

BEARING FAILURE DETECTION IN FRONT SIDE OF FELT ROLL 47 (10TH DRYER GROUP)

Reference vibration measurement on the front side bearing of a 625 RPM, 65 mm diameter fabric roll pointed out a severe BPFO bearing damage with impact visible in the acceleration-enveloping spectrum (see Figure 1).

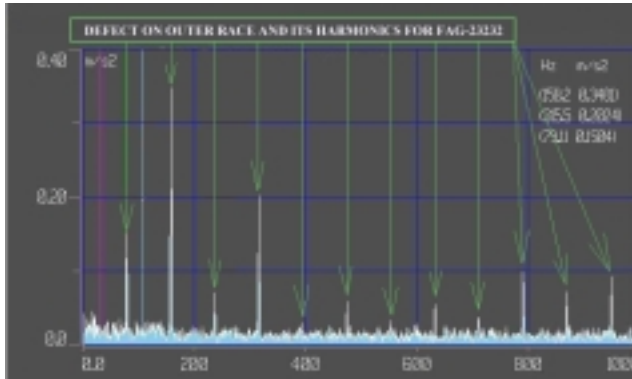


Figure 1 – Spectrum of acceleration Envelope measurement indicating outer race defect.

Having so many multiples of BPFO, this spectrum fits the description of a stage 3 bearing failure as described in the Technical Associates Illustrated Vibration Diagnostic (Figure 2).

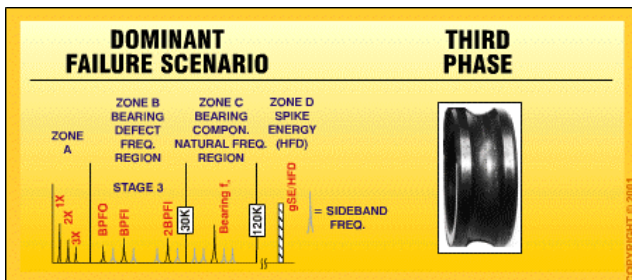


Figure 2: Stage 3 bearing failure

As per recommendation, the roll bearings were replaced on February 12, 2004.

After replacement of roll bearings, a significant drop in vibration level can be seen in Figure 3. A figure 4 is waterfall picture of envelope spectrum and clearly shows that bearing defect frequencies disappeared after bearing replaced.

To confirm that a defect actually existed, the front side bearing was cut open and visually inspected (see Figure 5).

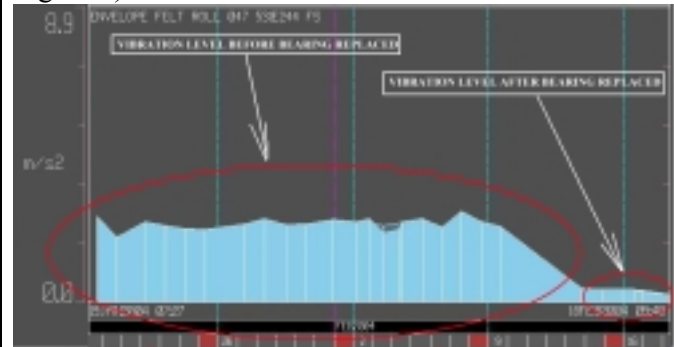


Figure 3: Vibration level before and after bearing replaced

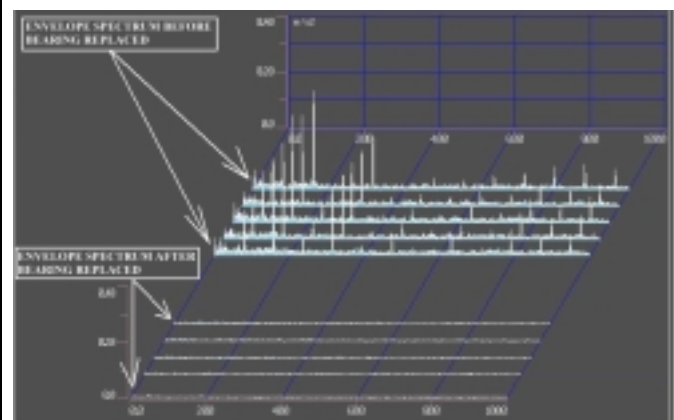


Figure 4: Waterfall picture showing improvement to the machine operation after bearing replaced



Figure 5 – Outer race damage found at front side bearing

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Due to accurate analysis and prompt action, a catastrophic failure to the 10th Dryer Group components was prevented. If left uncorrected, would have resulted in the paper machine shutting down for a minimum of 10 hours.

COST CALCULATION:

1. Cost for planned repair (US\$):

Following value were used in the calculations:

- labour US\$ 5 / h
- Production losses US\$ 10,000 / h

The time for repair was evaluated to be 4 hours in case of planned repair.

Labour: 3 persons * 4 h * 5 US\$	US\$ 60
Material: New Bearing (S/C 10587)	US\$ 585
Maintenance Total	US\$ 645
Production Losses	US\$ 0
TOTAL	US\$ 645

2. Evaluated costs for unplanned repair (US\$):

When calculating the costs for unplanned repair it was assumed that the roll would be damaged and it would have to be replaced. It would take 8 hours for six men to change the roll and 2 hours to change the fabric because the roll could not be changed without cutting the fabric.

Labour: 6 persons * 10 h * 5 US\$	US\$ 300
Material: New dryer fabric (S/C 167279) New Bearing (S/C 10587)	US\$ 27,504 US\$ 585
Maintenance Total	US\$ 28,389
Production Losses 10 h * 50 tons/h = 500 * US\$ 200	US\$ 100,000
TOTAL	US\$ 128,389

3. Cost Efficiency:

US\$ 128,389 – US\$ 645

= US\$ 127,744