



Skills and Practices Flyer # 43



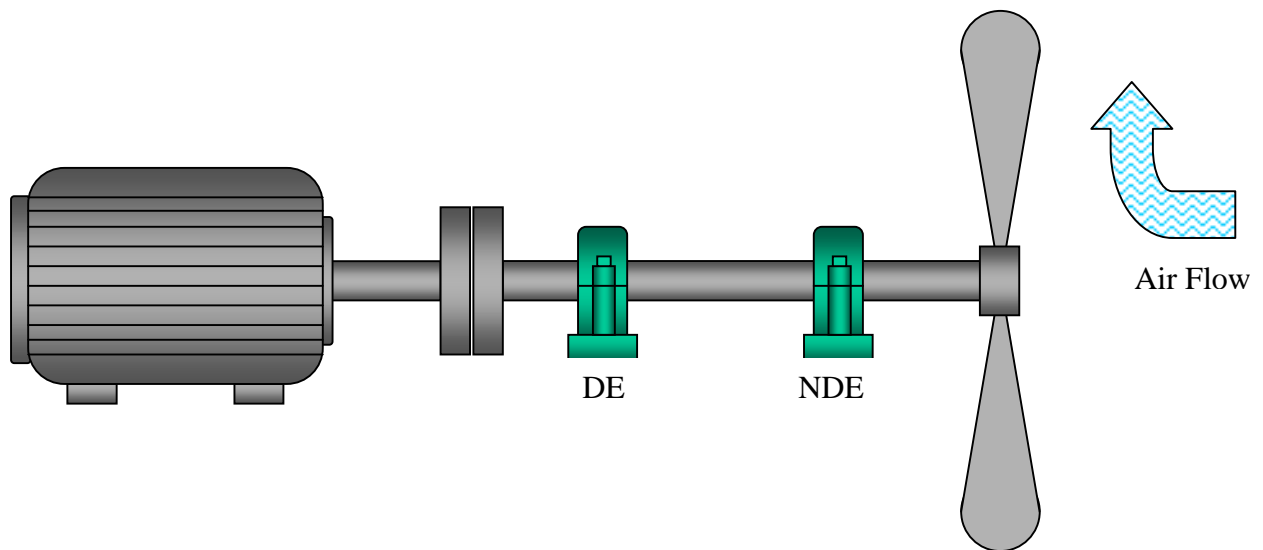
An occasional newsletter for sharing learnings from maintenance activities.

Overhung Fan Bearings – Part 1.

Many of our overhung fans have shafts that are supported by 2 spherical roller bearings mounted in plummer blocks, as shown below. One of these bearings will be the locked bearing that takes the thrust load (axial direction), and the other bearing will be floating so that it can accommodate any thermal growth in the axial direction.

For these fans it is **absolutely essential** that we lock the correct bearing. If we lock the wrong one we will have repeated bearing failures.

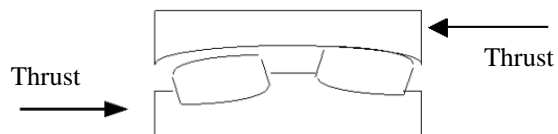
Before you read any further, answer this question: In the illustration below, which fan bearing should be the locked bearing? The drive end bearing or the non drive end bearing?



See over the page for the answer after you have made your choice!

The reason for this answer is that spherical roller bearings are not good at coping with loads that are mainly in the axial direction. They must also have a radial load that is significantly higher than the axial load.

Otherwise you get relative axial displacement of the inner and outer raceways.



If this happens, one row of rolling elements loses contact with the raceway as shown above. This allows the rolling elements to rattle around and wear out the cage pockets. When the cage fails, the rolling elements skew, and catastrophic bearing failure results.

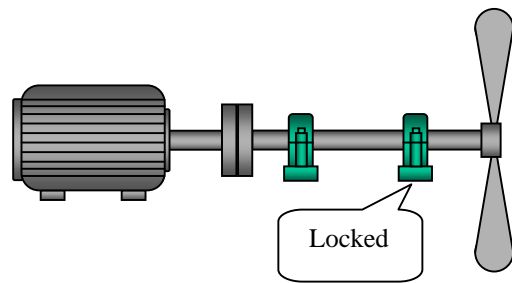
Now, overhung fans have relatively high axial loads because of the suction that is created in the axial direction as air is drawn in to the centre of the impeller.

And, for the direct coupled arrangement shown above, while there is some radial load at the non drive end bearing due to the weight of the impeller, there is very little radial load at the drive end bearing.



ANSWER:

The correct answer to the question on the previous page is: the non drive end bearing.



So, if we lock the non drive end bearing, where the radial load is highest, the rolling elements maintain contact with the raceways, and we have more chance of a long bearing life.

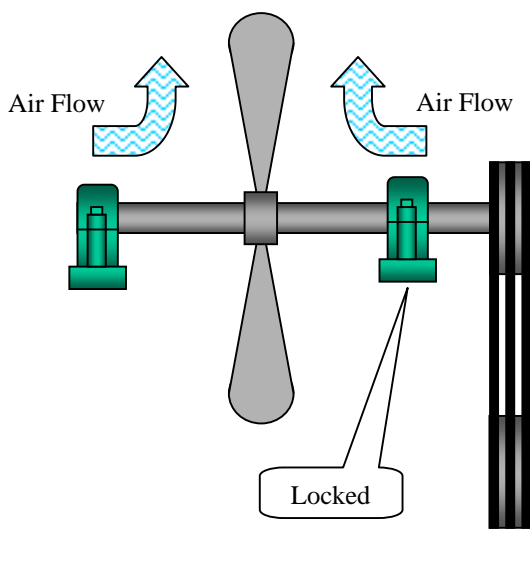
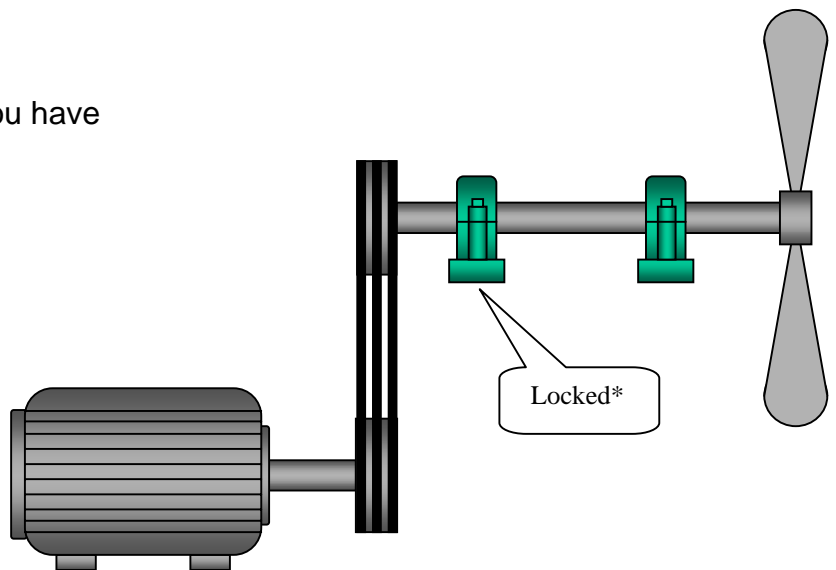
If we lock the drive end bearing we will have rapid bearing failure.

We sometimes make our choice based on whether the shaft is likely to expand because the air or gas is hot, or because we want to maintain clearances at the coupling or impeller end, or because of a desire to share the load between the bearings. These are not valid factors in this case.

Which bearing should be locked if you have a v-belt drive overhung fan?

In this case you would lock the drive end bearing because this is typically where the highest radial load is (due to the belts).

*However, in this case it is advisable to do an analysis of the loads before making your decision.



Which bearing should be locked if you have a v-belt drive fan supported between bearings?

Even though the axial loads are minimal in this case because air is drawn from both sides of the impeller, you would still lock the drive end bearing because this is where the highest radial load is.