

NEXT GENERATION BEST PRACTICE for fluid contamination control

Equipment: CAT 777D

Client: Northern Alberta Oil Sands Mine

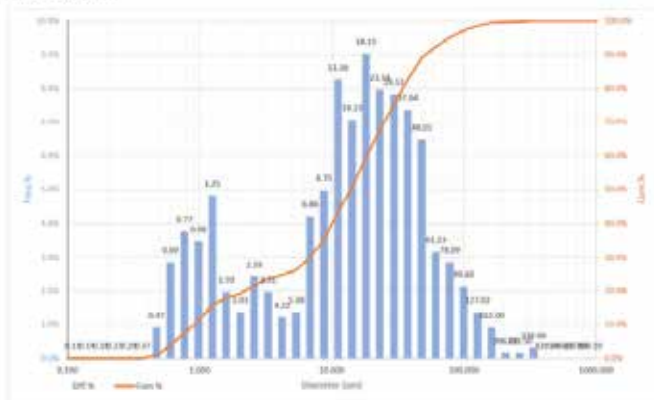
Mag-Shield® contain debris and prevent spread after torque converter failure for CAT 777D truck.

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.



Particle Size Graph



THE SOLUTION

Prior to this failure, **Mag-Shield®** were outfitted to the truck's hydraulic system as part of a fleet installation. **Mag-Shield®** 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-Shield®** resulted in reduced downtime, repair costs, premature component wear and maintenance costs.

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

THE RESULTS

Following the failure, the hydraulic tank was drained, and all 4 **Mag-Shield®** were removed and weighed before cleaning and analysis. It was determined that 1.717kg (3.78 lbs) of material was captured by **Mag-Shield®** which would have otherwise flowed throughout the system and caused additional damage. **Mag-Shield®** made cleaning the hydraulic system faster and more effective. Post failure clean up is made possible as **Mag-Shield®** continues 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.



Moreover, a sample from the **Mag-Shield®** with accumulated particles underwent scanning electron microscopy analysis conducted by SEMx Inc. The results showed a particle distribution of approximately 57% between 5µm and 40µm (particles that may not be captured by CAT Regular Efficiency filters), with an additional 26% of the captured particles being under 5µm (particles that may not be captured by CAT Ultra High-Efficiency filters). In contrast to OEM filters, **Mag-Shield®** serves as a valuable complement to OEM systems, efficiently capturing and retaining these ferrous particles and preventing their circulation throughout the system. It's worth noting that OEM filters, while effective in many aspects, may face challenges with smaller particles or in scenarios of high contamination, possibly triggering bypass operation.