



Issue 23: Bud's Take on Unique Ball Damage

Unique Ball Damage

Have you ever inspected a bearing and had an odd feeling that it was looking back at you?



Pic 1: Ball with circular scratches "eyeball"

Or maybe felt the rolling element was trying to say, "Look here "X" marks the spot?"



Pic 2: Ball with bands crossing "X marks the spot"

Over my years of conducting failure analysis I have found quite a few types of what I will call "unique" damage that can be found on the rolling element of ball and roller bearings. Some could say even a strange breed of failure types....leopard skin ball with eyeball?



Pic 3: Ball with leopard spots and eyeball.

This damage is not the root cause but symptoms that can lead to other or more severe problems.

Circular Scratches or “Eyeball” on Ball

What could cause the damage seen in picture 1? The damage is caused by the ball contacting the edges of the cage pocket. Normally the scratches will be in multiple directions due to the normal rolling nature of the rolling element. In this case the rolling element was forced to rotate on a single axis so the contact point had very little movement, resulting in the circular scratching. Similar damage can occur when a contaminant is trapped between the cage pocket and the rolling element. There are multiple root causes: improper fitting, heavy load, improper lubrication, and so on. Banded ball damage is often found 90° from the circular scratching.

X Marks the Spot

What is the cause of the “X” marking on the ball shown in picture 2? When a ball stops gyroscopically spinning and rotates on one axis the banded ball damage can occur. This failure has two separate bands; this can happen if a shutdown or cooling occurs after the first band is formed. The same issue occurs again making another band, just pure luck to make a nicely formed X. Similar to the previous failure, there can be multiple root causes to this failure including: improper fitting, heavy load, improper lubrication.

Leopard Spots

What caused the Midpoint Bearing coined “Leopard Spots” ball? The pattern is caused by corrosion or chemical contamination while the bearing was not in operation. Contamination in the lubrication caused the rust/corrosion damage. The eyeball or circular scratches occurred the same way as previously mentioned. In this case it is possible that the contamination in the lubrication is the cause of the rolling elements to rotate on a single axis.

Conclusion

All three examples of unique ball damage highlighted in this article are not the root cause of failure. They are symptoms of a larger issue and can assist in leading you to the root cause. This type of damage is often lost when a bearing sees catastrophic failure. Although this damage can occur during multiple failure modes, the most common is radial preload. I encourage the reading Bud’s Take Issue 3: What is Radial Preloading, available at midpointbearing.com

If you have any questions, comments, ideas for future topics please feel free to contact me directly at bud@midpointbearing.com

