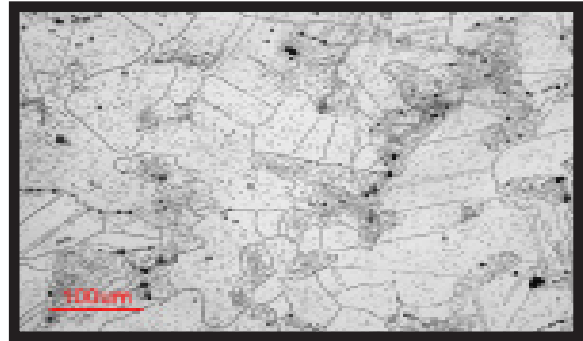


R&D Fund Project

Study Of GE 1st Stage Nozzle Premature Failure And Enhancement Of Refurbishment Procedures



First stage nozzle premature failure



Creep cavities

Project Overview

This project aims to determine the premature failure root causes of the first and second stage nozzles for GE Frame 9 gas turbines. Nozzle is the stationary part of the gas turbine that operates at high temperature of approximately 1500oC. With the high operating temperature and high stress levels, the components are exposed to creep condition, which can lead to creep failure. Other than creep condition, the components can also fail due to several factors such as cooling holes blockage, incorrect repair process, high number of start stops, EOH, etc. From this project, the root causes of the premature failures that have been reported were established. Besides, recommendations or preventive actions were discussed via enhancement of refurbishment procedure in order to avoid premature failures from occurring. Four premature failures were studied in this project in order to identify the root

causes of the failures. Based on the results obtained, several factors contributed to the failures, namely creep, fatigue, cooling holes blockage, number of start/stop and tripping, welding related defects, material degradation, lack of fusion between weldment and insufficient welding filler material.

Deliverables

- Case Study Reports
- Improved Refurbishment Procedures

Benefits

- The root causes of the first stage nozzle's premature failure were identified.
- Actions that can be taken by station personnel and also TNB REMACO before and after the repair work were proposed in order to avoid premature failure from recurring.
- Reduced number of unplanned outage due to premature failure.