ZEN™

Technical Information

TÜVRheinland®
CERT
Certified ISO 2008
Certified
Management System
according to ISO 9001:2008

HANDLING

ZEN bearing are high quality goods, but even slight deviations in functional areas, such as those caused by corrosion, can reduce their performance capacity. So, it is crucial to match the anti-corrosion protection, packaging, storage and handling to each other.

Smoke, dust, abrasive fines, metal fines, dirty lubricants and tools, fingerprints and humidity should be considered abrasive, corrosive and leading causes of degradation of bearing performance. It should be noticed that cleanliness extends not just to the bearings themselves, but to all work and storage areas, transport equipment, tools, fixtures shafts, housings and other bearing components.

Storage

Goods must be kept in a closed storage area which cannot be affected by any aggressive media, such as exhaust gases, aerosols of acids or salts. Direct sunlight should be avoided as it can cause fluctuations in the temperature.

The storage room must be clean and with constant temperature and air humidity should be as low as possible. High temperatures can reduce the bearing life, the clearance and deteriorate the lubricant and the accuracy of the bearing. Also, Jumps in temperature and increased humidity lead to condensation.

We should take into consideration that the chemical-physical behavior of greases can change during storage, so bearings should not be stored for too long. Furthermore, rolling bearings should not be stocked for longer than 3 years.

Packing

Bearings should only be removed from their original packaging immediately before montage. If a multi-item packaging is opened in order to take one, the package must be closed again immediately.

Always use the appropriate equipment when handling bearings and avoid general purpose tools.

Anti-corrosion protection

Dust and dirt have harmful effects on bearings. Then, it is necessary to prevent the entry of them by keeping the bearings and the environment as clean as possible. Also, the assembly area should be kept free from dust as any contamination has a damaging effect on bearing's running.

Hands should be kept clean and dry and if it is necessary, gloves should be worn. Cleaning should be carried out using brushes, paint brushes or lint-free cloths. However, new bearings do not have to be cleaned as they are factory cleaned and lubricated.

We should be careful with paraffin oil, petroleum ether, spirit and dewatering fluids because they can be flammable, and also, alkaline agents are corrosive. It is not advisable to mix oils and greases as this will affect the efficiency of the bearing.

FITTING

Several studies have shown that poor handling, particularly during installation, endanger a high percentage of bearing failures. Depending on bearing type and size, mechanical, hydraulic or thermal methods are used for fitting. Regardless of the mounting method, care must be taken to prevent bearing rings, cages and rolling elements from damaging.

Before fitting, take into consideration the following:

- Make sure that housing and shaft are not damaged, and the lubricant is clean.
- Ensure the new bearing is equal to the replacement.
- Keep the work area clean, dry and away from metalworking or other machines producing dust.

When mounting, the following should be observed:

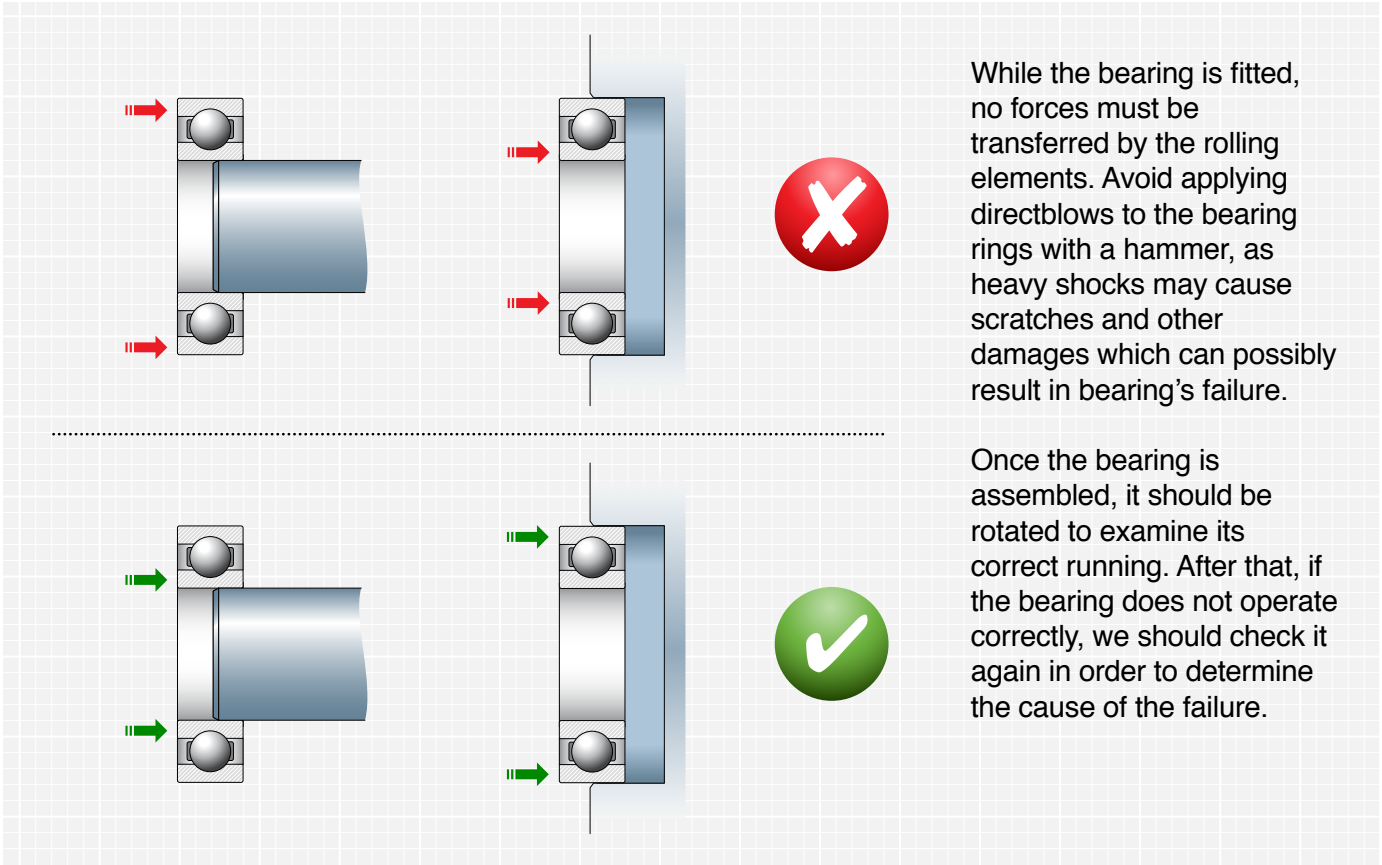
- Packaging is not removed until the last moment.
- The bearing should not be washed.
- The fitting forces must only be applied to the bearing ring with the interference fit.
- Use a minimum force on the bearing.

Incorrect assemblage

Special care must be taken when bearings are fitted cold, in order to ensure that the forces are applied to the ring with the interference fit. Bearing failure and damage to the raceways can be produced if the fitting force is transmitted through the rolling components.

Correct assemblage

Using the correct tools minimizes the possibilities of causing raceway damage. These tools permit us to apply, in a more adequate way, the forces to the component with the interference fit without producing any damage.



While the bearing is fitted, no forces must be transferred by the rolling elements. Avoid applying directblows to the bearing rings with a hammer, as heavy shocks may cause scratches and other damages which can possibly result in bearing's failure.

Once the bearing is assembled, it should be rotated to examine its correct running. After that, if the bearing does not operate correctly, we should check it again in order to determine the cause of the failure.

MOST COMMON CAUSES OF FAILURE

1 IMPROPER LUBRICATION

Lubrication is a key factor, improper lubrication can generate several and damaging failures.
The decision of which one is the most suitable for each bearing, depends on some factors, such as operating load, speed and temperature.

Improper lubrication can cause:

FAILURE	CAUSE	COUNTERMEASURE
Extreme abrasion	Entry of foreign matter and poor lubrication	Improve sealing and lubrication
Heavy vibration	Flaking of raceway and rolling element	
Premature flaking of raceway and rolling element surfaces	Corrosion	Use correct lubricant quantity
Over heating	Poor lubrication	Ensure abutment face and fitting diameter are perpendicular
Fracture occurring immediately after bearings were mounted or within a short time after mounting	Improper lubricant	Check lubrication
Fracture occurring during normal operation	Improper lubricant	
Constant noise	Flaking of raceway surface	
Cage fracture	Incorrect lubrication	
Corrosion	Chemical reaction with lubricant	Use correct lubricant
Discolouration of raceway and rolling element surface	Poor lubrication	
Abrasive wear	Poor lubrication	
Scoring of raceway and rolling element surfaces	Hard grease	Use soft grease

MOST COMMON CAUSES OF FAILURE

2 INADEQUATE BEARING SELECTION

Attention must be paid to the technical characteristics of the bearing in order to maximize its properties. Also, the selection of bearing made by the manufacturer is the correct choice for the application.

Usually, for an industrial application the replacement of a bearing should be done by the same type of bearing.

An inadequate bearing selection can cause:

FAILURE	CAUSE	COUNTERMEASURE
Flaking across the raceway	Shaft deflection	Use bearing with larger internal clearance
Fracture occurring immediately after bearings were mounted or within a short time after mounting	Inappropriate use of bearings	Check requests
Over heating	Clearance too small	
Discolouration of raceway and rolling element surface	Clearance too small	
Indentations on raceway at rolling element pitch	Excessive static load	Check static load

MOST COMMON CAUSES OF FAILURE

3 IMPROPER MOUNTING

Inadequate installation can lead to bearing failure. So, in order to avail all the bearing's life the fitting instructions (page 2) should be followed.

An improper mounting can cause:

FAILURE	CAUSE	COUNTERMEASURE
False brinelling	Small oscillations in application	Apply preload
Creep	Incorrectly fixed	Correct tolerances & fitting
Fracture occurring during normal operation	Bad fitting	Keep the environment clean and check fitting method
Fracture occurring immediately after bearings were mounted or within a short time after mounting	Bad mounting of bearings	Check fitting method
Discolouration of raceway and rolling element surface	Poor fitting	
Constant noise	Flaking of raceway surface	
Rolling element fracture	Bad fitting	Fit with care
Flaking across the raceway	Poor fitting and eccentricity	
Premature flaking of raceway and rolling element surfaces	Poor fitting	
Flaking at rolling element pitch on raceways	Raceways brinelled during fitting	
Indentations on raceway at rolling element pitch	Shock loads during fitting or poor handling	
Raceway surface fracture	High interference fit	Proper fitting
Rust in bearings	Exposing bearings to a corrosive atmosphere	Careful storage and handling corrosive atmosphere
Corrosion	Access of acid, alkali or gas	Check environment
Metallic noise	Poor fitting	Correct clearance

MOST COMMON CAUSES OF FAILURE

4 INDIRECT FAILURES

During bearings life, we have to pay attention to different aspects such as operating conditions, transport, storage and handling. If they are not in the ideal situation we can find excessive vibrations, overloading, over-speeding, high temperature and electrical discharge in the running of the bearing.

Indirect failures can cause:

FAILURE	CAUSE	COUNTERMEASURE
Scoring of raceway and rolling element surfaces	High start-up acceleration	Control acceleration
Cage fracture	High acceleration	Ensure uniform rotation
Rolling element fracture	Excessive internal clearance	Check clearance
Raceway surface fracture	Excessive shock loads	Correct loading
Indentations on raceway at rolling element pitch	Excessive static load	Check static load
Premature flaking of raceway and rolling element surfaces	Clearance too small	Correct clearance and load
Flaking on one side of entire raceway	Excessive axial load by poor fitting or linear expansion	Use clearance fit on non-rotating bearing outer ring
Over heating	Excessive load	Examine shaft and housing tolerances for closing effect or correct clearance
Heavy vibration	Excessively wide clearance	Replace bearing
Irregular noise	Damage in the rolling components	Reduce loads and/ or clearance
Metallic noise	Too small clearance	Examine shaft and housing tolerance for closing effect

5 MATERIAL DEFECTS AND MANUFACTURING ERRORS

Bearing failures due to manufacturing defects are not very usual as manufacturing process and material technology is in a continuous improvement.

Nowadays, sophisticated instruments are used to detect bearing material defects, eliminating poor quality products during the manufacturing process.

Material defects and manufacturing errors can cause:

FAILURE	CAUSE	COUNTERMEASURE
Fracture occurring immediately after bearings were mounted or within a short time after mounting	Defect in bearing	Replace bearing
Flaking around raceway	Poor housing accuracy	Check geometric accuracy of housing bore

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BEARINGS FOR YOUR FUTURE

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