



NITROGEN COMPRESSOR GEARBOX (REFINERY, MALAYSIA)

1 TECHNICAL DATA:

Power	1400 KW
Type	Speed Increaser
Input/Output Speed	2980 / 27,685 rpm
Ratio	9.29
Driving Equipment	Motor
Driven Equipment	Nitrogen Compressor
Make	European
Year of Commissioning	2007
Year of Refurbishing	2014
Oil Recommended	ISO VG 46
Service Factor	1.55
Lube Oil Flow	120 LPM
Lube Oil Pressure	0.5 – 1.8 kg/cm ²

2 PREAMBLE / PROBLEM REPORTED

Gearbox experienced failure of gear internals and bearings, leading to an immediate shutdown after 7 years of operation. The gearbox was dismantled, and detailed inspection data, including GA drawings and photographs, were shared for technical evaluation and refurbishment planning.

3 DIAGNOSTICS STEPS UNDERTAKEN / OBSERVATIONS MADE:

Detailed inspection and condition assessment identified the following:

- Severe gear tooth damage and scoring on shaft journals
- Complete wear of the Hirth gear on the pinion assembly
- Broken and sheared casing studs at the parting plane
- Dents and damage marks on casing bores, indicating structural impact

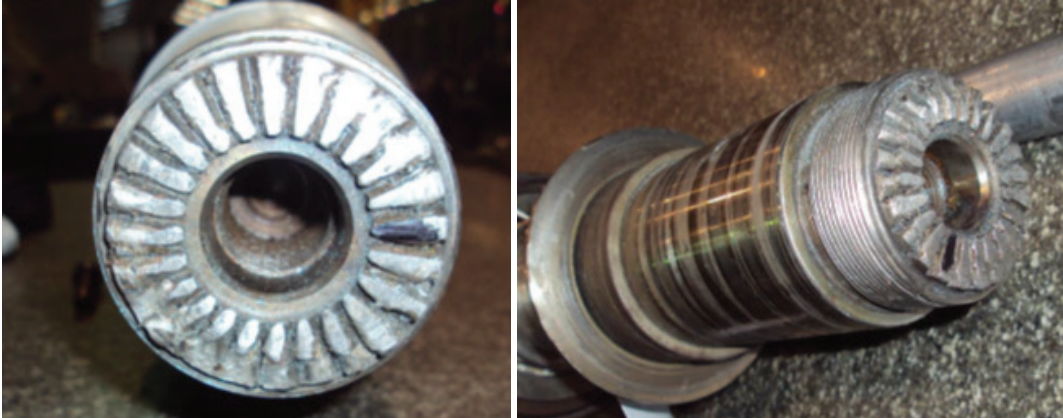
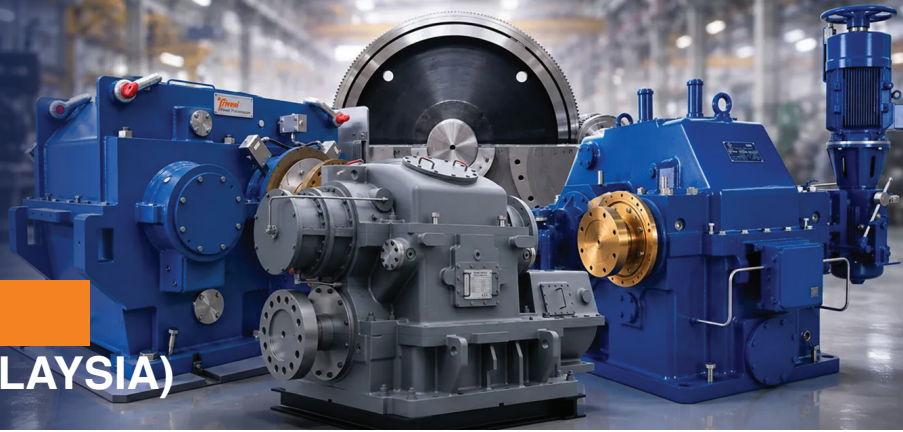


Damaged Input Geat Wheel



Pinion Shaft

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Hirth Gear

4 ANALYSIS & ACTION TAKEN:

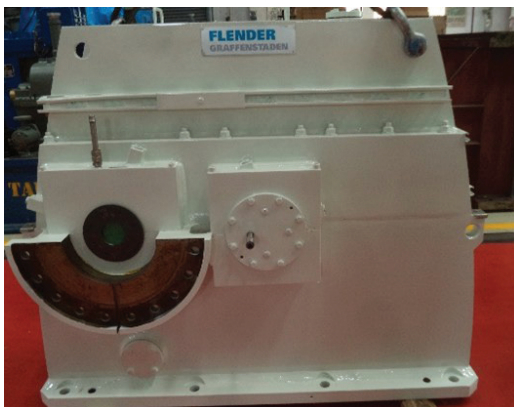
- The root cause was identified as external shock loading due to compressor surge, resulting in excessive dynamic stress on gearbox components
- Existing internals were found to be non-compliant with API 613 standards
- The gearbox casing required restoration through precision re-machining

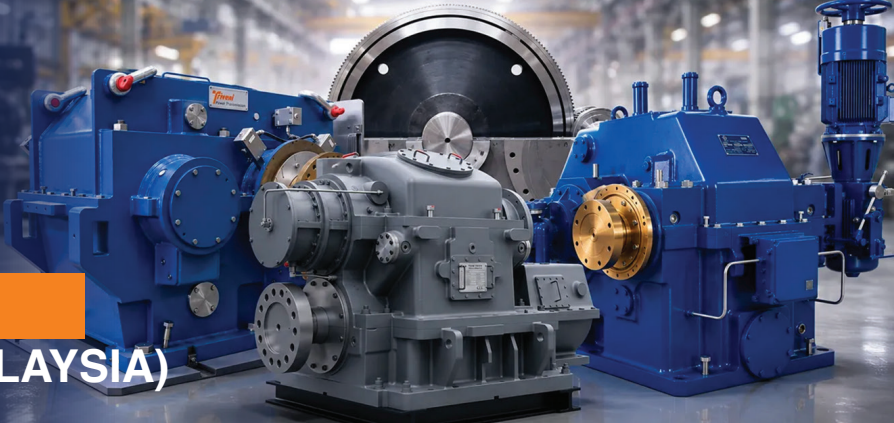
Engineering Actions:

- Designed and manufactured new gear internals and bearings compliant with API 613 (5th Edition)
- Restored casing integrity through re-machining and dimensional correction
- Assembled and tested the gearbox as per API standards
- Conducted no-load trial run testing to validate performance

Post-testing results confirmed:

- Bearing temperatures and shaft vibrations were within acceptable API limits
- Stable and reliable gearbox performance





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5 CONCLUSION:

- The gearbox was successfully refurbished and recommissioned in 2014, restoring reliable operation of the nitrogen compressor system.

The solution ensured:

- Compliance with API 613 (5th Edition)
- Replacement of damaged internals with upgraded components
- Full restoration of gearbox structural integrity
- Verified performance through rigorous no load and load testing at site

6 OUTCOME:

Reliable operation was restored with enhanced durability and improved performance under demanding refinery conditions.