

# What causes ball bearings to fail

[Ball bearings](#) are used in a wide range of machinery and equipment. They are often found in car engines, power tools, compressors and motors.

Ball bearings are designed to withstand high speeds, heavy loads and shock loads. However, if they're not properly maintained and lubricated they can fail prematurely.

Here are some common causes of ball bearing failure:

## Fatigue

Fatigue is a common cause of ball bearing failure. Fatigue occurs when a material is subjected to cyclic loading and unloading. The repeated stress causes the material to fail at a lower load than it would without fatigue.

Fatigue is most commonly seen in bearing applications where the load cycle is frequent and severe, such as those found in motors, fans, pumps and compressors. When this happens, tiny cracks can form in the surface of the raceway (the smooth area between the balls) or on both sides of the raceway. As these cracks enlarge over time, they cause surface roughness or pitting which leads to reduced lubrication effectiveness and increased friction between the balls and raceways which increases heat generation and causes premature failure.

The best way to prevent ball bearing failure caused by fatigue is proper maintenance practices such as inspecting bearings regularly for signs of damage or excessive wear; replacing bearings that show signs of damage; replacing components that are known wear items such as seals; and lubricating all bearings properly according to manufacturer's instructions.

## Improper lubrication

Ball bearings, like all other bearings, are lubricated to reduce friction and wear.

Improper lubrication causes ball bearings to fail. This can be due to improper oiling or lack of oil altogether. The most common cause of failure is lack of lubrication.

The reason for this is that the steel balls in a bearing are subjected to high speeds and pressures. At these speeds, the centrifugal force causes them to stick together if they are not separated by a thin film of oil. The oil helps prevent this from happening by providing a barrier between the balls and allowing them to spin freely without touching each other. If there is not enough oil in the bearing, it will run dry, causing severe damage as well as premature failure of the bearing itself.

In order to prevent premature failure of your ball bearings, you need to make sure that they have proper lubrication at all times by using the right type of lubricant.

## Bearing Misalignment

There are a number of factors that can cause ball bearings to fail. The most common is misalignment.

Misalignment occurs when the outer ring of the ball bearing moves out of position. This can happen due to improper installation, but it is also possible for the outer ring to move during use over time. The only way to prevent this type of failure is by making sure the bearings are properly installed and maintained over time.

If you suspect that your bearings are misaligned, you should remove any covers or shields that may be present on your machine before removing bearings to inspect them for alignment.

The only way to properly align bearings is by using a dial indicator or other measuring device. The distance between the centerline of your spindle and the centerline of your bearing should be within 0.001" (one-thousandth) of an inch for proper alignment.

## Corrosion and Contamination

Contamination is a major cause of bearing failure. This can occur when foreign particles are introduced into the bearing during manufacture, assembly or service. These contaminants may be material from the original casting process, such as oils from machining operations, or from other sources such as lubricants and coolants. In addition to causing wear, they can also accelerate corrosion by providing an electrolyte environment for electrochemical reactions between the metal surfaces of the bearing races and balls.

Contamination can also occur when liquids enter the bearing housing through seals or lubrication holes in the housing. This may happen due to accidental spillage or improper filling during re-lubrication operations if personnel fail to follow proper procedures.

## Overload

Overloading can cause a ball bearing to fail. The load on the bearing will increase until it reaches its maximum load rating. If this load is exceeded, the bearing will fail, leading to damage and even an accident.

For example, if you have a machine that requires 5 horsepower (hp) of power and you use 10 hp of power to run it, the bearings in your machine will be overloaded. This could cause damage not only to your bearings but also other parts of your machine such as gears and motors.

Ensure that the load on your bearings never exceeds their maximum rated load by using a torque wrench or other similar device when tightening bolts on components such as shafts or gears. These devices will ensure that bolts are tightened properly so they don't loosen over time due to vibrations during operation or other factors such as wear from friction between moving

components inside the machine's mechanism.

## **Installation Error**

A common cause of ball bearings failing is installation error. Most bearings are designed for a specific mounting configuration. If you mount them in the wrong orientation, or with improper preload, they will fail prematurely.

Bearings that are not properly installed may also fail due to gross overload. When a bearing is subjected to excessive loads or shock loads, it can experience premature failure. Overloading can occur when a component experiences an impact or sudden acceleration during operation.

Incorrect preload can lead to premature bearing failure as well. The preload on a bearing determines how much load it can handle before it fails. If the correct amount of preload is not applied during installation, the bearing will not be able to handle its normal operating load, resulting in premature failure of the bearing under those conditions.

Ball bearing failure can be caused by multiple factors. There are specific conditions that must be present for a ball bearing to fail, such as an environment that is too high or low in temperature, or extreme loading and overloading of the equipment with which they are installed and used. However, many of the most common causes of ball bearing failure have to do with the way that they have been improperly maintained or serviced prior to failure occurring.