12 REASONS

YOUR BEARINGS WILL FAIL

Ritbearing
CORPORATION

Things break. No matter what you do, there is always a chance that products you own will fail. The same holds true for bearings, but that doesn't mean that you can't prevent many of the issues that lead to costly downtime.

This article is a guide to all of the major factors that can lead to bearing failure, as well as ways that you can prevent the issues from happening. By learning more about these potential problems and knowing how to stop them, you can get the most life out of your bearings and make your application much stronger.

COMMON FACTORS THAT LEAD TO BEARING FAILURE

There are several reasons why your bearings may fail, but that doesn't mean that you won't be able to spot the issues before they become a problem. This list will let you know the causes behind each factor, what to look for, and how you can prevent any issues.

REASON # 1

LUBRICATION FAILURE

CAUSES:

According to a study from RKB Bearing Industries, up to 80 percent of bearing failure is caused by improper lubrication. This means insufficient lubrication, use of improper lubricants, or excessive temperatures that degrade the lubricant.

WHAT TO LOOK FOR:

Discolored rolling elements (such as blue or brown) and rolling element tracks. Overheating or excessive wear in the bearing.

HOW TO FIX IT:

Use the appropriate type and correct amount of lubricant, avoid grease loss, and follow appropriate re-lubrication intervals.

REASON # 2

CONTAMINATION

CAUSES:

Foreign substances getting into bearing lubricants or cleaning solutions. These include:

- Dirt
- Abrasive grit
- Dust
- Steel chips from contaminated work areas
- Dirty hands or tools

WHAT TO LOOK FOR:

Denting of rolling elements and raceways that cause vibration.

HOW TO FIX IT:

Filter the lubricant and clean work areas, tools, fixtures, and hands to reduce the risk of contamination.

REASON # 3

IMPROPER MOUNTING

CAUSES:

Improper installation of the mounting. In most instances, bearings should be mounted with a press fit on the rotating ring.

WHAT TO LOOK FOR:

These are some of the prevalent conditions that can cause denting, wear, cracked rings, high operating temperature, early fatigue, and premature failure of bearings (among many others):

- Mounting bearings on shafts by applying pressure or blows to the outer race
- Mounting bearings into a housing by pressing on the inner ring
- Loose shaft fits
- Loose housing fits
- Excessively tight fits
- Out of round housings
- Poor finish on the bearing seat

HOW TO FIX IT:

Follow proper mounting instructions and provide training to ensure all employees understand the difference between a properly- and improperly-installed mounting.

REASON # 4

MISALIGNMENT

CAUSES:

Bent shafts, out-of-square shaft shoulders, out-of-square spacers, out-of-square clamping nuts, and improper installation due to loose fits can cause misalignment, which can result in overheating and separator failure.

WHAT TO LOOK FOR:

A wear path not parallel to raceway edges on the raceway of the non-rotating ring.

HOW TO FIX IT:

Inspect shafts and housings for runout of shoulders and bearing seats and use precision-grade locknuts.

REASON # 5

FALSE BRINELLING

CAUSES:

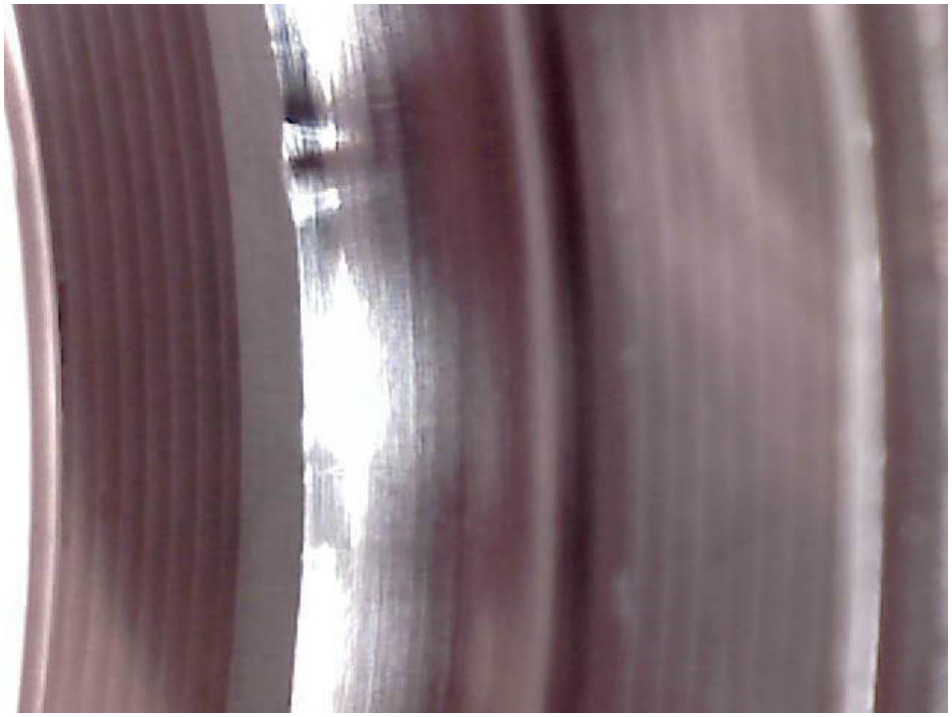
The rapid movement of the balls in the raceway while the equipment is idle wears away at the lubrication, and lack of rotation in the bearing does not allow fresh lubricant to return to the spot.

WHAT TO LOOK FOR:

Linear wear marks in the axial direction at the rolling element pitch and no raised edges as opposed to marks due to incorrect mounting.

HOW TO FIX IT:

Eliminate or absorb external vibration that would cause the balls to move and use lubricants containing anti-wear additives.



REASON # 6

CORROSION

CAUSES:

Moisture, acid action, poor or broken-down greases, poor wrappings, and condensation resulting from excessive temperature reversals can cause corrosion that is abrasive to the finely-finished surfaces of ball and roller bearings.

WHAT TO LOOK FOR:

Red or brown stains or deposits on rolling elements, raceways, or cages. Increased vibration followed by wear, an increase in radial clearance, or loss of preload.

HOW TO FIX IT:

Divert corrosive fluids away from bearing areas. Use integrally sealed bearings, and consider external seals for particularly hostile environments. Also, use of the proper bearing material, such as stainless steel, can help if you cannot avoid a corrosive environment.

REASON # 7

ELECTRICAL DAMAGE (FLUTING)

CAUSES:

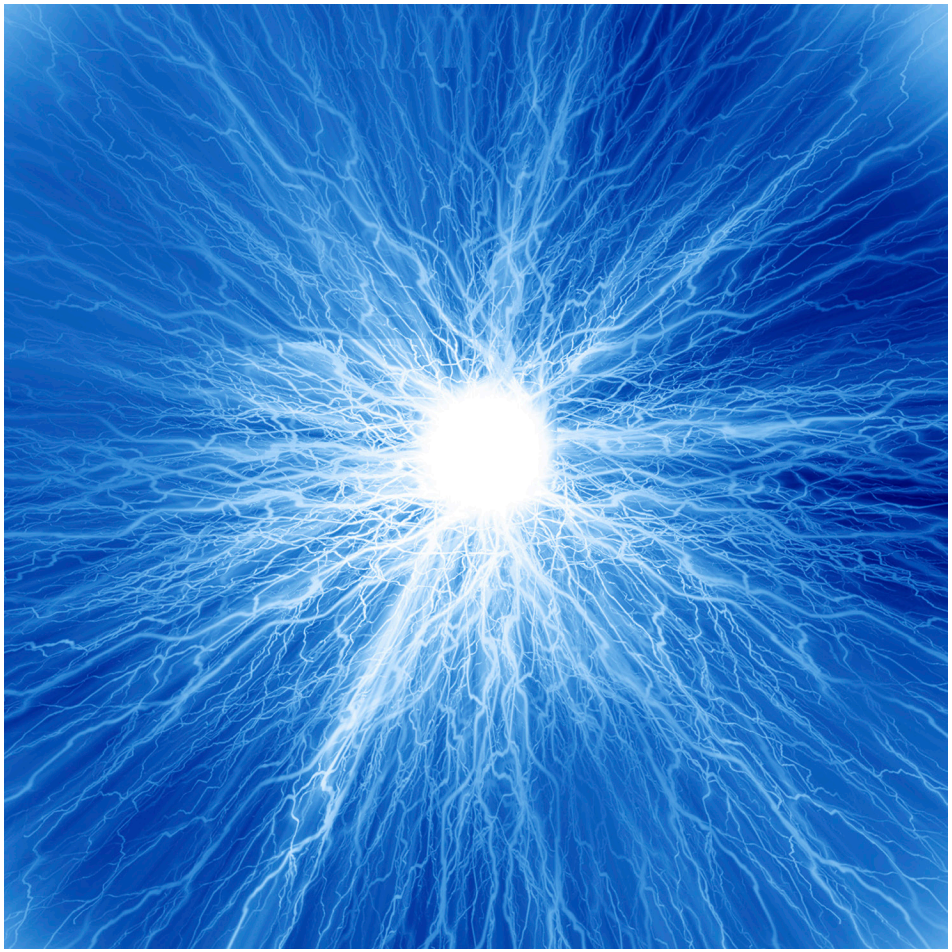
Constant passage of alternating or direct current, even with low currents.

WHAT TO LOOK FOR:

Brownish marks parallel to the axis on either a large part of the raceway or covering the entire raceway circumference.

HOW TO FIX IT:

Prevent electrical currents from flowing through the bearing by means of grounding or insulating, or use insulated bearings.



REASON # 8

FATIGUE (SPALLING)

CAUSES:

Overloading, excessive preload, tight inner ring fits, and using the bearing beyond its calculated fatigue life.

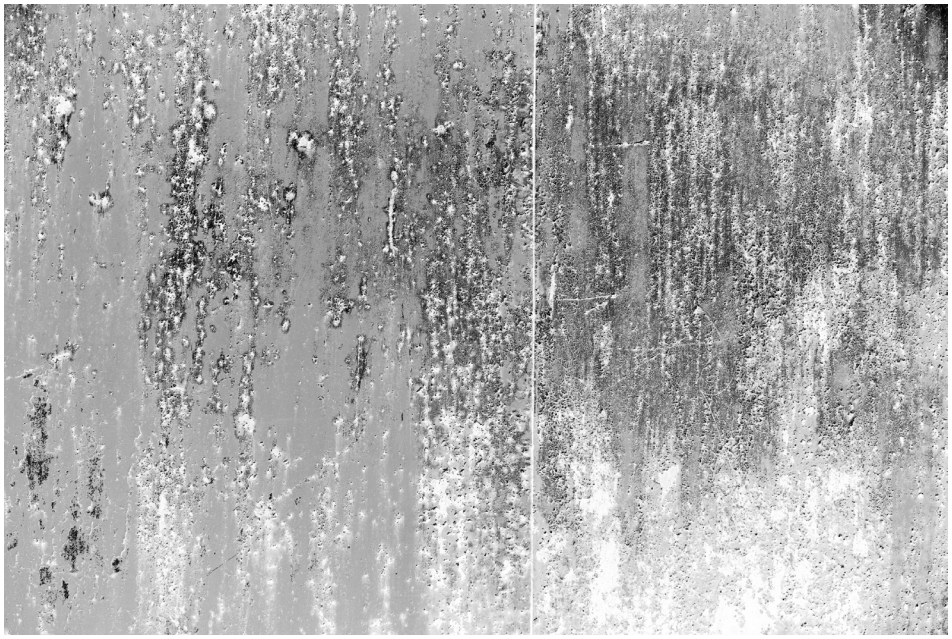
WHAT TO LOOK FOR:

Often referred to as spalling, fatigue can be indicated by the fracture of the running surfaces and subsequent removal of small discrete particles of material from the inner ring, outer ring, or rolling elements.

Spalling is progressive and, once started, will spread with continued operation. It is always accompanied by a noticeable increase in vibration and increased noise.

HOW TO FIX IT:

Replace the bearing and/or consider a redesign that uses a bearing with greater calculated fatigue life, internal clearances, and proper shaft and housing recommendations.



REASON # 9

OVERHEATING

CAUSES:

Excessive operating temperatures and improper lubrication.

High temperatures can cause grease to bleed (purge the oil) which reduces the efficiency of the lubricant. In elevated temperature conditions, oxidation causes loss of lubricating oils from the grease leaving a dry crusty soap that can seize the bearing. Higher temperatures also reduce the hardness of the metal causing early failure.

WHAT TO LOOK FOR:

Discoloration of the rings, rolling elements, and cages from gold to blue. In extreme cases, the bearing components will deform. Higher temperatures can also degrade or destroy lubricant.

HOW TO FIX IT:

Thermal or overload controls, adequate heat paths, and supplemental cooling.

REASON # 10

EXCESSIVE LOADS

CAUSES:

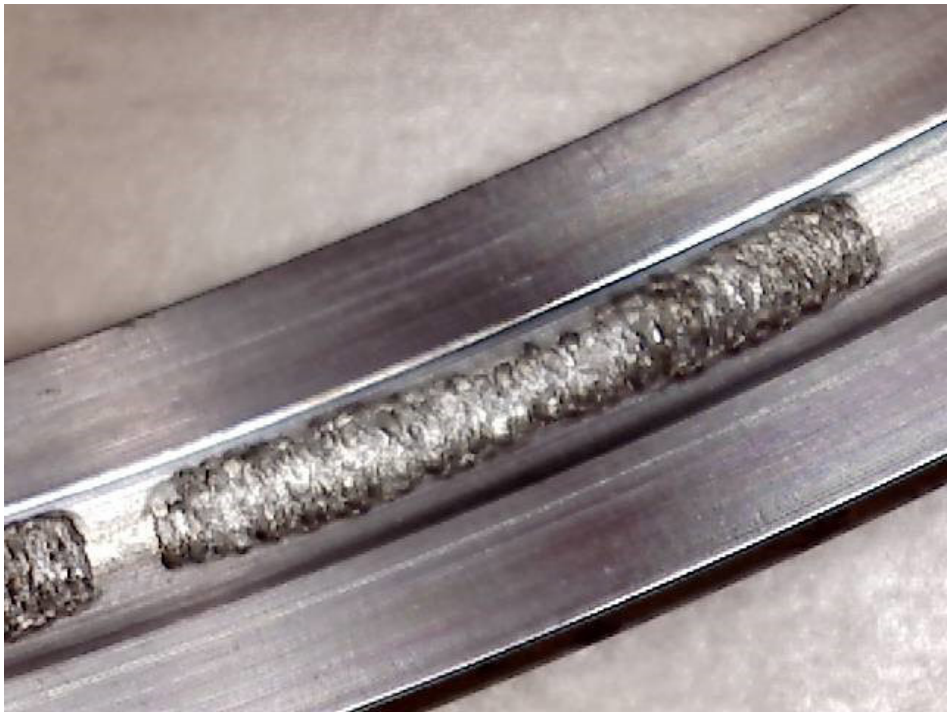
You guessed it! Putting too much load on the bearing.

WHAT TO LOOK FOR:

Heaving rolling element wear paths, evidence of overheating, and widespread fatigue areas.

HOW TO FIX IT:

Reduce the load, or consider a redesign using a bearing with greater capacity.



REASON # 11

IMPROPER STORAGE & HANDLING

CAUSES:

Improper storage exposes bearings to dampness and dust. Storing bearings in excessively high temperatures can also degrade grease shelf life, so always check with the original manufacturer of grease for storage specifications. Handling bearings by opening boxes and tearing wrappings prematurely can let in dirt and expose bearings to corrosive elements.

WHAT TO LOOK FOR:

Dampness and temperatures that can cause rust and/or uncovered bearings in a storage area.

HOW TO FIX IT:

Store bearings in a dry area at room temperature. Always cover bearings to keep them clean while in storage. Always take bearings to the place of installation before unwrapping.

REASON # 12

FIT

CAUSES:

For a tight fit: Excessive loading of the rolling element when interference fits exceed the radial clearance at operating temperatures.
For a loose fit: Micromotion between fitted parts where the fits are too loose in relation to the acting forces.

WHAT TO LOOK FOR:

For a tight fit: A heavy rolling element wear path in the bottom of the raceway, overheating, and potentially an inner ring axial crack.

For a loose fit: Fretting – the generation of fine metal particles which oxidize – which leaves a distinctive brown color. Wear at the fitting surfaces can cause noise and runout problems.

HOW TO FIX IT:

Make sure proper clearance is selected to avoid fit issues. Refer to the manufacturer's installation guide.

HOW TO PREVENT FAILURE

Our goal is to help you get the most out of your bearings by sharing our knowledge of the industry. Now that you know the different problems that can cause bearing failure and what signs to look for, you're already taking big steps in limiting machine failure.
Of course, you don't have to wait for the signs of bearing failure to take action. Regular preventative measures can keep your bearings at peak performance for as long as possible and save your business time and money. But we've given you enough information to digest today, so we'll cover that topic in our next article.

ABOUT THE AUTHOR

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