# Issue 29: Bud's Take on The Frustration of Bearing Analysis

I started this article back in 2009. As the years have rolled by I've realized I've gotten older but the story remains the same. My viewpoint has not changed even as my role changed from working for a manufacturer to working for a distributor. I made some changes, but the gist is the same, I hope you enjoy!

**The Frustration of Bearing Analysis**

Bearing failed due to excessive thrust load? That can't be, since there is no thrust in the application! Another bearing company not taking any responsibility for their bad bearing!

If you have heard this argument or reviewed a bearing failure report that didn't seem to come to any strong conclusions, feel free to relax because you are not alone. I have been informed by multiple bearing users they were not satisfied with failure reports from multiple bearing manufacturers. Many don't even "waste their time" asking for reports because they don't expect more than an "it's not our fault" report. All they want is a few ideas on how to resolve the problem.

**Where the issue begins:**

Working for a major bearing manufacturer I did an investigation concluding that nearly 100% of bearings returned for analysis on the industrial side of business were accompanied by little or no application information. Virtually all completed bearing reports contained assumed results or were nothing more than a summary of findings.

The question is how does this happen? Having accurate failure analysis reports is critical to finding the root cause and resolving issues!

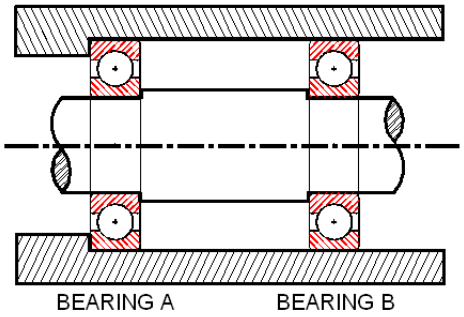


***Figure 1***

**More to the Story:**

It is quite common for the bearing to tell a story that does not directly lead to the root cause. Let's explore the complaint mentioned at the beginning of this article and ***Figure 1***.

If bearing A is stationary due to shoulders and bearing B is designed to be your float bearing, what could happen if your fitting practice (i.e. shaft and housing fits,) are incorrect? Two quick scenarios come to mind:

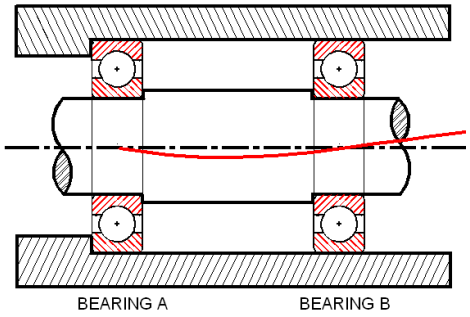


***Figure 2***

**Scenario 1:** The fitting practice is excessive and the system has a thin shaft. The machine goes into operation and heat is generated. The shaft begins to expand, bearing B cannot float, the shaft deflects resulting in the system failing, ***figure 2***.

What type of failure was observed in the bearing? The bearing failed due to misalignment. One might say, "I laser aligned the system myself, another bogus failure report." However, the fitting practice is the issue. Without the supporting information the root cause will not be found.

**Scenario 2:** Again the fitting practice is excessive, but now we are dealing with a rigid shaft. The machine goes into operation and heat is generated. The shaft begins to expand, bearing B cannot float, and the shaft continues to expand causing a thrust or axial load (or a parasitic thrust load) on the bearings. In some cases the thrust load can become so high as to cause the rolling elements to roll high onto the raceway shoulder. This causes shoulder override resulting in system failure, ***Figure 3***.

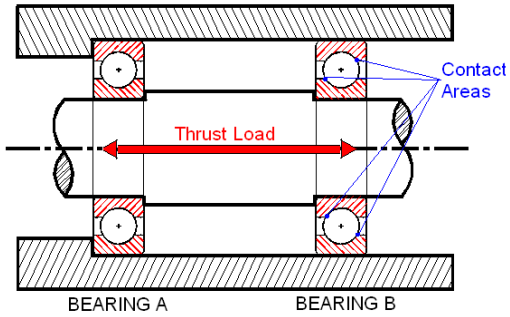


***Figure 3***

What type of failure was observed in the bearing? The bearing failed due to excessive thrust or axial load. Once again I can hear, "Thrust load? There's no thrust load, another bogus failure report." The issue again is the fitting practice but without the supporting information the root cause will not be found.

**<u>Early Stopping Point:</u>**

Another frustration in bearing analysis is that once something obvious is found the report is halted. When the person doing the inspection does not have background information or is looking for a specific issue such as noise, they will stop when they believe they have found the cause of failure. For example, if a returned bearing is burnt black, it is very easy to conclude the bearing failed due to heat. ***Figure 4*** details how multiple mounting root causes, insufficient or excessive interference, can result in the same failure mode. In this case, the mode is heat generation, lubrication failure then bearing failure. Both cases in ***Figure 4*** could not be resolved without obtaining further application details, fitting practices.

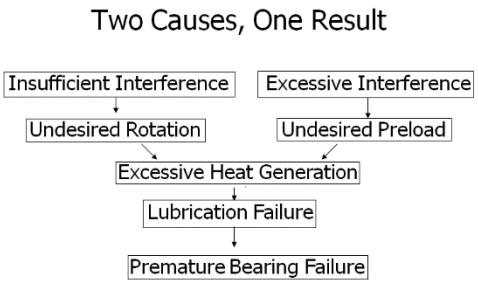


***Figure 4***

**Conclusion:**

This article was focused on one major type of failure, fitting practices or mounting, it's imperative to remember that there are multiple ways that bearings can fail: handling, storage, mounting, lubrication, and/or fatigue and often times these failures can look identical.

The two major issues; bearing failure mode that does not directly relate to the root cause and concluding from the first obvious damage found. Both give the impression that bearing reports are incorrect. To the get the most out of your bearing failure report it is imperative that all of the application data available is supplied. If no application data is available, at a minimum, try to explain what the bearing was doing and why it was pulled from service. Bearing reports follow the old cliché, "Garbage in, garbage out."

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

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