

GAS TURBINE LOAD GEARBOX (REFINERY-INDIA)

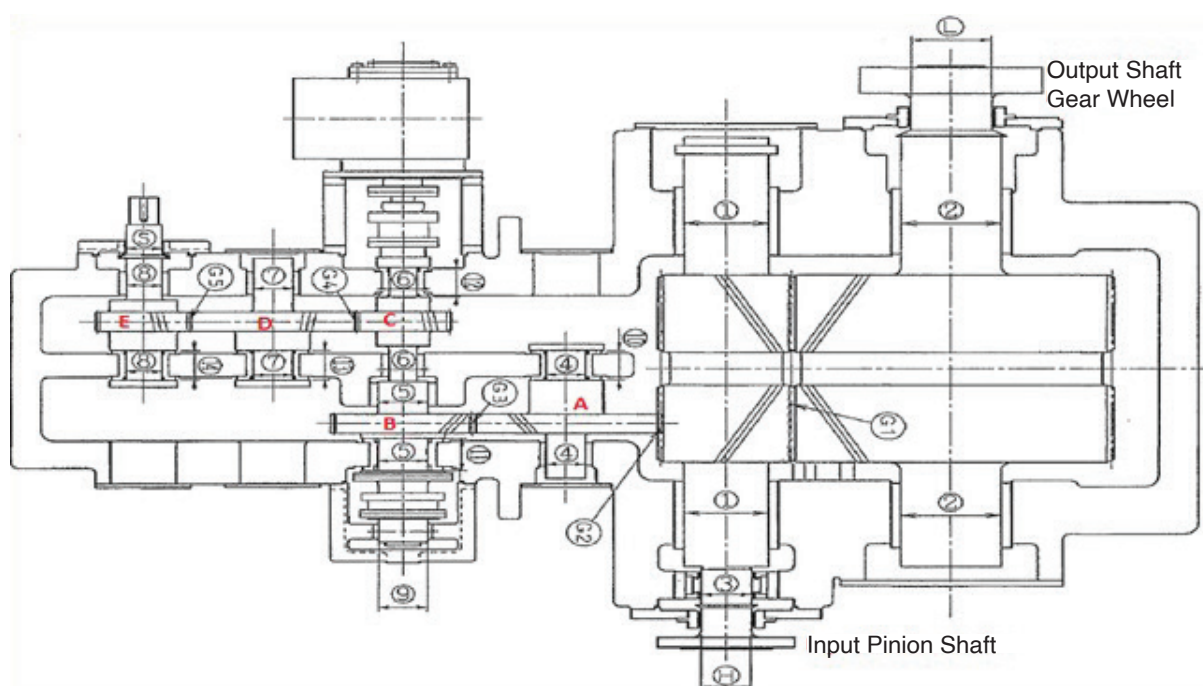


1 TECHNICAL DATA:

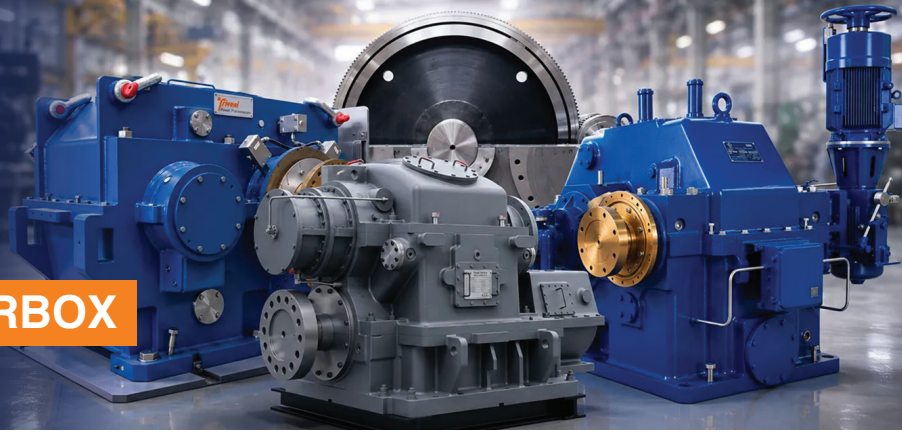
Power	35,000 KW
Type	Speed Increaser
Input/Output Speed	7258 / 1500 rpm
Ratio	1: 4.83
Driving Equipment	Gas Turbine
Driven Equipment	Alternator
Make	Japanese
Year of Commissioning	2012

2 PREAMBLE / PROBLEM REPORTED

- The Japanese OEM gearboxes were commissioned in 2012. In 2021, the unit began experiencing high vibration and abnormal noise during startup.
- During December 2021, the problem escalated with severe damage to Idler Gear Shaft 3(D), resulting in casing bore damage.
- The OEM recommended complete gearbox replacement with a lead time exceeding 24 months. Considering the operational urgency, the customer approached Triveni for a faster and technically viable repair solution



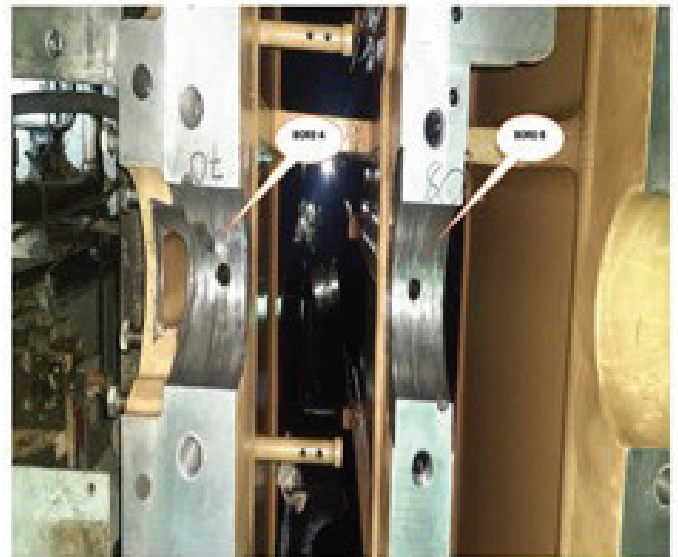
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3 DIAGNOSTICS STEPS UNDERTAKEN / OBSERVATIONS MADE:

A detailed inspection and site assessment identified the following:

- Significant damage to barring and starting shaft casing bores
- Gearbox casing was grouted to the foundation, making dismantling impractical
- Damage observed in the accessory-side gear set, including the idler assembly
- Overall condition indicated progressive deterioration under operating conditions

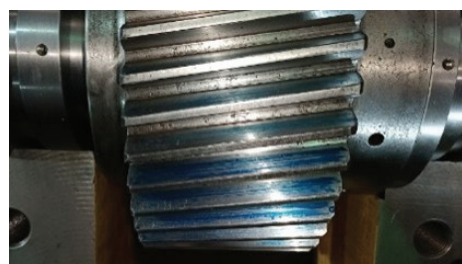


4 ANALYSIS:

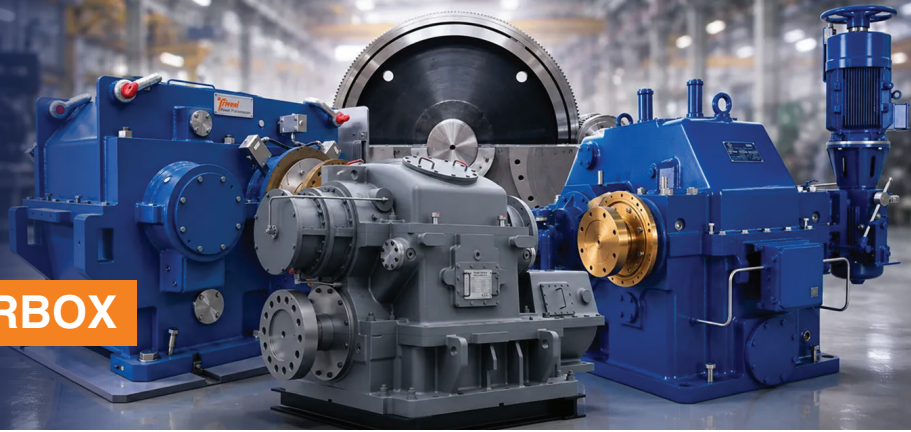
- The root cause was identified as continued operation under degraded conditions, aggravated by the absence of temperature and vibration monitoring on the accessory stage
- This led to undetected damage progression, culminating in catastrophic failure
- To address potential misalignment and ensure correct load distribution, gear mesh optimization was required

Design Enhancements:

- Introduction of a mesh adjustment feature in the idler shaft bearing arrangement
- Provision of adjustable shims beneath bearing pads to enable:
 - Skew correction
 - Precise alignment
 - Optimal tooth contact across the gear face

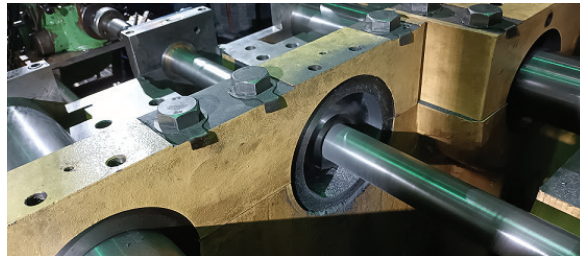


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5 SOLUTION OFFERED / ACTION TAKEN:

- Executed in-situ boring and machining of damaged casing bores using specialized fixtures
- Ensured proper bore alignment and parallelism during restoration
- Designed and manufactured a new gear set and bearing system tailored to the modified casing geometry
- Developed and supplied a new Idler Gear Shaft 3(D) assembly with improved bearing design.



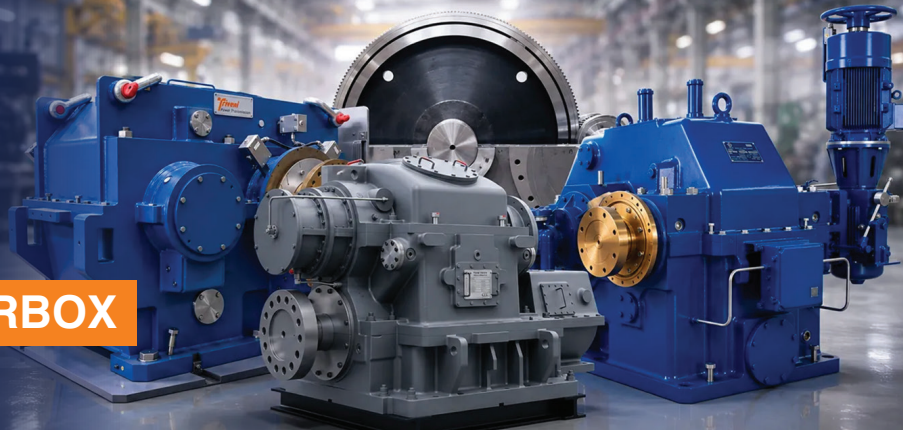
Bore Check



Skew Check



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6 CONCLUSION:

- The gearbox was successfully repaired and recommissioned, restoring reliable operation without the need for full replacement.

The implemented solution ensured:

- Restoration of casing integrity through precision in-situ machining
- Achieving correct gear tooth contact and alignment
- Integration of upgraded gear internals and bearing systems
- Stable operation with parameters within permissible limits

7 OUTCOME:

The insitu repaired gearbox has been operating satisfactorily since commissioning, delivering enhanced reliability, reduced downtime, and optimized performance.

