

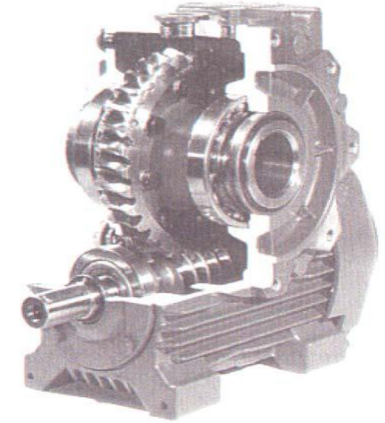
Castrol Optigear Synthetic Eliminates Failures of Cooling Bed Gearboxes

METALS (USA)

Cooling Bed Worm Gearboxes

Castrol Optigear® Synthetic 800/2200

Annual Savings: \$30,000



THE SITUATION

The cooling bed at a major steel mill is operated by three carryover worm gear drives that were experiencing frequent failures. One of the causes was significantly increased load on the cooling bed to meet the production schedule. Based on maintenance data, the average life of these gearboxes varies from 1.4 years for the South gearbox to 3.5 years for the North gearbox. One gearbox repair cost is approx. \$30,000.

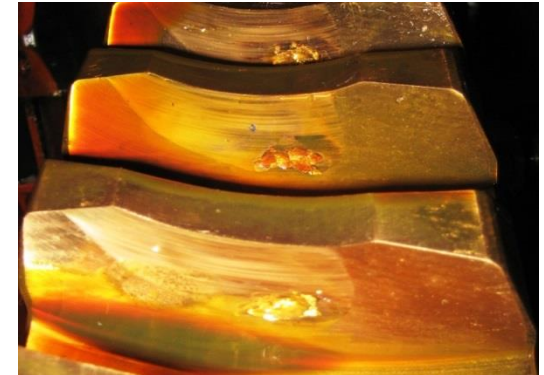
The differences between these gearboxes are the relative location and the amount of load, with the South gearbox having the highest load and being most susceptible to misalignment due to the longer input powertrain. Castrol worked with the Reliability department to conduct root cause analysis and make recommendations to significantly increase the life of the gearboxes.

BEFORE

- Number of South gearbox failures in 3.5 years = 2.5
- Number of North gearbox failures in 3.5 years = 1
- Total average number of cooling bed gearbox failures in 3.5 years = 3.5
- **The cost to rebuild cooling bed gearboxes in 3.5 years = \$105,000**

AFTER

- No cooling bed gearbox failures in 3.5 years
- **The cost to rebuild cooling bed gearboxes in 3.5 years = \$0**



Cooling Bed South Drive - bronze wheel condition after 1 year in service before Optigear® Synthetic 800/2200 gear oil; note the sliding wear and spalling already forming

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RECOMMENDATIONS

Castrol engineers conducted a root cause analysis which included:

- Gear inspection of the cooling bed worm gearboxes
- Investigation of all possible causes of the failures such as: improper lubricant, gear overloading, misalignment, improper gear profile, or insufficient gear materials
- Thorough analysis of oil sample reports for the last 15 years using Six Sigma software and methodology

The following was concluded, based on the investigation:

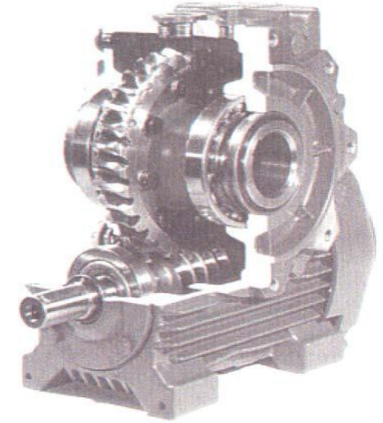
- Overloading and misalignment are contributing factors.
- Due to these contributing factors, the oil's viscosity of ISO 1000 was not sufficient to develop proper oil film and protect the gears from wear.

Castrol Optigear Synthetic 800/2200 high performance gear oil was recommended, due to its extremely high viscosity of ISO 2200.

CONCLUSION

- **The result after conversion to Castrol Optigear Synthetic 800/2200 was complete elimination of cooling bed gearbox failures.**
- **No gearboxes were rebuilt during the last 3.5 years* with \$105,000 savings over that time**
- **Annual savings = \$30,000**
- **Actual savings is much greater considering reduced oil usage (oil was changed each time when gearbox was rebuilt) and increased uptime.**

* At the time of case study publication, all cooling bed gearboxes continue to run for about 4 years with no failures.



OTHER POTENTIAL APPLICATIONS

Optigear Synthetic 800 utilizes polyglycol base oil and bronze-compatible EP additives which make it ideal for the extreme sliding of worm gear drives.

In addition, it is well suited for any high temperature gear oil application where long oil and equipment life are desired.