



Skills and Practices Flyer # 44

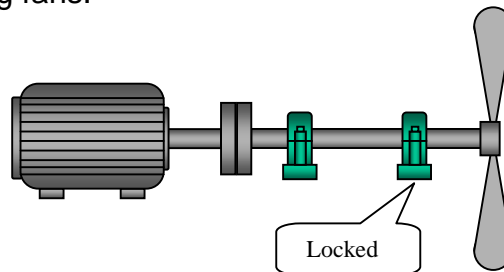


An occasional newsletter for sharing learnings from maintenance activities.

Overhung Fan Bearings – Part 2.

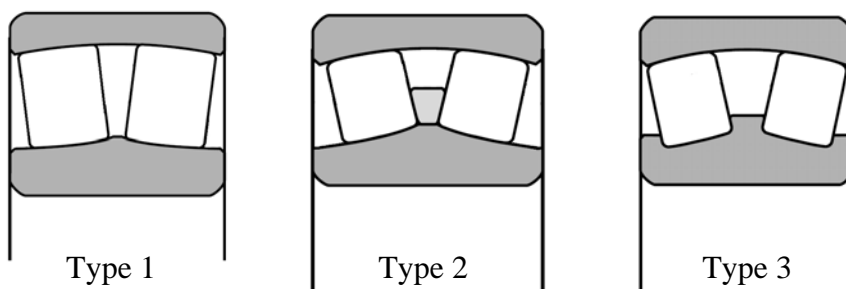
In Part 1 of this topic, I showed that it is essential to lock the correct bearing when using spherical roller bearings in plummer blocks on overhung fans.

The key issue is to make sure that the axial load is applied to the bearing with the highest radial load, otherwise catastrophic failure of the cage may result.

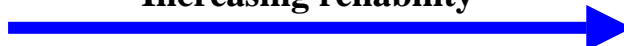


In addition to locking the correct bearing, there is another factor that has a significant impact on the life of the bearings – the internal configuration.

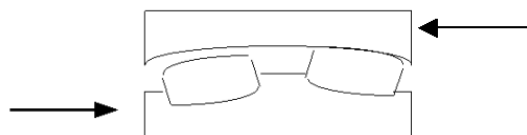
Spherical roller bearings can come with a number of different internal configurations as shown below. Each configuration has advantages and disadvantages, but in relation to direct coupled overhung fans, the configuration on the left is the least reliable, while the one on the right is the most reliable.



Increasing reliability



Why is it so? As explained in the Part 1 Flyer, in situations where there is insufficient radial load, one row of rollers is not in good contact with the outer race. In this condition, Type 1 provides the least guidance for the rollers, while Type 3 provides the most guidance for the rollers.

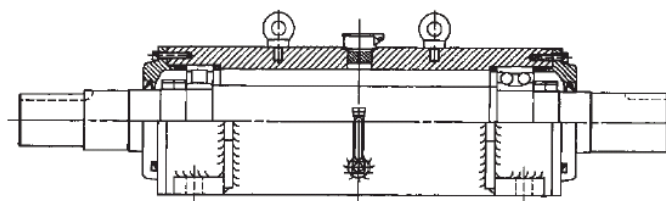


Now, the bad news is that even if you lock the correct bearing and you have a bearing with a good internal configuration, you may still experience failures because of the high axial to radial load ratio. (Particularly if you have a direct coupled application as shown at the top of the page).

For bearing Types 1 and 2, it is desirable to have the ratio of the axial load to the radial load less than “e”, where e is a factor that varies from bearing to bearing. This figure can be found in any of the manufacturers’ catalogues. In practice this typically means that **the radial load needs to be somewhere around three or four times the axial load.**

For Type 3, it is desirable to have the ratio of the axial load to the radial load less than “2e”. Therefore **the radial load needs to be somewhere around twice the axial load.**

If you don’t meet the radial to axial load requirements, and you are having failures, then you should consider replacing the spherical roller bearings and plummer blocks with non self aligning bearings and an inline tunnel housing as shown below.



The bearings used in these housings will depend upon the application, but they may have angular contact ball bearings at one end and either a cylindrical roller or a deep groove ball bearing at the other.

This arrangement has a number of advantages over spherical roller bearings and plummer blocks. Not only do they eliminate issues about load ratios (i.e. no spherical roller bearings), but they lend themselves to lubrication with oil rather than grease. With the right seals, this can be more reliable, and it also means that you can monitor the condition of the lubricant and the bearings through oil analysis.

The downsides are that these arrangements cost more, and the fan assembly may require more dismantling in order to replace the bearings. But the reality is that you rarely have to do this.

These arrangements are extremely reliable!

Where we have experienced repeated failures because of load ratio issues, we have installed tunnel housings with a 100% success rate. There have been no more failures in over 10 years in some cases, and we have no indications that there are any in the pipeline.

NOTE: We must be careful about soft foot when **installing** tunnel housings. Because the housing is much longer, we are more likely to encounter soft foot problems than when using plummer blocks.

The bottom line?

Spherical roller bearings are not always the most suitable bearing for use in overhung fan applications. We often have these arrangements in our plants because we make the mistake of buying to a price rather than considering reliability and whole of life cost issues.