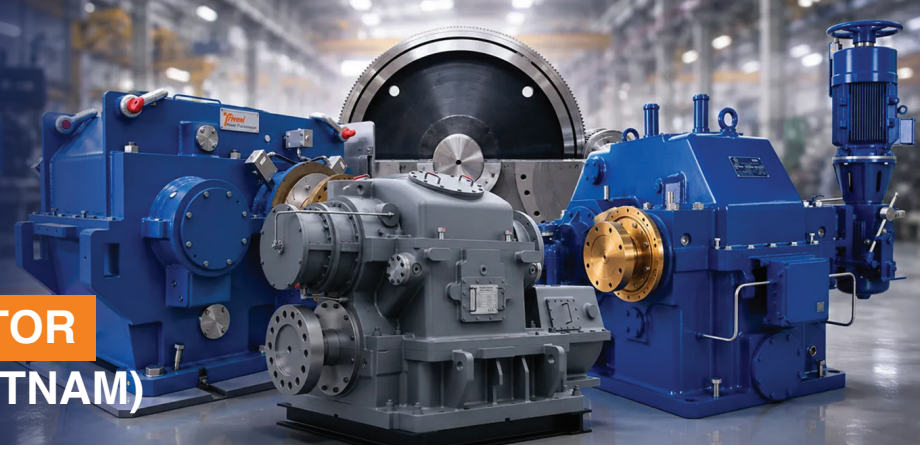
Triveni
POWER TRANSMISSION LTD.



GAS TURBINE – GENERATOR GEARBOX (REFINERY-VIETNAM)

1 TECHNICAL DATA:

Power	54,000 KW
Type	Speed Reducer
Input/Output Speed	5133 / 3000 rpm
Ratio	1.711
Driving Equipment	Gas Turbine (Frame-6)
Driven Equipment	Alternator
Make	European
Year of Commissioning	August 2003

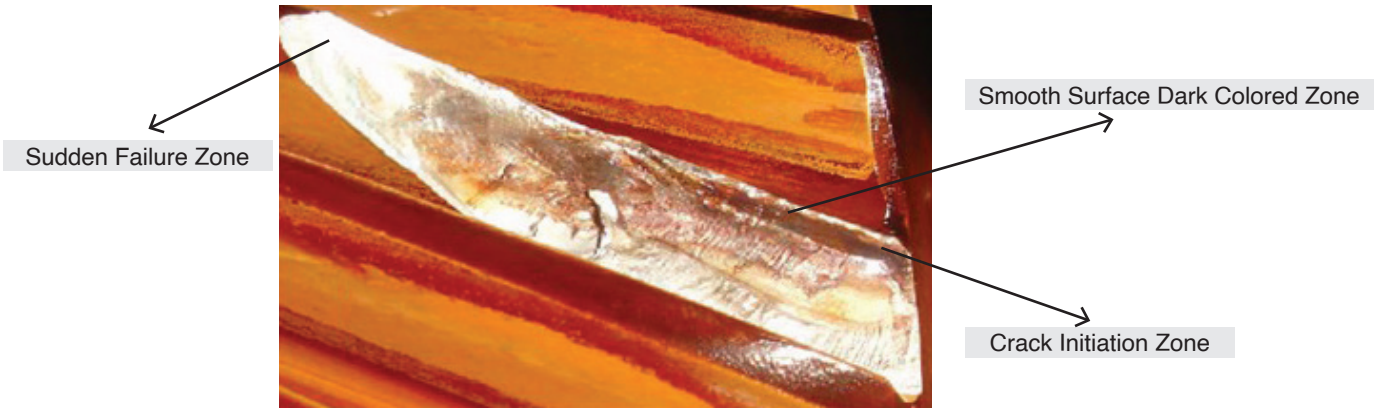
2 PREAMBLE / PROBLEM REPORTED

Gearbox exhibited abnormal noise during operation during July 2017. Upon inspection, damage was identified in one tooth of the output gear wheel (LHH), specifically near the apex region. The customer contacted Triveni to diagnose the issue and provide a reliable corrective solution.

3 DIAGNOSTICS STEPS UNDERTAKEN / OBSERVATIONS MADE:

On-site inspection and technical evaluation revealed the following:

- Gearbox casing vibration was 45% higher than normal operating levels
- One tooth of the output gear wheel was damaged near the apex region
- Reduced hardness of approximately 52 HRC was observed near the damaged area
- Surface characteristics of the cracked tooth indicated that the gearbox had been operating with the defect for an extended period
- Bearings, shaft alignment, and torque shaft were inspected and found to be within acceptable limits



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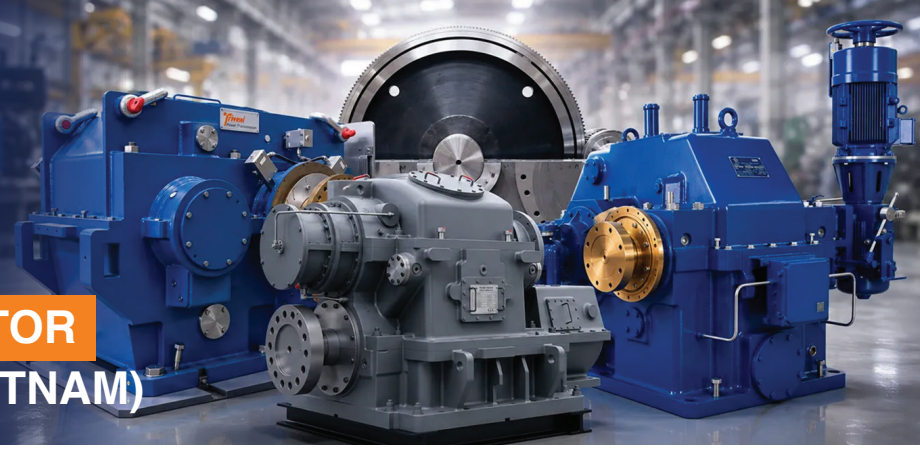

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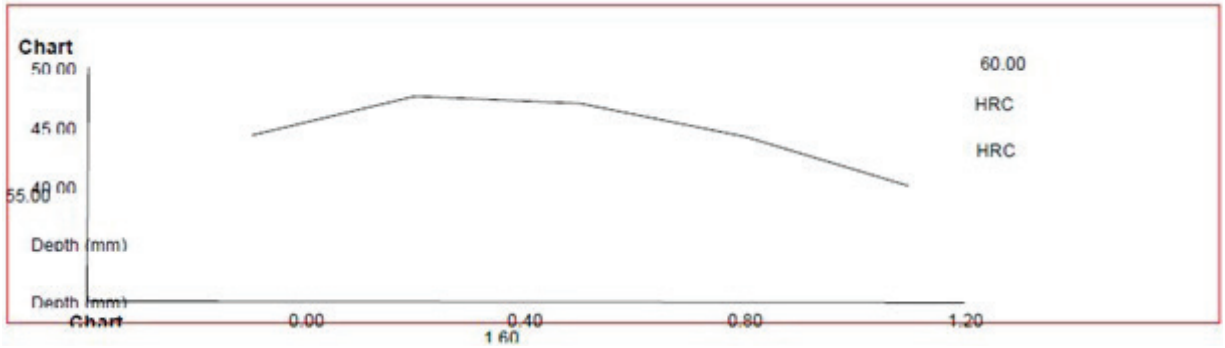
4 ANALYSIS:

- Excluding for the damaged tooth, all other gear teeth exhibited hardness within the specified range of 57–60 HRC
- The damaged tooth showed localized reduction in hardness (52–55 HRC) near the crack zone
- Crack initiation was traced to the tooth root surface, with evidence of grinding burn during finishing
- Excessive material removal during grinding resulted in localized tempering, leading to reduced hardness and eventual tooth failure



5 SOLUTION OFFERED / ACTION TAKEN:

- Supplied new case-carburized gear internals and bearings to enhance durability and performance
- Performed grinding burn testing (roll scan) to validate tooth integrity, stress distribution, and absence of low localised hardness and thermal damage
- Gear internals were assembled and installed at site in November 2008

Post-commissioning performance:

- Maximum casing vibration recorded: 1.6 mm/sec
- Maximum bearing temperature at full load: 94°C

All parameters were within acceptable operating limits.

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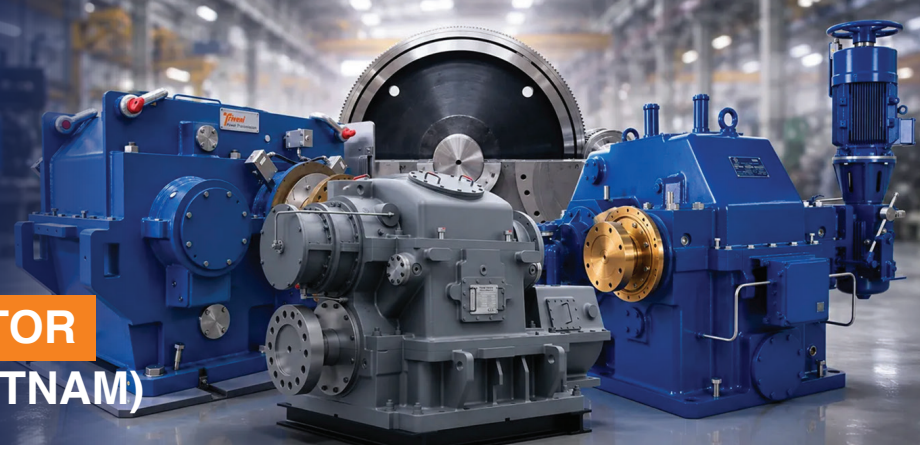

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6 CONCLUSION:

- The gearbox was successfully refurbished and recommissioned, eliminating the root cause of failure.

The implemented solution ensured:

- Elimination of abnormal noise and elevated vibration levels
- Compliance with required material hardness and stress distribution standards
- Reliable gearbox operation within specified performance limits

7 OUTCOME:

The gearbox has been operating satisfactorily since refurbishment, delivering stable performance and improved operational reliability.