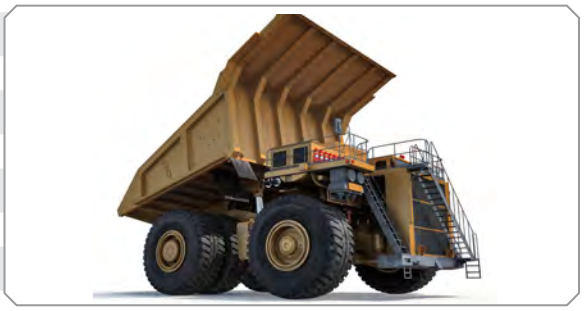
CASE STUDY

CUSTOMER
IRON ORE MINE

LOCATION
KATHA, SOUTH AFRICA / 2016 - 2018

EQUIPMENT
KOMATSU HAUL TRUCK FLEET WHEEL HUBS

APPLICATION
OUTER TAPER ROLLER BEARING LUBE OIL



SAFETY

Fewer failures - minimized touch points. Significantly reduced safety risk with less human:machine interface

EQUIPMENT

Prevented 208 bearing failures in < 2 years.

Bearing life extended past OEM expected life of 20,000 hrs

ROI

$185 investement saves $156k USD / truck

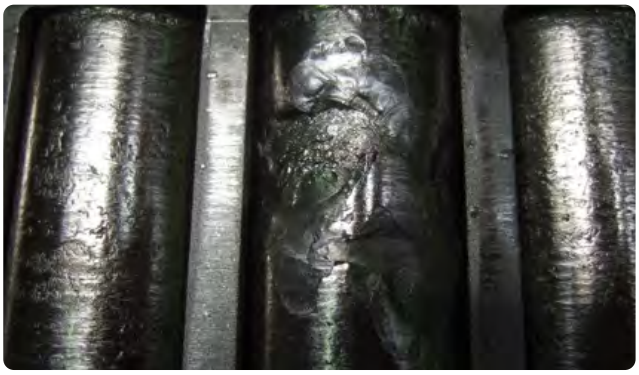
$17k investment saves $14 Million USD / fleet

CHALLENGE

The mine site was experiencing premature outer taper roller bearing failures on the front wheel hubs of their Komatsu 860 E and 960 E haul trucks.

The site operates 92 haul trucks, and the expected operating life of front wheel hubs is 20 000 hours; the site however, was experiencing 1-3 failures per week at a cost of 1 million South African Rand per failure.

The mine started investigating in May of 2015. Oil analysis determined that during operation, contamination was wearing heavily on the outer taper roller bearings which was, in turn, causing premature wheel hub failure.



Damaged outer taper roller bearing

FREQUENCY OF FAILURES	1-3 WEEKS	
COST / FAILURE		$ 1,000,000
		$ 90,000
		$ 68,000

CASE STUDY

SOLUTION

In November 2016, the minesite reliability team decided to run a trial on OEI magnetic filter elements to test their ability to improve haul truck front wheel hub reliability. The team replaced all the OEM plugs that were installed on the roller bearing covers with OEI magnetic filter elements.

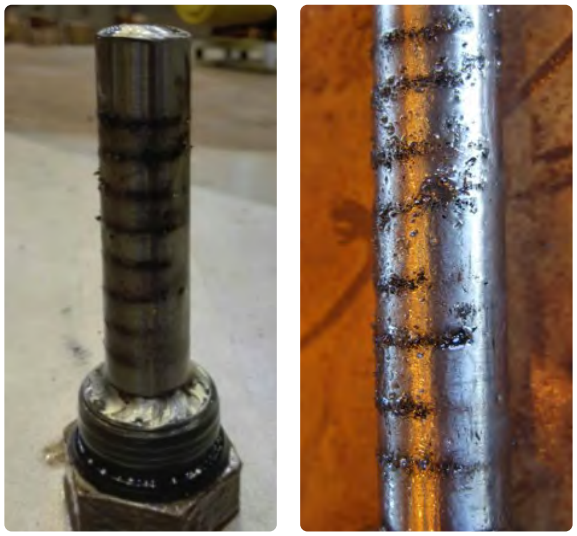
10 WEEK TRIAL RESULTS

Over the 10 weeks that the haul trucks operated with OEI filters, **there were no front wheel hub failures.** Based on the mine's estimation that they were previously experiencing between 1-3 failures per week, the savings were significant.

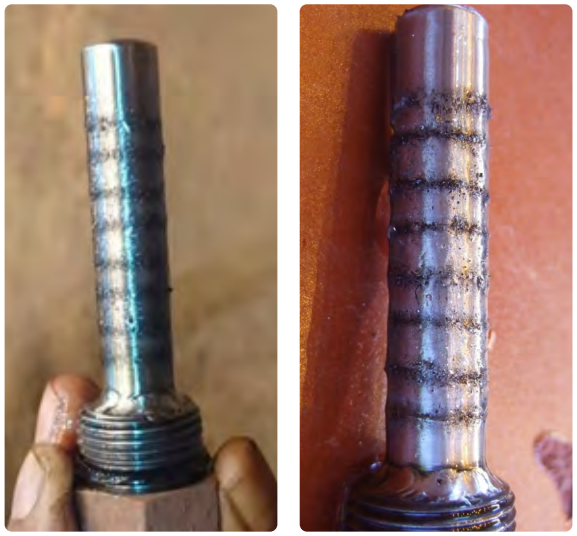
WHEEL HUB FAILURES	0	
SAVINGS		$ 2,000,000
		$ 180,000
		$ 136,000

The photos show contamination collected on the OEI magnetic filter elements from the left and right-hand-side wheel hubs of one haul truck after only 500 hours of operation.

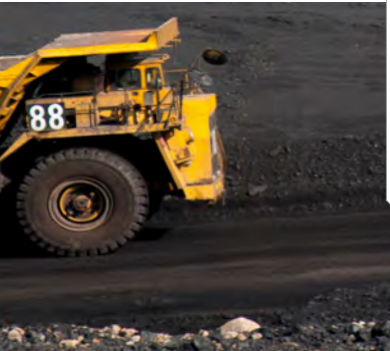
Note that the most damaging wear particles to a bearing are between 1 and 4 microns, and the human eye can only see particles down to ~ 30 microns (the size of cigarette smoke particles). The contamination particles shown in the pictures below are large enough to cause significant bearing damage and consequent failure.



Right-hand-side front wheel hub



Left-hand-side front wheel hub



OEI

Magnetic filter elements use the highest-grade rare earth magnetics which make them both a highly-effective predictive maintenance tool, as well as highly-efficient in removing wear particles down to, and below, 1 micron.

OEM

Drain plugs typically use either low-grade rare earth magnetics or ceramic magnetics. They are often designed too short to penetrate the fluid, and they are not powerful enough to capture and hold wear contamination.

NEXT STEPS

Based on the success of the 10 week trial, the international mining organization decided to use this minesite to run a pilot program for OEI filtration. The minesite outfitted all of their haul truck front wheel hubs with OEI magnetic filter elements. They have since been recording their findings to determine the value of deploying OEI filtration on other critical equipment systems.

PILOT PROGRAM RESULTS

The following results are the calculated savings for the operation of 92 haul trucks deploying OEI magnetic filter elements on their front wheel hubs for 2 years (104 weeks). The calculations are based on the prevention of 1-3 wheel hub failures per week, where each haul truck operates for 15 hours per day.

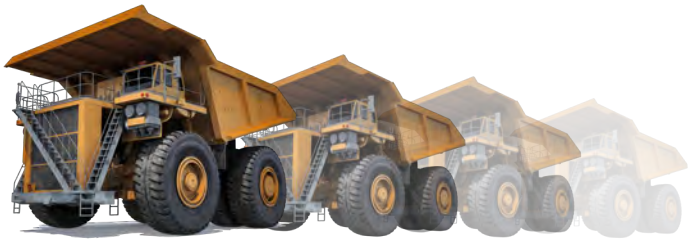
1 HAUL TRUCK

2.3 FAILURES PREVENTED / 2 YEARS

NO FAILURES	COST SAVINGS
10,920 hours	$ 2,290,000
104 weeks	$ 206,100
2 years	$ 155,720

92 HAUL TRUCK FLEET

208 FAILURES PREVENTED / 2 YEARS



COST SAVINGS

$ 208,000,000

$ 18,720,000

$ 14,144,000

CONCLUSION

The pilot program success has identified OEI magnetic filtration as an integral tool in the mining organization's reliability program. Using the magnetic filter elements as predictive maintenance tools, as well as high-efficiency filters, saved the minesite over $14 million USD in under 2 years.

These results have propelled the minesite to deploy OEI filtration on all critical haul truck systems: engines, hydraulics, coolant systems and lube oil systems. Further, there has been discussion regarding distribution of OEI filtration for equipment across all the mining organization's international minesites.

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