

# Causes of Ball Bearing Failure

[Ball bearings](#) are used in a variety of applications to reduce friction and wear. They are used in the automotive industry, power generation, construction equipment and many other types of machinery.

Ball bearings are made from a variety of materials, including steel and brass. The most common type of ball bearing is made from chrome steel, which is very durable and long lasting. However, ball bearings can fail for a number of reasons, including:

## Improper Lubrication

Improper lubrication is one of the main causes of ball bearing failure. Lubrication keeps the ball bearings from wearing out and helps them last longer. If you don't lubricate your ball bearings properly, they will wear out more quickly.

There are two main types of lubrication for ball bearings: oil-based and grease-based. Oil-based lubricants are usually used in water-soluble environments, while grease-based lubricants are used in high temperature or dusty environments.

The best way to lubricate a ball bearing is with a spray can that contains both oil and grease. By spraying your bearings with this type of spray can, you can get both types of lubricant onto your bearings at the same time.

## Fatigue

Fatigue is the number one cause of ball bearing failure. Fatigue occurs when a material is exposed to cyclic stresses below its endurance limit. When cyclic stress levels exceed

the endurance limit, fatigue damage accumulates over time until the material fails catastrophically.

Fatigue occurs in two different ways:

**Intermittent fatigue:** This type of fatigue is caused by short-duration, high-stress loads that occur intermittently and unpredictably over time. Intermittent cyclic stress causes localized surface fatigue cracks that grow until they reach a critical length and propagate through the material, causing complete failure.

**Continuous fatigue:** Continuous cyclic stress applied over a long period of time leads to gradual wear-out or fatigue failure. The amount of damage depends on the rate at which the load cycles between maximum and minimum values.

## **Pollution**

The failure of ball bearings is often associated with corrosion, which can be caused by pollution. Pollution is defined as the introduction of harmful substances into the environment. As a result, there are many different types of pollution that can cause failure in ball bearings.

Ball bearing failure caused by water contamination.

Water is one of the most common causes of ball bearing failure. Water can enter a bearing through cracks and pores in the surface, or it can be absorbed by the grease itself. Once water has entered a bearing, it will begin to rust and corrode the metal surfaces within it. This corrosion process may take place over an extended period of time, but once it starts it cannot be stopped until all the rust and corrosion has been removed from all parts of the bearing.

Pollution caused by particulates

Particulates are solid particles that float in our air like

dust or smoke from factory emissions or other sources. These particulates have no effect on lubricants because they are too small to settle out from them, but if they are present in sufficient quantities they can clog up your bearings and prevent proper lubrication from occurring. The result is premature wear and eventual failure of your bearing if you don't clean out those particulates before they get started on their destructive.

## **Overload**

Overload can cause ball bearing failure. Overload is a condition that exceeds the limit of the bearing's load capacity. The load limit is determined by the bearing's radial play, retainer dimensions and lubricant viscosity.

Overloads can be caused by excessive speed, excessive torque or by an unbalanced load on the bearing. The most common cause of overload failure is excessive speed.

If you run your equipment too fast for too long, you will eventually wear out your bearings and destroy them. This is because you are forcing them to spin faster than they were designed to go. The faster you spin your equipment, the more pressure you put on each individual bearing in the system. When this happens, there is not enough room between the spinning shaft and stationary housing for oil to flow around freely inside of it anymore. This causes one side of each ball to heat up significantly more than its opposite side does as it spins around inside its cage at high speeds for extended periods of time.

## **Dislocation**

Ball bearings are used in a wide variety of applications, and they are also subject to a wide variety of failure modes. The most common cause of ball bearing failure is dislocation.

Dislocation occurs when the inner ring becomes dislodged from its seat in the outer ring. This can happen when the shaft is rotating with too much force or when the shaft is not rotating at all. In either case, the inner ring may be forced out of its seat by centrifugal force, which causes damage to both rings and increases friction between them.

The main cause of this type of failure is improper mounting or installation, although some materials are more prone to dislocations than others. For example, if you use a lubricant that does not work well at high temperatures or pressures, you may experience dislocations because it will not provide enough lubrication for smooth operation over time.

## **Overheating**

Overheating is one of the most common causes of ball bearing failure. When a bearing overheats, its internal parts expand and contract beyond their normal tolerances. This puts stress on the bearings' internal components and can cause them to break down or become permanently damaged.

Ball bearings may overheat for a variety of reasons:

Rotor imbalance causes the rotor to vibrate, which in turn causes friction between the shaft and housing. This friction generates heat that can damage your bearings.

A bad seal can allow dirt and water to get inside your bearing races, causing corrosion that damages the raceways and races themselves.

If there is too much play between the inner race and outer ring, then it allows more movement of these parts during operation, which again generates heat as additional friction occurs between moving surfaces.

Critical speeds, load, and heat are the main reasons for ball bearing failure. Critical speeds occur when the speed of an

object is doubled. This means that the ball bearing will spin once in the same amount of time to turn twice. The effect of critical speeds over a period of time causes shock loading. Heat build up can also affect ball bearings if overheating is present. The ball bearings themselves can get hot as well as any mounting surfaces from metal-to-metal friction.