

CASE STUDY

Caterpillar Dozer Final Drive Root Cause Analysis



AT A GLANCE

Overview

- Analysis was undertaken into the performance of dozer final drives due to a large proportional of "abnormal" samples (as identified by the client's laboratory).
- A specialist mechanical engineer with significant OEM engineering experience was assigned to conduct the investigation.
- Data analysis of the oil sample results, in conjunction with detailed knowledge of the machinery ensured high quality root cause analysis and new oil analysis limits were recommended.



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"The engineers wealth of experience and OEM knowledge ensured the root cause was identified by following a systematic process"

Maintenance Manager

THE ADDED VALUE

HolisticAM created value for the client by:

Value One

Accurately identifying root cause of abnormal oil sample results

Value Two

Focusing attention on maintaining oil viscosity and film strength to maintain compartment cleanliness and maximise component life.

Value Three

Using more rigorous oil sample analysis limits to ensure the site analysts were able to identify the same root cause in the future



PROJECT OVERVIEW

A specialist mechanical engineer with significant OEM-engineering experience was assigned to conduct the investigation into the performance of dozer final drives.

The engineer conducted off-site analysis on the oil sampling records, and coupled with their extensive equipment knowledge, concluded the root cause of abnormal samples was transmission oil mixing with final drive oil.

In conjunction, the laboratory alarm limits were recalculated using current site sample data to provide earlier warning of internal contamination and therefore component degradation.

THE CHALLENGE

Large counts of "abnormal" samples were evident in the clients extensive corporate oil analysis database. A significant contributor was the final drives in a specific make and model of tractor across their multiple operations. The root cause of the disproportionate count of abnormal samples was required.

THE SOLUTION

The engineer commenced exploratory data analysis and quickly determined the abnormal samples were predominately flagged for "high wear" or "oil" problem codes.

Further analysis showed the "wear" samples did not suffer from dirt ingress (indicated by silicon and aluminium); instead, iron was being generated internally in the final drive.

The "oil" samples were generally flagged due to low viscosity. Plotting viscosity and iron on the same chart showed a correlation – as viscosity decreased, iron increased. This would be as expected if the thinner oil film is unable to support operating loads.

Analysis of the oil additive pack at these same times suggested the final drive additive pack was consistent with transmission oil. Either the compartment was being filled with the wrong oil, or oil transfer was occurring between the compartments. Site investigation concluded incorrect oil fill was unlikely, thus oil transfer past the axle oil seal was considered the most likely culprit.



The oil sampling limits were considered wide, and closing the limits would provide the site more warning of abnormal internal conditions in the final drive. The limits were recalculated

THE RESULTS

The specialist engineer was able to identify the root cause of the abnormal samples, provide guidance as to the fix and recalculate improved oil sample limits for the client.

THE ADDED VALUE

The analysis created value for the client by:

- Accurately identifying root cause of abnormal oil sample results
- Focusing attention on maintaining oil viscosity and film strength to maintain compartment cleanliness and maximise component life.
- Using more rigorous oil sample analysis limits to ensure the site analysts were able to identify the same root cause in the future

HolisticAM was able to deliver this value with engineers that have 20-years experience with equipment OEMs and significant site operational experience.



Who are we?

Holistic Asset Management is a leading provider of advanced reliability engineering technology and services to the asset intensive industries. We work with our customers to develop tailored solutions that meet the needs of their individual operations and help them realize significant savings in their maintenance costs.

We are proud of the reputation we have earned as a reliable and advanced engineering services provider to the mining industry. Our commitment to our customers is to provide the most reliable and advanced engineering solutions that will help them improve their reliability management systems and ultimately reduce their operational costs.

Unlock the full potential of your assets with our services. Contact us today to schedule a consultation and discover the difference we can make.

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