

Swing Gearbox Gear Condition Improvement

PHOSPHATE MINING (USA)

Dragline Swing Gearboxes

Castrol Optigear® 1100/1500 gear oil*

ANNUAL SAVINGS: \$148,992



THE SITUATION

A major phosphate mining company was changing swing gearboxes on their Bucyrus 1370 dragline every five years. Each time they had to encounter the following expenses:

- New timed swing case gear set - \$80,000
- New swing shaft bearing set - \$12,000
- Lost production time - 32 hrs
- Downtime cost - \$10,000 per hour
- Labor to replace gears and bearings – 128 man-hours (4 men x 32 hrs)

The customer was looking for ways to significantly increase the service life of their swing gearboxes.

BEFORE

Five (5) years cost calculations:

Replacement parts cost - \$92,000
Labor cost - \$7,040
Cost of lost production - \$320,000
Total five (5) years cost - \$419,040

Total annual cost of one gearbox and bearings replacement: \$83,808

AFTER

Nine (9) years cost calculations:

Replacement parts cost - \$92,000
Labor cost - \$7,040
Cost of lost production - \$320,000
Total nine (9) years cost - \$419,040

Total annual cost of one gearbox and bearings replacement: \$46,560

THE SOLUTION

- After thorough investigation of the problem, Castrol engineers have introduced Optigear 1100/1500 gear oil.
- After changeover of one swing gearbox to Castrol Optigear 1100/1500 gear oil, the life of the swing gearbox was increased to nine (9) years equating to an 80% gear life extension.
- Optigear 1100 gear oil is capable of extending the life of swing gear cases by up to ten (10) years with the use of efficient filtration.

Swing Gearbox Gear Condition Improvement

RECOMMENDATIONS

Optigear 1100 Gear Oils with TGOA are formulated with a unique patented blend of oil soluble additives which provide very low friction, excellent anti-wear/EP properties, and advanced surface protection.

Optigear 1100 gear oils can smooth out damage already done to the gear teeth, severely reducing the chance of further wear.

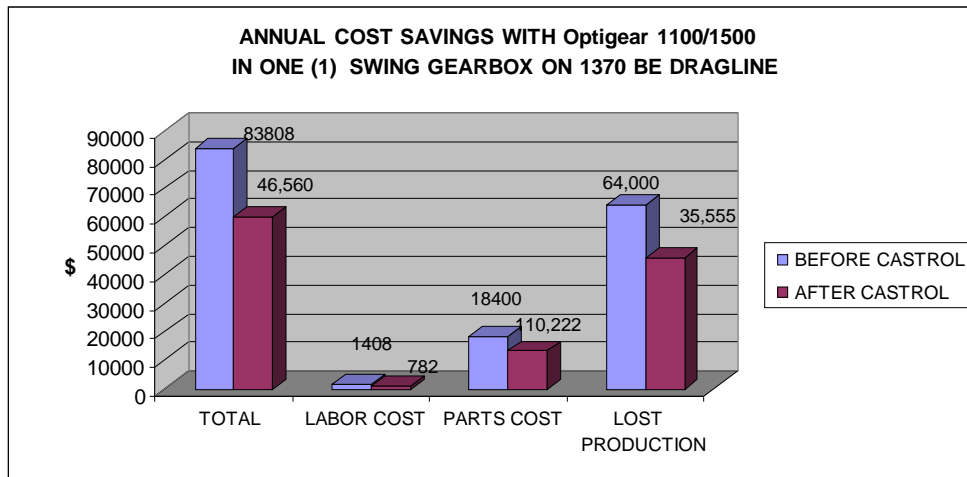
The service life of Optigear 1100 gear oil is at least 2 to 4 times longer than major competitors' gear oils.

CONCLUSION

Optigear 1100/1500 gear oil's unique properties have extended the life of swing gearboxes from five (5) to nine (9) years which is 80% gear life extension under very harsh working conditions of phosphate mining.

SAVINGS:

- Actual savings per one gearbox - \$37,248
- Annual savings per one dragline with four swing gearboxes - \$148,992



OTHER POTENTIAL APPLICATIONS

Optigear 1100 high performance gear oil is the right product for heavily loaded critical gearboxes. It can be used in all mining gear applications with good integrity. Benefits include: reduced downtime, increased parts life, less labor costs, and less waste oil.

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Gear Inspection Documentation

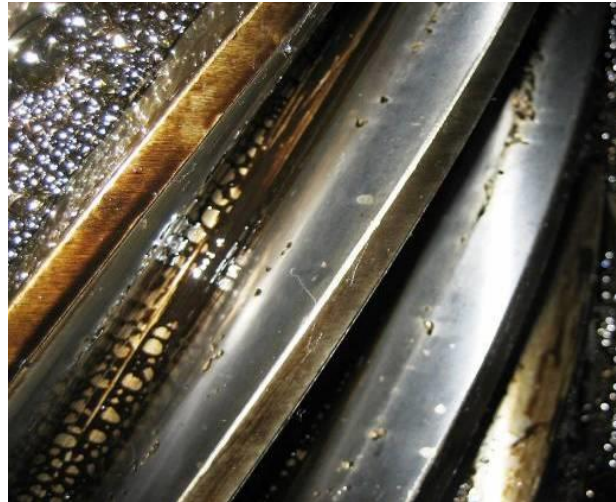
SWING GEARBOX. Input High Speed Drive Pinion

Before Optigear 1100/1500



Progressive macropitting with pits that coalesce and form shallow craters on about 50% of working tooth surface.

After Optigear 1100/1500



Progressive macropitting has been arrested. Gear condition has significantly improved. Pitted area reduced to about 5 - 10%.

Progressive macropitting has been arrested and gear condition has been significantly improved from last inspection by Optigear 1100 smoothing action.

Gear Inspection Documentation

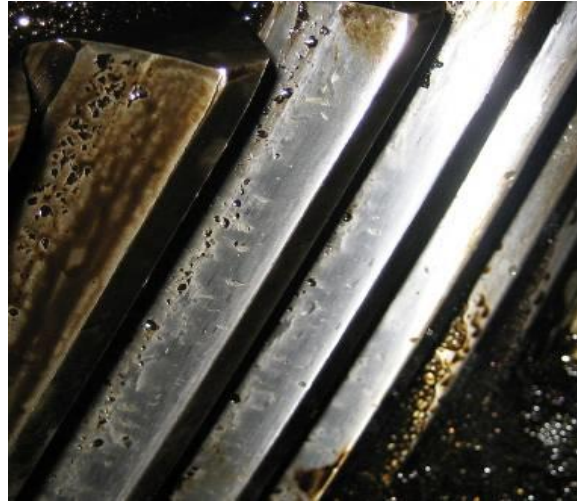
SWING GEARBOX. Upper & Lower Intermediate Gears

Before Optigear 1100



Progressive macropitting with pits that coalesce and form shallow craters on about 60% of working tooth surface.

After Optigear 1100



Progressive macropitting has been arrested. Gear condition has significantly improved. Pitted area reduced to about 10%.

Optigear 1100 gear oils can smooth out any damage already done to the gear teeth, severely reducing the chance of further wear.