LAYCO ELECTRIC INNOVATIONS

Your Premium Provider for Supply and Service of Electric Motors, Industrial Controls, and Power Distribution Solutions

Information Sheet # 04

Your Reliable Guide for Power Solutions

BEARING TYPES
Maintenance and Reliability

1.0 Introduction:

Rotating mechanical and electrical equipment used throughout industrial and commercial applications incorporate bearings of one type or another to ensure rotating shafts run freely with minimal friction. Bearings help in maintaining the alignment and rotational movements of a machine. LEI specializes in the maintenance of many types of motors and servos all of which incorporate either roller or sleeve type bearings.

This information sheet covers bearings, discusses the types of bearings, how they are constructed, typical reasons for failure, and maintenance procedures that should be adopted to avoid failure and unscheduled shutdown of vital pieces of equipment with the resultant cost in terms of cost and safety.

Figure 1

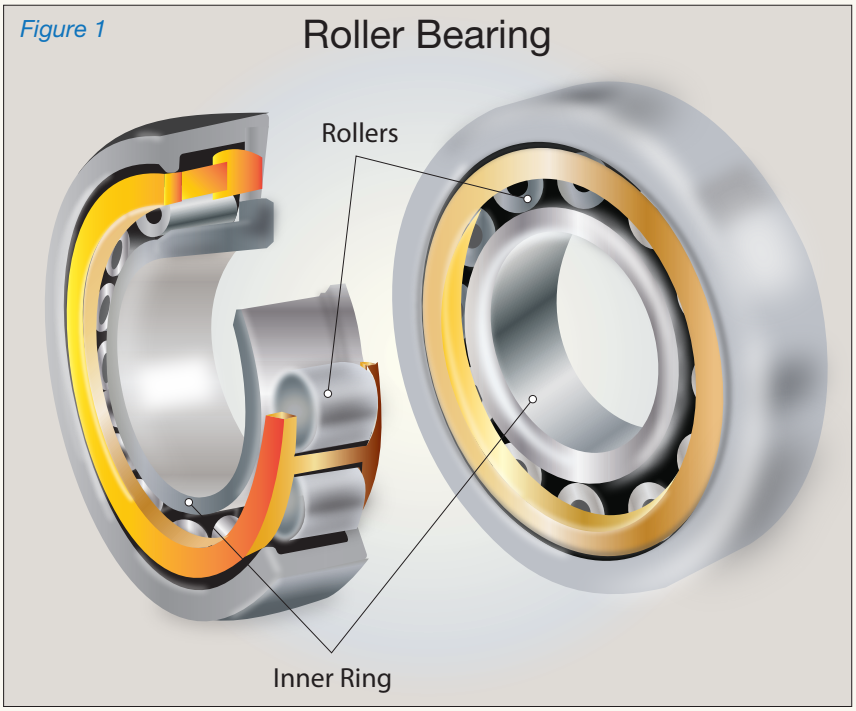


Figure 2

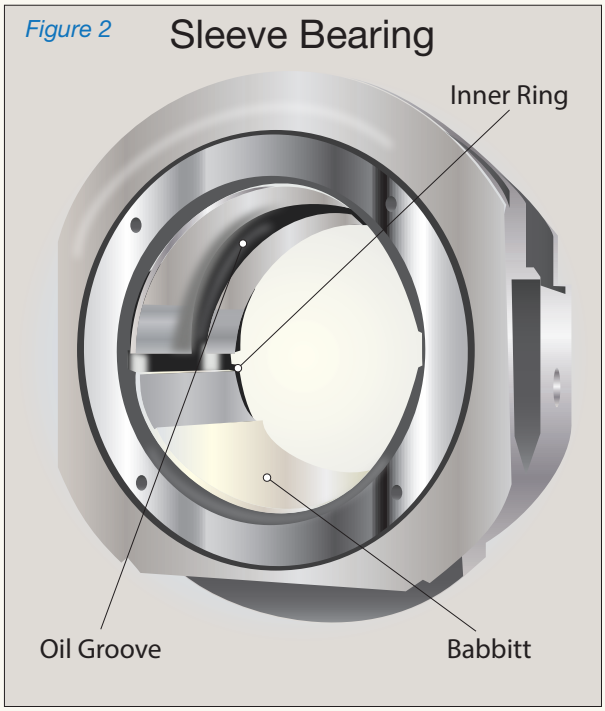
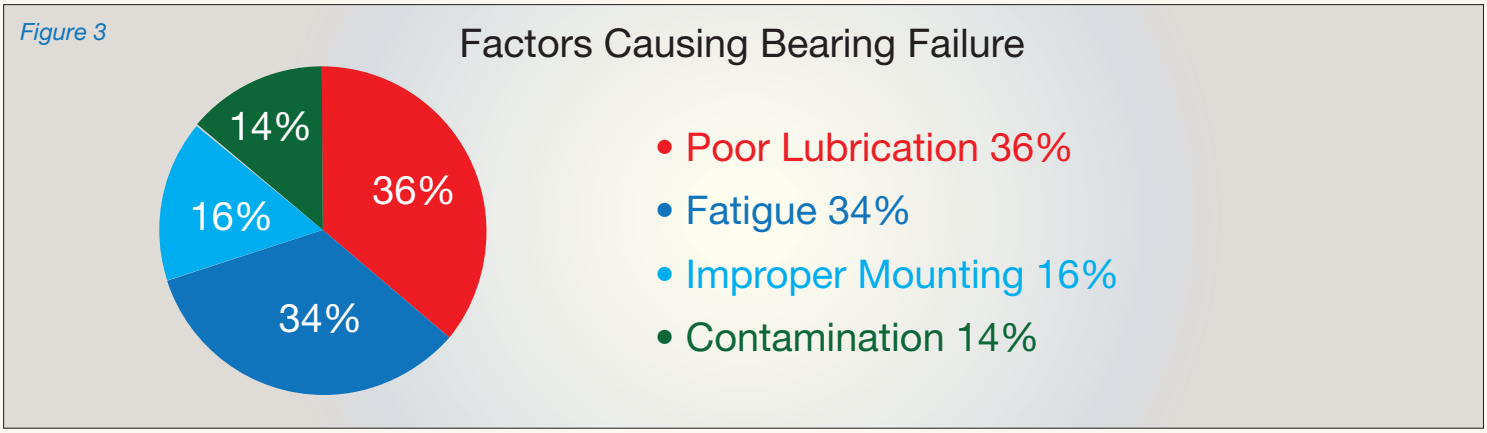


Figure 3



To fulfill our commitment to be the leading supplier, the Layco Electrical Innovations team ensures they are always up-to-date with the current industry standards as well as industry trends. As a service, our **Information Sheets** are circulated on a regular basis to existing and potential power customers to maintain their awareness of changes and developments in standards, codes and technology within the power and motor control industry.

The installation information provided in this information sheet is informational in nature only, and should not be considered the advice of a properly licensed and qualified electrician or used in place of a detailed review of the applicable National Electric Codes and local codes. Specific questions about how this information may affect any particular situation should be addressed to a licensed and qualified electrician.

2.0 What is the Function of a Bearing:

Bearings maintain the weight of the load a shaft bears during operation, they also enable free rotation to eliminate friction and the wear and heat generated by friction. Without bearings a rotating shaft, and the surface it is rotated within, will rapidly under load be destroyed. The application of a bearing to a shaft enables rotating electrical equipment to run many hours with a high degree of reliability.

3.0 Principal Types of Bearings Within Electrical Components:

Bearing types fall principally into to categories -

3.1 Roller and Ball Bearings:

An alternative to sleeve bearings are Roller and Ball bearings. Note the following characteristics -

3.1.1 Ball Bearings - Ball bearings are more forgiving when it comes to angular misalignment. Roller bearings, much less so. While a ball bearing can handle a misalignment of up to 0.004 inches, a cylindrical roller bearing might already have difficulty rotating when misaligned by anything more than 0.001 inches.

Ball bearings do not have infinite lives. Eventually, they fail from fatigue, spalling, or any number of other causes. They are designed on a statistical basis with a useful life where a certain number are expected to fail after a set number of revolutions.

3.1.2 Roller Bearings - Similarly constructed as ball bearings, roller bearings have line contact rather than point contact, enabling them greater capacity and higher shock resistance. Roller bearings can often be disassembled and the roller carrier and rollers, or the outer or inner races, replaced individually, see *Figure 1*.

3.2 Sleeve Bearings:

A sleeve bearing is one of the simplest types of bearing and contains a bearing surface and a mating component. Its role is simply to ensure linear or rotational movement between the two parts with minimal friction. Plain bearings must be made from a material that is durable, low friction, low wear to the bearing and shaft, resistant to elevated temperatures, and corrosion resistant. The component within a sleeve bearing that incorporates the bearing material is called a Babbit.

The Babbit bearing material in a sleeve bearing is a soft, white non-ferrous alloy which is used to provide a bearing surface, see *Figure 2*. In general, the harder the surfaces in contact the lower the coefficient of friction and the greater the pressure required for the two to gall or to seize when lubrication fails.

4.0 Key Reasons for Bearing Failure:

The life and reliability of a rotating piece of machinery is closely linked to the life of its bearing's see *Figure 3*. Users should be aware of the principal reason for bearing failure, which are -

4.1 Foreign Matter/Contamination:

Foreign particles, including dirt, grit, lint, dust, and metal shavings, can all cause wear in the bearings. Foreign matter is a working fact of some operating environments, and improper sealing can further contribute to unnecessary levels of abrasive particulate.

4.2 Poor Lubrication:

Inadequate lubrication can cause overheating and excessive wear. Improper maintenance, leakage, oxidation, and atmospheric environment can all contribute to a lack of appropriate lubrication.

4.3 Bearing Fatigue:

Excessive load repeated over time can cause metal fatigue. Rolling elements create a wave in contacting material as they roll. This constantly rolling load puts the material in rapidly alternating tension and compression, which will cause damage over time, including brinelling.

4.4 Improper Mounting:

Issues such as pressure to the outer race, loose shaft-fit, shafts/housings fitted too tightly, and rough finish on the bearing seat will respectively result in, denting, rotation of shaft within inner ring producing heat and wear, cause rings to crack and high temperatures, and the bearing can breakdown due to loose-fitting.

5.0 Important Protocols to Follow in Bearing Maintenance:

The following procedures should be followed during bearing maintenance to ensure long life and reliability:

1. **Handle with care -** Bearings are delicate and should be handled with care in an uncontaminated repair facility.
2. **Inspection -** Inspect the housing and shaft before replacement. Use a soft cloth to clean surfaces and remove nicks and burrs.
3. **Correct mounting -** Follow the recommended mounting technique for the specific bearing. Only apply pressure as defined.
4. **Avoid preheating or overheating -** Only apply heat to the level recommended by the manufacturer to avoid distortion.
5. **Tools -** Always use specialized tools for the particular type of bearing being replaced or overhauled.
6. **Prevent corrosion -** During maintenance avoid exposure to water including sweat by using gloves during service.
7. **Proper lubrication -** Use the manufacturer's recommended lubricant to address the operating temperature, speed, and load.

LEI
LAYCO ELECTRIC INNOVATIONS

LEI Headquarters
1827 N 75th East Ave.
Tulsa, OK 74115
Ph: 800.579.6950
Fx: 800.488.0719

lei-corp.com info@lei-corp.com