

HIGH-SPEED PLANETARY GEARBOX (REFINERY– SOUTH AFRICA)



1 TECHNICAL DATA:

Power	100 KW
Type	Speed Reducer
Input/Output Speed	23,442 / 3014 rpm
Ratio	1 : 7.78
Driving Equipment	European Nitrogen Booster Turbine
Driven Equipment	Alternator
Make	European
Year of Commissioning	2018

2 PREAMBLE / PROBLEM REPORTED

- Failure of the high-speed planetary gearbox led to a complete plant shutdown. The unit had a history of frequent gear and bearing failures, making immediate restoration critical to resume operations.

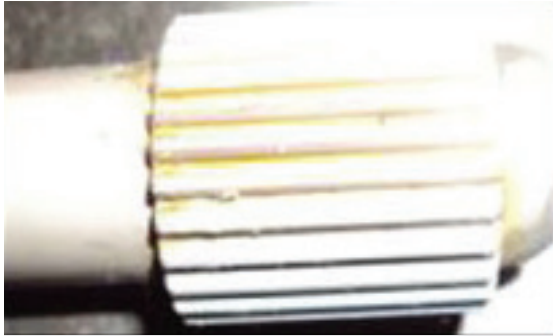
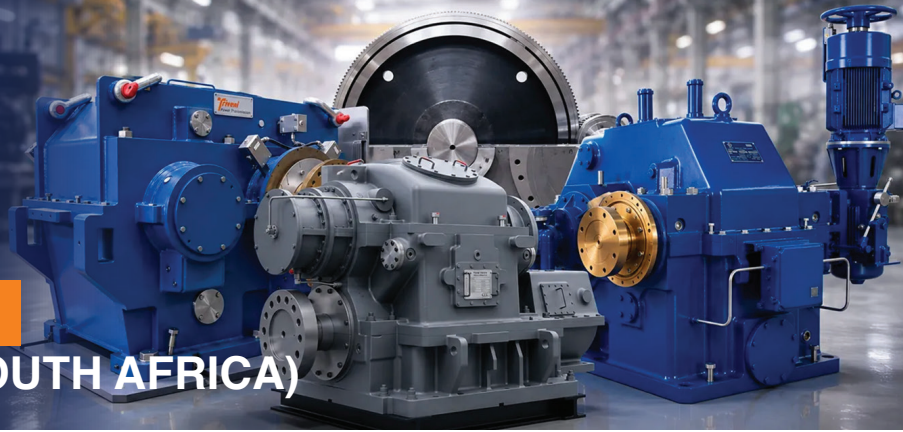


3 DIAGNOSTICS STEPS UNDERTAKEN / OBSERVATIONS MADE

Detailed inspection and assessment of the gearbox condition revealed the following:

- Severe pitting on gear teeth, indicating progressive surface fatigue
- Gear components had significantly degraded due to repeated failures
- Bearing clearances were found to be beyond permissible limits
- Critical components including planet gears, annulus ring, and planet pin journals were damaged
- Reverse engineering was not feasible due to the poor condition of the existing parts

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Sun Pinion



Annulus



Planet Pin

4 ANALYSIS:

- The primary root cause was identified as uneven load distribution across bearings, leading to end loading of gears
- This resulted in localized stress concentrations and initiation of pitting damage
- Repeated operation under deteriorated conditions accelerated progressive gear and bearing failure, ultimately leading to system breakdown

5 SOLUTION OFFERED / ACTION TAKEN:

- Designed and manufactured new sun pinion and planet gears, compatible with the existing system configuration
- Supplied a complete set of new gear internals, including annulus ring, planet gears, sun pinion, and planet pins
- Installed new bearings to ensure proper load distribution and operational stability
- Assembled the gearbox and conducted a full-speed, no-load trial run as per standard procedures



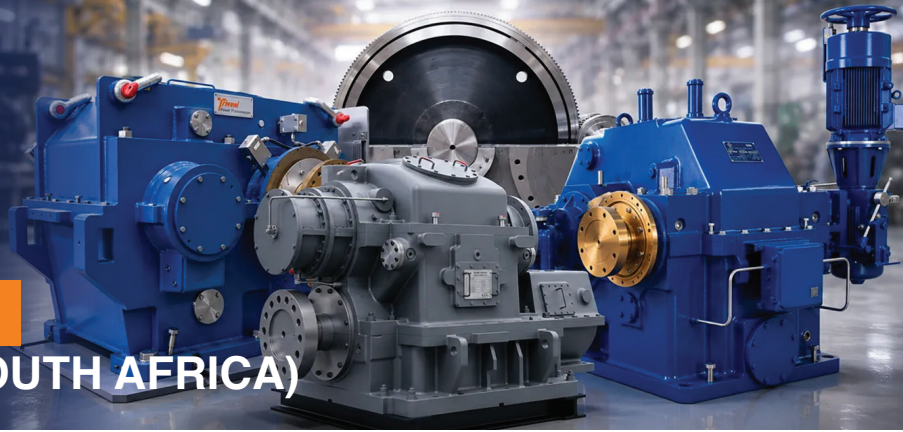
6 CONCLUSION:

The gearbox was successfully restored and recommissioned, enabling reliable plant operation.

The implemented solution ensured:

- Complete replacement of damaged gear internals and bearings
- Restoration of design integrity for high-speed planetary gearbox operation
- Stable and reliable performance under rated load conditions

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7 OUTCOME:

The gearbox has been operating continuously and reliably since commissioning, with no recurrence of earlier failures, and the entire project was completed within 20 weeks.