

**Location** : PM1 10th Dryer Group  
**Position** : 10th Dryer Group Input Shaft Bearing  
**Problem** : **BALL AND OUTER RACE DEFECT**

**Symptoms:** High vibration picked up in the drying cylinder No.58 back side bearing. Examination of the vibration spectrum exhibited a peak at 320 Hz, along with harmonic activity and tied in to the calculated defect frequency for the input shaft bearing (SKF-23030)

Based on this information, a recommendation to remove the bearing was made.

As this machine could not stopped during paper machine running, than it was decided to replace the bearing during paper machine annual shutdown on February 10, 2004.

**Corrective Action** : The drive shaft bearing was inspected on a planned shutdown (Feb 10, 2004). The bearing examined it was noticed that the bearing was damaged in outer ring and roller bearing. After the bearing replaced the vibration spectrum showed that the situation was in order.

**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 16 hours.**

ENVELOPE SPECTRUM

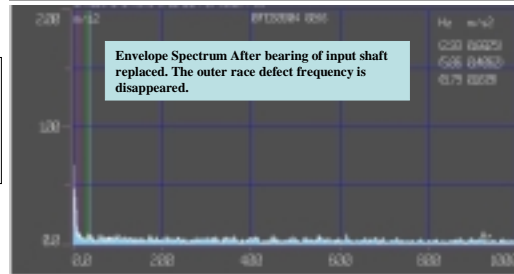
**Envelope Spectrum before bearing replaced.**

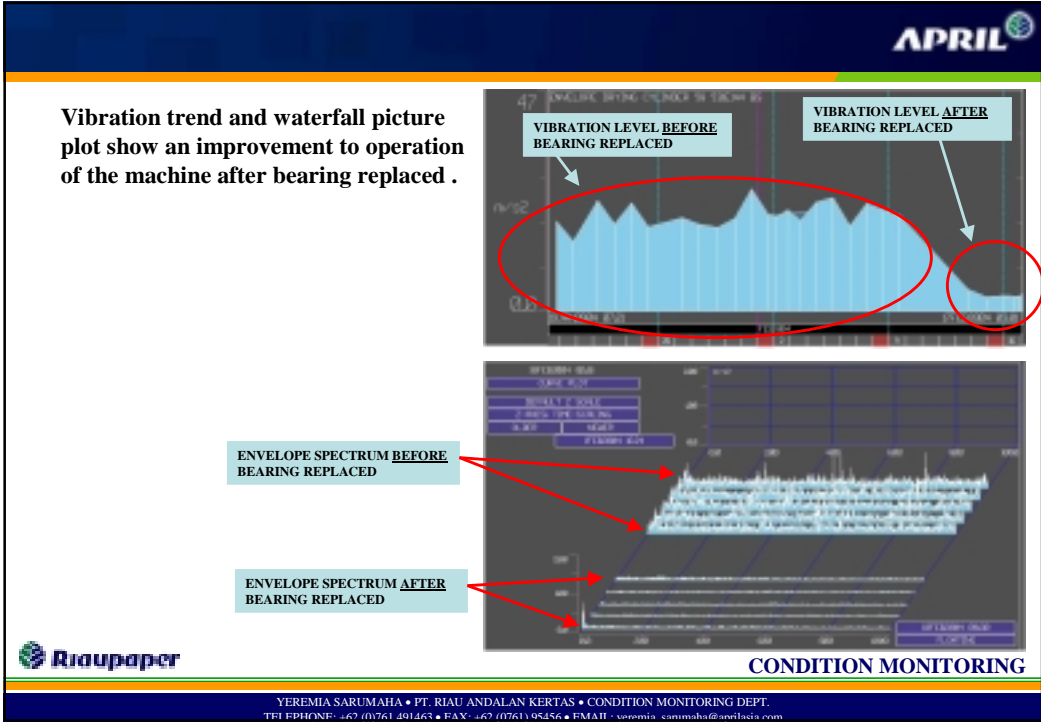
Examination of the vibration spectrum exhibited a peak at 320 Hz, along with harmonic activity and tied in to the calculated defect frequency for the input shaft bearing



**Envelope Spectrum after bearing replaced.**

Envelope spectrum recorded from the new bearing shows an improvement to operation of the machine after bearing replaced .





### Cost for planned repair (US\$)

Following value were used in the calculations:

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

<b>Labour:</b> 6 * 8 * 5	<b>240</b>
<b>Material:</b> New Bearing SKF23030 (S/C 267237)	<b>272</b>
<b>Maintenance Total</b>	<b>512</b>
<b>Production Losses</b>	<b>0</b>
<b>TOTAL</b>	<b>512</b>

### Evaluated costs for unplanned repair (US\$)

The time for repair was evaluated to be 16 hours in case of unplanned repair.

In this calculation the consecutive failure have not been taken into consideration, but the primary loss was caused by the production stoppage, which would have been considerably longer, if the gears or cylinder had been damaged.

Cost Efficiency:

**US\$ 160,943 – US\$ 512**

**= US\$ 160,431**

<b>Labour:</b> 6 * 16 * 5	<b>480</b>
<b>Material:</b> New Bearing SKF23030 (S/C 267237)	<b>272</b>
New Bearing SKF6228 (S/C 267245)	<b>191</b>
<b>Maintenance Total</b>	<b>943</b>
<b>Production Losses</b> 16 h * 50 tons/h = 800 * US\$ 200	<b>160,000</b>
<b>TOTAL</b>	<b>160,943</b>