

STEAM TURBINE DRIVE GEARBOX (CEMENT – SOUTH, INDIA)



1 TECHNICAL DATA:

Power	25,000 KW
Type	Speed Reducer
Input / Output Speed	7759 / 1500 rpm
Driving Equipment	Steam Turbine
Driven Equipment	Alternator
Make	European
Year of Commissioning	2009

2 PREAMBLE / PROBLEM REPORTED

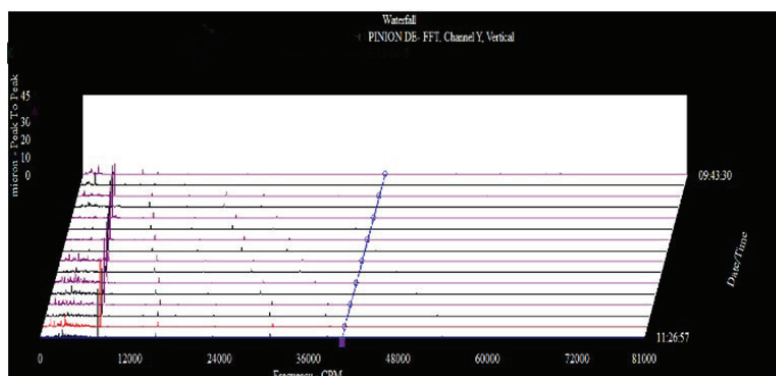
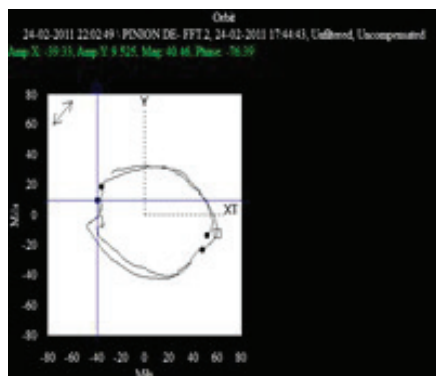
The original gearbox, supplied by a European OEM, exhibited high shaft vibration and abnormal noise during operation, affecting overall reliability.

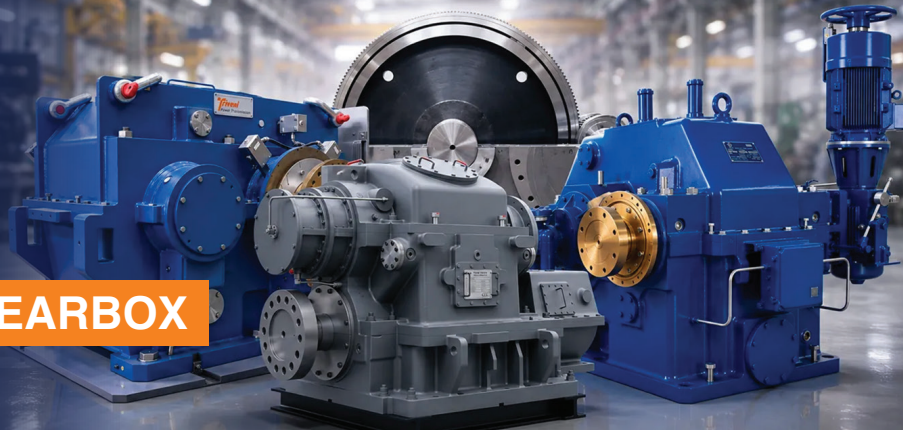
- Shaft vibration reached up to 200 microns at the pinion DE side (horizontal direction) at rated speed
- Vertical vibration at the pinion DE side was observed up to 128 microns
- Shaft vibration at the pinion NDE side remained within acceptable limits
- Abnormal noise was observed beyond 5500 RPM

3 DIAGNOSTICS STEPS UNDERTAKEN / OBSERVATIONS MADE

A detailed vibration analysis and system inspection revealed the following:

- Dominant 1X rotational frequency observed across all speeds in both horizontal and vertical directions
- Shaft orbit patterns were circular with multiple node points, perpendicular to gear separation forces
- Increase in vibration levels coincided with the onset of abnormal noise
- The measured Distance Between Shaft Ends (DBSE) was found to be shorter than the coupling spacer, indicating coupling compression instead of pre-stretch

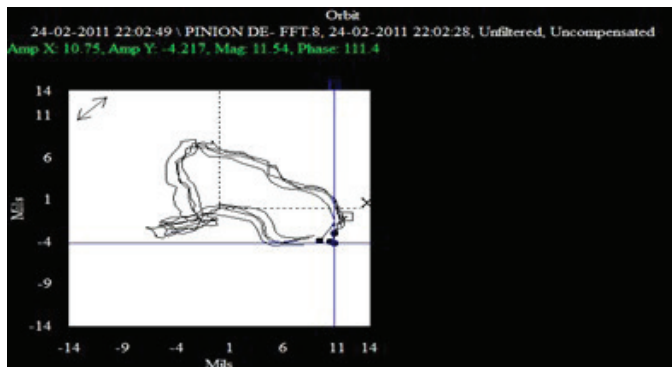




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4 ANALYSIS

- The dominant 1X vibration indicated shaft preloading rather than imbalance-related issues
- Orbit analysis / slow roll vector ruled out shaft runout as a potential cause
- The issue was traced to improper coupling pre-stretch, resulting in axial loading of the shaft
- This condition led to helix locking on one side of the gear, causing excessive vibration and abnormal noise



5 SOLUTION OFFERED / ACTION TAKEN

Triveni implemented targeted corrective measures to address the root cause:

- DBSE was accurately re-measured under operating conditions
- The mismatch was corrected by removing 2.8 mm of shim from the coupling assembly
- Alignment was revalidated to ensure proper shaft positioning and coupling behaviour

6 CONCLUSION

The gearbox was successfully stabilized and recommissioned, restoring reliable operation. The implemented solution ensured:

- Elimination of high shaft vibration and abnormal noise
- Proper coupling pre-stretch, preventing helix locking
- Stable operation with all parameters within permissible limits

7 OUTCOME

The gearbox has been operating reliably since recommissioning, delivering consistent performance