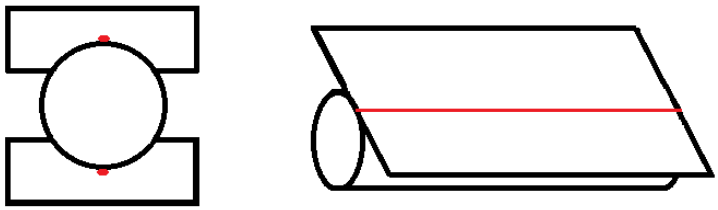
Issue 25: Bud's Take on Bearings 101: Roller Bearings

In June 2019 we released my first Bearings 101 which discussed ball bearings. If you missed it, it is available to read or download at Midpointbearing.com. In this article I will address some of the most common roller bearings.

By way of review, a bearing is a highly engineered machine component that allows parts to turn or slide. They are found in almost every type of machinery. The two general categories of bearings are sliding surface bearings (plain or journal) and rolling contact bearings. The three major functions of bearings are to carry load, reduce friction and position moving machine parts.

Line Contact vs. Point Contact

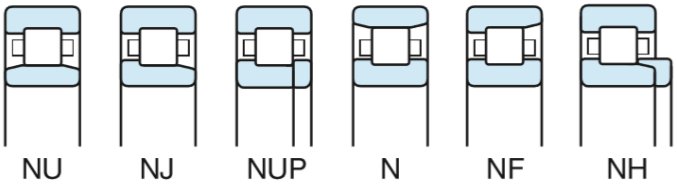
Roller bearing generally carries more load than a ball bearing due to line contact. Because of the large contact area they generally generate more friction resulting in lower limiting speeds. All bearings need an amount of load to avoid skidding. Due to the mass and contact area of a roller the minimum loading is critical to achieve proper rolling and avoid skidding damage. This damage will shorten bearing life.



Point Contact Line Contact

Here is a look at a few types of Roller Bearings

<u>Cylindrical Roller Bearing (CRB):</u> The rollers are cylindrical in shape and designed to take heavy radial load. These bearing can come with different shoulder designs for placement and support within the application. In most design one ring is designed to slide to allow for thermal expansion.



Needle Roller Bearings (NRB): Similar to CRB, but the rollers are much thinner. These bearings are designed to carry heavy radial load in a small cross section. Needle roller bearings are available in many options such as split, thrust, drawn cup, needle and cage only. Many versions are designed to ride directly on the journal or shaft.

Tapered Roller Bearing (TRB): The rollers are tapered in design and attached to the inner ring; the assembly is called the cone. The outer ring is referred to as the cup. Tapered roller bearings, similar to all other roller bearings, require a minimum load or pre-load to insure the rollers are in their proper rolling position. This design can carry both radial and axial loads.

Spherical Roller Bearing (SRB): The rollers are shaped like a barrel and the outer ring raceway is spherical in design. These bearing are designed to carry primarily radial load but can also handle some axial loads. The outer ring design allows this bearing to self-align or accommodate some mis-alignment.

Bronze cage design

Steel Cage design

Thrust roller bearing: In this style bearing the rings are often called washers similar to the thrust ball bearing. The two rings are parallel to each other and the rolling elements and retainer are set between the two rings. This style of bearing is designed to carry heavy axial load and small radial load.

Spherical Thrust Roller Bearing (STRB): This type bearing has barrel shaped rollers mounted onto the shaft washer. The housing washer is spherical in design to allow for self-aligning. This bearing is designed to carry heavy axial load and a very small amount of radial load.

Bronze cage design

Steel Cage design

Summary

In this article I discussed 6 types of roller bearings as my objective was not to overwhelm the bearing beginner. There are more bearing types and variations to discuss. Over the last two articles I discussed 4 types of ball bearings and 6 types of roller bearings which cover about 95% of bearing types sold by Midpoint Bearing. As I plunge further into this topic of bearing basics I will note many of the topics I have discussed in previous Bud's Take articles.

If you are a bearing beginner I would recommend going to midpointbearing.com and review my articles on Precision and Clearance, Basic Dynamic Load Rating and Basic Bearing Life Rating.

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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