

Investigating Bearing Failures in Gas Turbines

BACKGROUND

Bearing failures and high operating bearing temperatures at two gas compressor stations of a major utility motivated a detailed study into finding root causes for these problems. As part of this effort, MIS was commissioned to analyze operating data for the troubled compressor stations, review failure analyses reports, and determine potential root causes for the failures and the over-temperature problems.

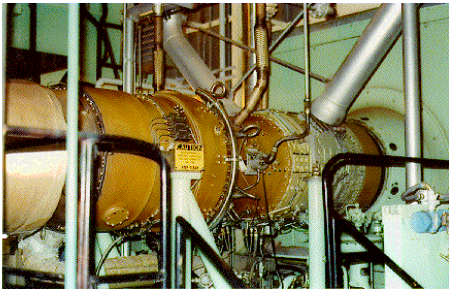


Figure 1. Gas turbine drive bearing

DISCUSSION

Historical operating data, from the plant computer and operator log sheets, were gathered and manipulated into spreadsheet format. Many time history plots of various parameters were developed. Overhaul and metallurgical failure analysis reports were reviewed as well as design details and operating characteristics for the compressor and its components. Tests to measure various parameters were observed and the corresponding data collected. Finally, a detailed review and analysis of the gathered information was performed (fig. 2).

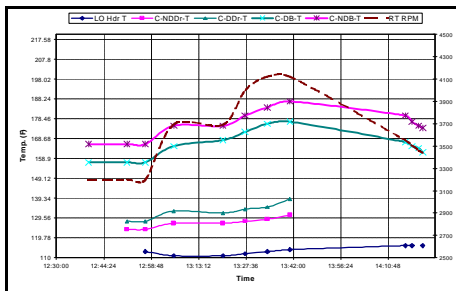


Figure 2. Bearing temperature historical

Review of overhaul and failure analysis reports and analysis of data revealed:

- A non-drive bearing failure resulted from oil starvation in the bearing caused by loss of power to the auxiliary lube oil pump.
- A drive bearing failure and a second non-drive bearing failure were caused by lack of proper lubrication during startup transients. The root causes for these failures are related to disturbances in the oil line system.

Review of gathered data, system design, and test results indicated that the oil delivery system was very susceptible to poor performance. This is because of the overall design of the oil system where small disturbances in fluid flow (such as pump performance, pluggage, oil viscosity, temperature, filtration, etc.) can significantly impact oil delivery to the journal bearings. Therefore the source of high operating temperatures in the bearings is believed to be related to that issue.

CONCLUSION

Using available historical operating data, test data, and failure analysis reports, MIS was able to deduce the root causes for the bearing failures and over temperature problems. With these findings MIS was able to recommend to the client remedial actions to verify and mitigate the bearing problems.

