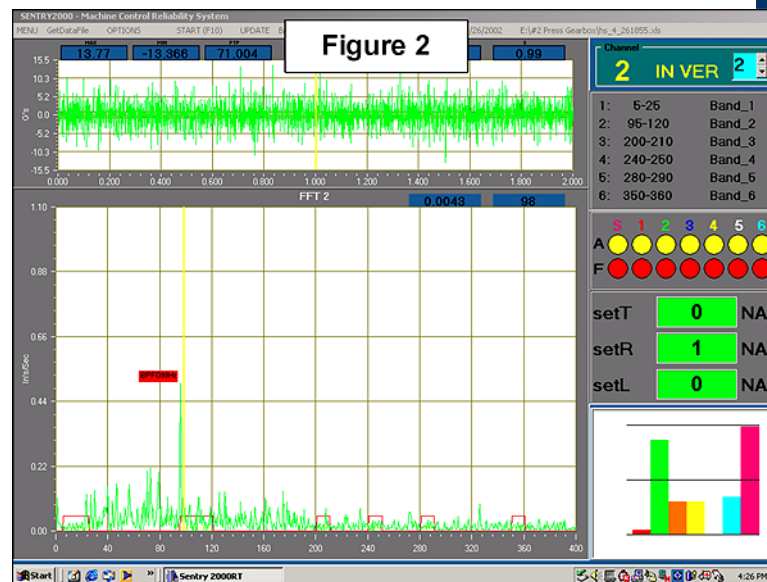


Figure 2: This depicts bearing defect frequencies (BDF) being excited by the looseness. PRES, Inc. was able to determine that the mechanical looseness was primarily due to the deterioration of the structural steel that supports the 400 hp motor. This results in severe mechanical stresses being placed on the input of the gearbox which effects the gears and the input bearing supporting the high-speed shaft.



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