Case study

Investigating cause of bearing failure

THE CHALLENGE

Frazer-Nash were asked to examine the cause of bearing failures on the 825kW diesel generator sets that provide the essential services electricity to a nuclear power station.

Using a combination of on-site vibration measurements and root cause analysis, we identified the source of the problem as the clutch, which transmits torque between the diesel engine and the electrical machinery.

OUR SOLUTION

Our initial assessment showed that the bearing failures were due to misalignment between the two halves of the drive train, causing excessive journal loads and loss of the hydrodynamic film of oil between the shaft and the bearing pads.

We then carried out vibration measurements to establish the dynamic behaviour across the entire range of drive train loading, and this showed that the onset of the vibration was linked to a critical level of torque transmission through the clutch.

It seemed that the clutch had a long history of wear and stiction problems, and an earlier modification aimed at improving clutch reliability had compromised the internal alignment of its components leading to vibration and the bearing failures. This theory was substantiated by our Root Cause Analysis (RCA) based on the fault history and maintenance records.

From this analysis, we proposed an interim fix to prevent further bearing failures, and re-designed the centripetal clutch mechanism for improved long term performance. This process included:

- Solid modelling to re-engineer the main problem areas with respect to wear and stiction.
- Centripetal finite element analysis to determine the internal dynamic loads.
- Selection of materials for low friction and wear compatibility.
- Selection of low friction bushes.
- Production of manufacturing drawings.

By undertaking a comprehensive assessment of the clutch, combining on-site measurements, numerical modelling, and engineering design, Frazer-Nash were able to identify the cause of the bearing failure, and provide an effective troubleshooting service for resolving plant failures and plant reliability issues.

Client

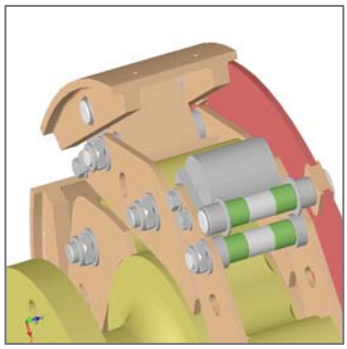
MGBG

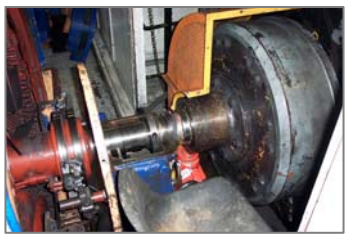
Business need

Determine the cause of component failure in a diesel generator and rectify the problem with a long term solution

Why Frazer-Nash?

Frazer-Nash utilise a range of systems, models and procedures to understand the root cause of system and structure failure.





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