

Common Causes of Bearing Failures

The accurate diagnosis of a bearing failure is imperative to prevent repeat failures and additional expense. Rolling bearings are precision machine elements found in a wide variety of applications. They are typically very reliable even under the toughest conditions. Under normal operating conditions, bearings have a substantial service life, which is expressed as either a period of time or as the total number of rotations before the rolling elements or inner and outer rings fatigue or fail. According to research, less than 1 percent of rolling bearings do not reach their expected life.

Bearing damage is the most common cause of machine disruptions or failures. Although they have a robust and compact design, these components are subject to diverse influences that affect their service life:

- High bearing loads
- Improper mounting
- Assembly errors
- Lubrication problems
- Vibration
- Contamination from outside
- High operating temperatures
- Intrusion of water, dirt or other contaminants
- Improper bearing selection for the application
- Electrical damage in motors due to arcing
- Misalignment
- High Temperatures

To prevent and avoid bearing damage, active condition-based maintenance measures have proven effective, such as:

- Monitoring of the damage frequency for inner race, outer race, rolling element and cage
- Analysis of the envelope spectrum for identification of damaged components
- Monitoring of bearing vibration by means of overall readings (shock pulse)
- Monitoring of bearing temperature
- Alignment of bearing supported shafts
- Field balancing of bearing supported rotors to reduce reaction forces.

More than 35% of bearing failures can be attributed to improper lubrication. An enthusiastic but untrained lube tech with a grease gun is more than likely to cause premature bearing failures due to over greasing than he is due to under greasing.

Over greasing a bearing will cause the rollers or balls to slide along the race instead of turning, and the grease will actually churn. This churning action will eventually bleed the base oil from the grease and all that will be left to lubricate the bearing is a thickener system with little or no lubricating properties. The heat generated from the churning and insufficient lubricating oil will begin to harden the grease. This will prevent any new grease added to the bearing from reaching the rolling elements. The end result is bearing failure and equipment downtime. Ironically, an attempt to sufficiently lubricate a bearing by giving it several extra pumps from a grease gun will eventually result in its failure due to under lubrication. Consider using auto-lubricators to avoid lubrication issues.

In most instances, bearings should be mounted with a press fit on the rotating ring. These are some of the prevalent conditions that can cause denting, wear, cracked rings, high operating temperature, and early failure of bearings.

Install mountings properly, and provide training to ensure all employees understand the difference between a properly and improperly installed mounting. Improper mounting is commonly caused by bent shafts, out-of-square shaft shoulders, out-of-square spacers, out-of-square clamping nuts or improper installation due to loose fits. Misalignment can result in overheating and separator failure.