Issue 34: Bud's Take on Lubrication Failure: Starvation

Lubrication Failure→Starvation

It is a brutal fact that more than 50% of bearing failures are due to lubrication issues. The difficultly is that where the term inadequate lubrication is used, more questions develop. What does it mean? Is there too much, too little, wrong viscosity, contamination, etc. This begins our information investigation necessary to find the root cause. I have evaluated numerous failures that occurred due to lubrication starvation. In this article we will discuss how starvation of lube leads to shortened bearing life.

Important Bearing Terms:

Bearing Free Space is the area remaining inside of the bearing cavity after subtracting the space consumed by the rolling elements and retainer.

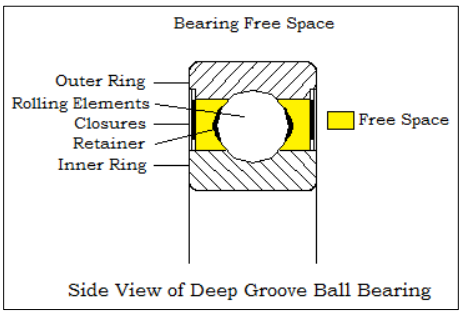

Fig 1: Representation of Bearing Free Space

Closures are seals or shields built into the bearing to maintain grease and keep contamination out.

Bearings with Closures (Seals or Shields)

Bearings with closures on both sides are supplied by bearing manufacturers with approximately 20-50% grease fill. This amount varies by manufacturer and or application. These type bearings are considered maintenance free, **sealed for life*, no grease replenishment required. Closures are often employed where calculated grease life exceeds the calculated bearing life. If the bearing is operated properly starvation should not occur.

Grease Amount

Focusing on grease amount we will assume the feeding interval, compatibility, and all other issues are correct. Many companies are proactive and contact the bearing manufacturer to confirm the amount of grease required for the size of the bearing. Bearing engineers will calculate the required amount necessary for the bearing based on application information.

Specific Gravity of Grease	Free Space of Bearing (cm^3)	Grease Amount in Grams	
		20%	50%
0.925	90.0614	16.7	41.7

Chart 1: Example of 6216 bearing fill calculation.

What Is Missing?

The above calculation, while accurate, does not take into account the grease necessary to prime the feeding tube, housing cavity, and any other possible space outside the bearing.

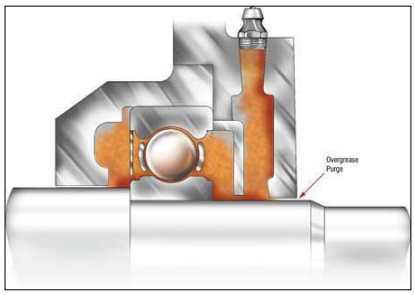

Fig 2: Grease shown in multiple cavities.

Both auto-lubrication and manual lubrication are very effective if the additional space is considered. When we look at the example in Chart 1 above, the 6216 bearing will hold 83 grams of grease (100%). The surrounding cavity is considerably larger. Using an auto-lubrication system pumping 5-10 grams a day, how long will it take to re-lubricate the bearing?

Conclusion

Lubrication starvation in bearings is a guaranteed way to shorten bearing life. Always consult with the manufacturer if you have questions regarding lubrication.

**sealed for life where life is the calculated life for the grease*