

MAG-SHIELDS® prevent additional damage by capturing contaminants following torque converter failure in a CAT 777 haul truck

The Problem

A CAT 777D operating at a northern Alberta oil sands mine suffered a torque converter failure. This failure can be particularly catastrophic because the torque converter, braking and hoisting systems share the same hydraulic oil. When a torque converter failure occurs, a significant amount of metal contamination is released into the system and quickly circulated through all the circuits. The entire contents of the hydraulic system (405L or 107 US gallons) can circulate in approximately 1 minute, so contamination spreads quickly causing damage and accelerated wear to the brake and hoist components.

The Solution

Prior to this failure BAY6 Solutions Mag-Shields were outfitted to the truck's hydraulic system as part of a fleet installation. Mag-Shields effectively captured ferrous debris from the fluid returning to the reservoir before it reached the inlet side of the system, without causing aeration, cavitation, or a restriction to fluid flow. Use of Mag-Shields resulted in reduced downtime, repair costs, premature component wear and maintenance costs.

The Results



A new Mag-Shield weighs 1.545 kg.



One of four Mag-Shields recovered following the torque converter failure, indicating that 437 grams of material was captured.

Following the failure the hydraulic tank was drained, and all 4 Mag-Shields were removed and weighed before cleaning and analysis. It was determined that 1.717kg (3.78 lbs) of material was captured by Mag-Shields which would have otherwise flowed throughout the system and caused additional damage. Mag-Shields made cleaning the hydraulic system faster and more effective. Post failure clean up is made possible as Mag-Shields continue to clean residual contaminants from the system when the truck is put back into service. Follow-on failures were mitigated, and significant savings were observed by the truck owner.



Side-by-side comparison of new Mag-Shields to those that were removed from the CAT 777D post torque converter failure. All the particles on the dirty Mag-Shields were prevented from continuously circulating through the system.

Additionally, a sample from the dirty Mag-Shields was submitted to SEMx Inc. for scanning electron microscopy analysis which determined a captured particle distribution of: approximately 57% were between 5µm and 40µm (these may not be captured by CAT Regular Efficiency filters), and approximately 26% of the captured particles were under 5µm (these particles may not be captured by CAT Ultra High Efficiency filters). Unlike OEM filters, Mag-Shields were able to capture and hold these ferrous particles, stopping them from circulating further throughout the system. OEM filters were not effective at removing smaller sizes of particles or simply plug up with large volumes or contamination, forcing the system into bypass operation.

Particle Size Graph

