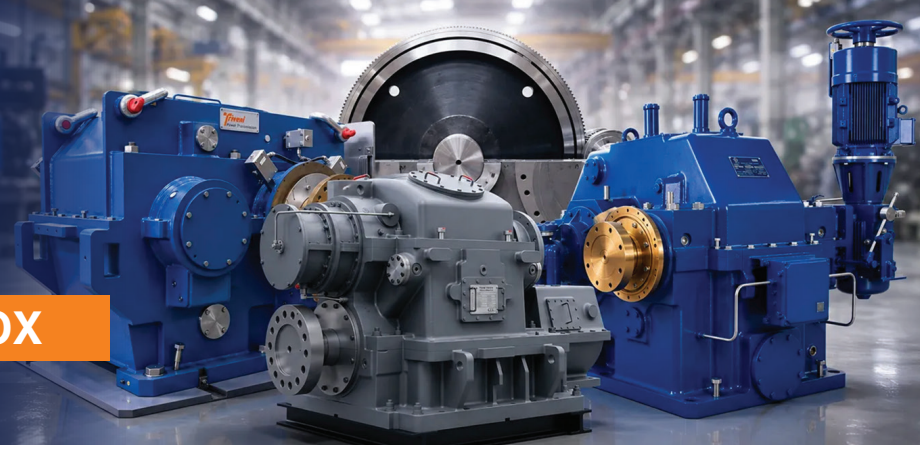
Triveni
POWER TRANSMISSION LTD.



STEAM TURBINE GEARBOX
(CPP – KENYA)

1 TECHNICAL DATA:

Power	805 kW
Type	Speed Reducer
Input/Output Speed	4795 / 1500 RPM
Ratio	1: 3.19
Make	German
Driving Equipment	Steam Turbine (Asian Make)
Driven Equipment	Alternator
Make	Asian
Year of Commissioning	2013

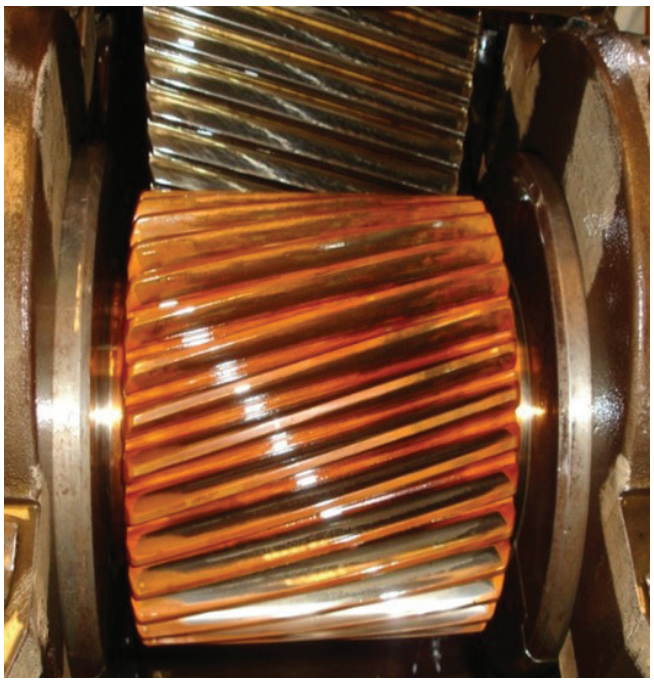
2 PREAMBLE / PROBLEM REPORTED

During commissioning of a newly supplied gearbox, the system experienced high shaft vibration, resulting in frequent tripping of the steam turbine generator (STG) and impacting operational stability.

3 DIAGNOSTICS STEPS UNDERTAKEN / OBSERVATIONS MADE

A detailed site investigation and vibration analysis revealed the following:

- High axial vibration developed within 2–3 days of operation
- Elevated vibration levels were recorded across all bearing locations, with the highest value of 6 mm/sec at the gear NDE side
- The increase in vibration was sudden and non-linear in nature
- Dominant vibration frequency corresponded to 1X gear rotational speed
- Significant 2X and 3X components in axial direction were observed
- Harmonics of gear rotational speed appeared after a few hours of operation
- Vibration spectrum predominantly showed gear-related frequencies (GMF)



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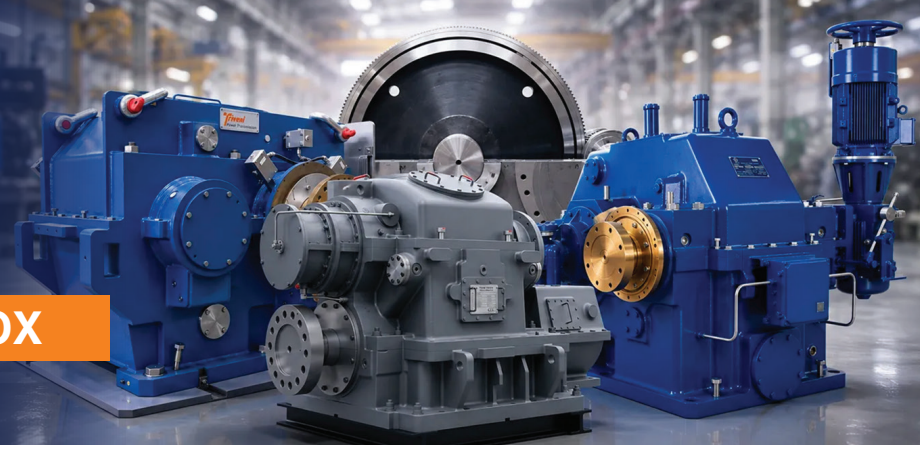

4 ANALYSIS:

- The dominant vibration in the axial direction ruled out typical gear mesh-related issues and internal misalignment
- Absence of vibration increase linked to turbine speed indicated that turbine–gearbox alignment was not the cause
- Time-dependent nature of vibration ruled out looseness or inherent bearing design defects
- Analysis pointed towards thermal growth mismatch and coupling-related constraints
- Higher vibration at the gear shaft NDE side, where the thrust bearing is located, indicated axial force transmission through the coupling
- The root cause was identified as incorrect coupling selection (gear coupling), which restricted axial movement and induced axial loading

5 SOLUTION OFFERED / ACTION TAKEN:

Triveni implemented a targeted solution to eliminate the root cause:

- Identified mismatch in axial and radial growth between the gearbox shaft and alternator shaft, leading to coupling locking.
- Replaced the existing gear coupling with a flexible coupling, capable of accommodating misalignment and thermal expansion.
- This modification enabled absorption of axial movement and eliminated induced stresses.

6 CONCLUSION:

The gearbox was successfully stabilized and recommissioned, restoring reliable operation of the STG unit.

The implemented solution ensured:

- Elimination of high shaft vibration and frequent tripping
- Proper accommodation of thermal growth and alignment variations
- Improved load distribution through optimized coupling selection

7 OUTCOME:

The system has been operating reliably since commissioning, with stable performance and no recurrence of the earlier issues. The complete solution was implemented within 12 weeks