2011

Miner- Cutter head

Gearbox teardown & Vibration

Cutter head gearbox was replaced due to the loud audible noise occurring in the high speed gear area, and the vibration analysis results. Wear on the gears/bearings was inspected at the Joy rebuild facility, and compared with the vibration data.

Distribution:

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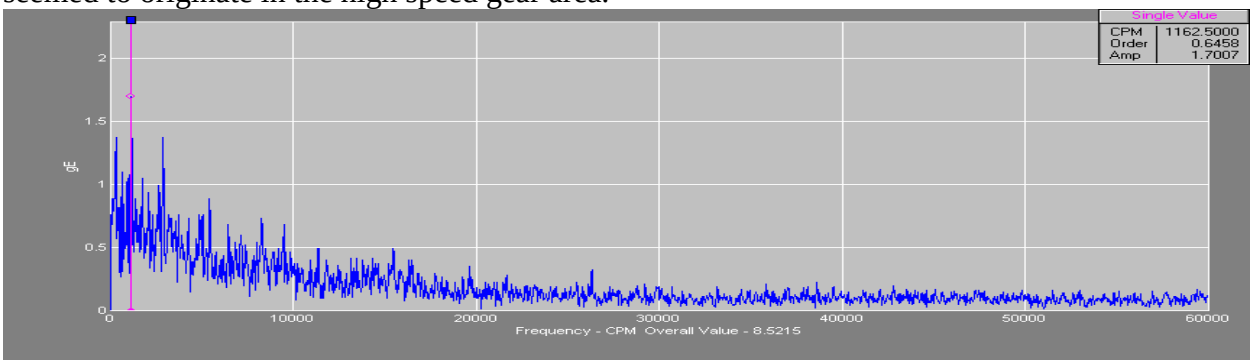
Introduction

On July 27th, 2011 vibration analysis was completed on the left and right cutter head gearboxes on a miner from an underground mine. Left cutter head has displayed loud audible noise at the high speed gears location. It also showed much higher enveloped acceleration (early detection) readings then the right cutter head. Our recommendation based on the vibration readings, and the audible noise was to replace the left side gearbox.

Equipment used:
1. SKF CMVA30 hand held data collector.

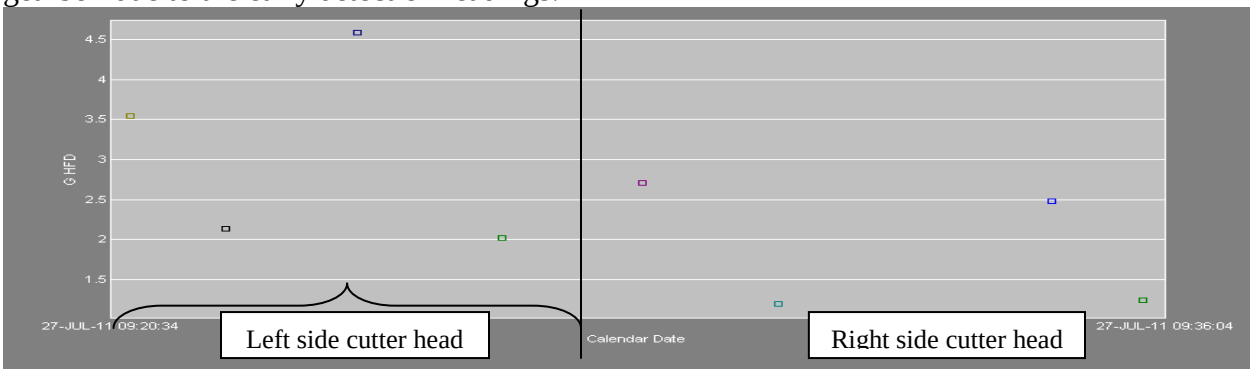
Vibration Evaluation

The spectrum below was taken on the left side cutter head gearbox (A gear, and B gear area). The spectrum shows raised floor. Highest peak in the spectrum is 1162 CPM, which is the running speed of the reach gears. The left cutter head has also had a loud audible noise which seemed to originate in the high speed gear area.



Gear A, and gear B area reading (gE)

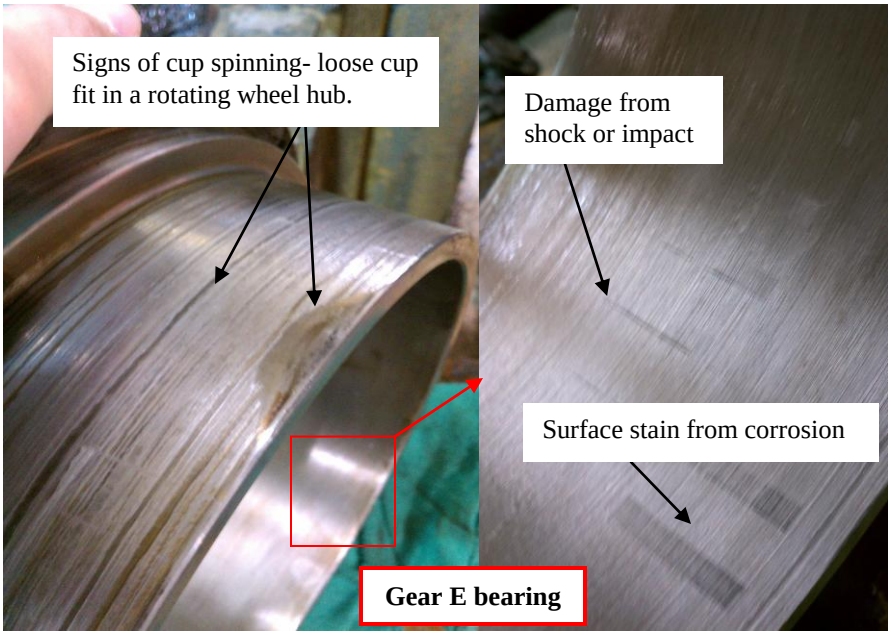
Seen below are the HFD readings taken on the left, and the right side cutter head. As we can see the left side shows more metal to metal contact/lack of lubrication then the right side. The highest high frequency reading is on the reach gear area (4.5 G's). Replace the left side gearbox due to the early detection readings.



Gearbox teardown

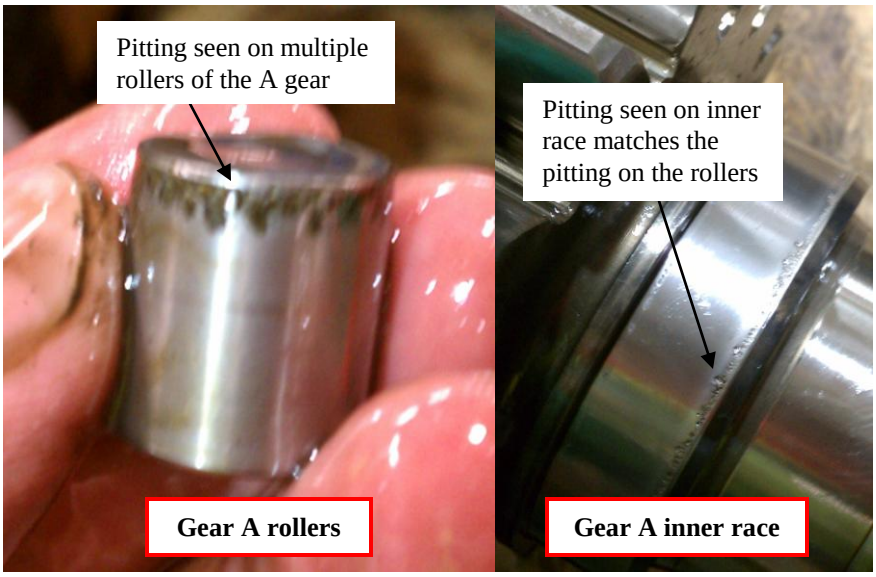
Listed below are the findings at the gearbox tear down.

Finding #1- Low speed gears



The E gear bearing shows impact damage, and surface staining on the outer race. Inner race shows signs of cup spinning- loose cup fit in a rotating wheel hub. Metal to metal contact has started to occur.

Finding #2- High speed gears



The A gear bearing show pitting on the inner race, which can also be seen on the rollers. Rollers also seemed to be loose in the cage. When the shaft was pulled out of the bearing, the rollers fell out of the cage, which should not happen in this type of bearing. The slight pitting was also present on the D gear bearing.

Conclusion

The tear down of the left side cutter head gearbox determined the unit was in the early stage of failure. The visual inspection has found pitting all around the inner race and on the rollers of the gear A bearing. Rollers also seemed to be loose in the cage. The slight pitting was found on the D gear bearing. The E gear bearing showed impact damage, slight surface staining, and signs of loose cup fit in the rotating wheel hub. Our concern lied mostly around the A gear bearing, due to it being the high-speed bearing, and the degradation would happen more rapidly.

Vibration readings were not trended on the unit, and could not be monitored for the increase over time, thus we have compared the vibration readings taken on the left, and the right side cutter heads. Early detection readings (enveloped acceleration) have indicated metal to metal contact /lack of lubrication on the left side cutter head unit, high speed gear area.