ANALYSIS OF BEARING FAILURE

(ROLLING CONTACT BEARING)

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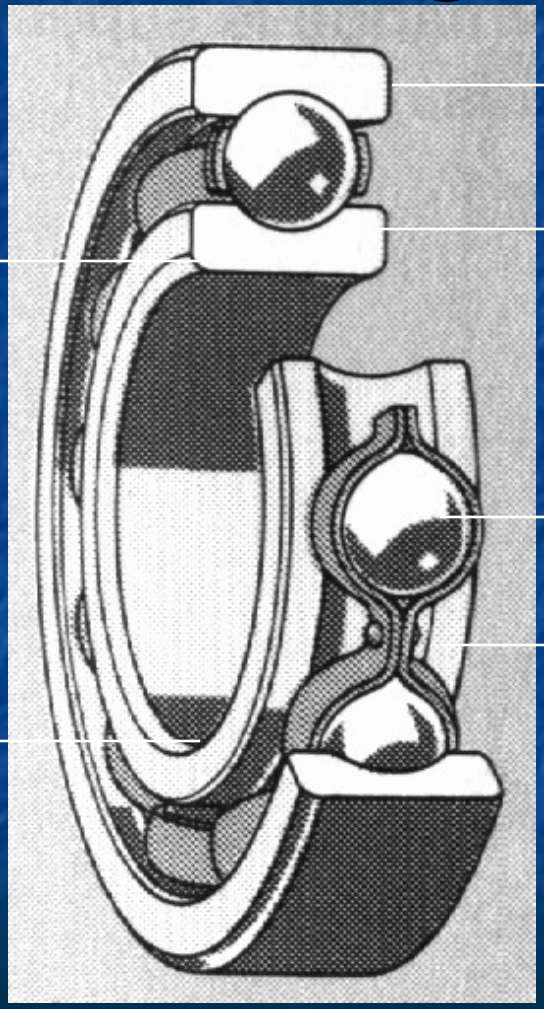
Introduction

- Bearing are among the most important component in industries.
- Unfortunately it sometimes happens that a bearing does not attain its calculated rating life.
- There may be many reasons for it.

How is bearing life defined?

- Bearing cannot rotate for ever.
- The life of a bearing is defined as the number of revolutions the bearing can perform before incipient flaking occurs.
- This does not mean to say that the bearing cannot be used after then.

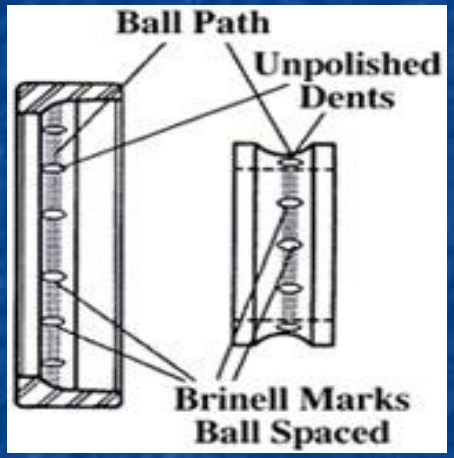
Rolling Bearing Parts

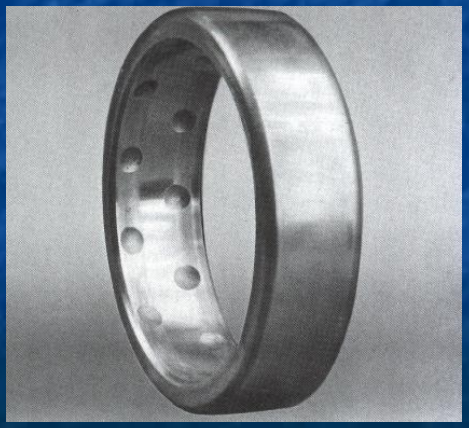


The parts and nomenclature for a Ball Bearing

True Brinellilng

- Using hammer to install.
- Dropping a bearing.
- Pressing a bearing onto a shaft by applying force to the non-rotating ring.



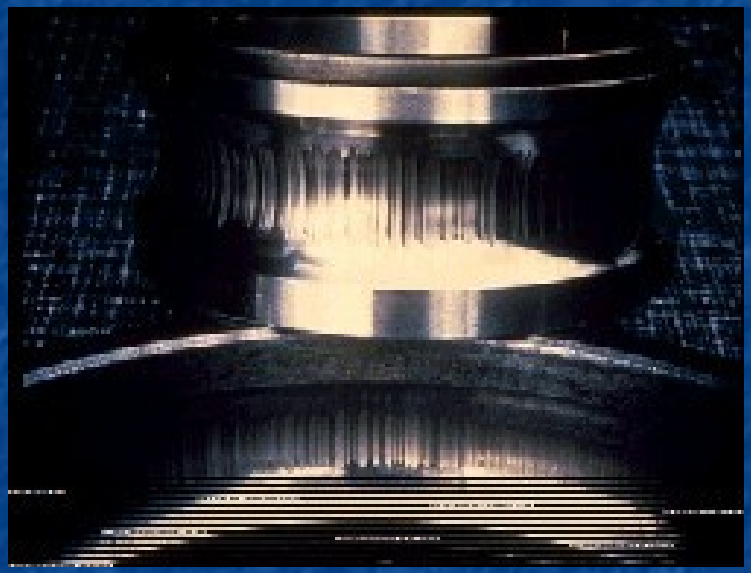


Contamination

- It includes airborne dust, dirt or any abrasive substance that gets into the bearing.
- Contamination results in bearing vibration and wear

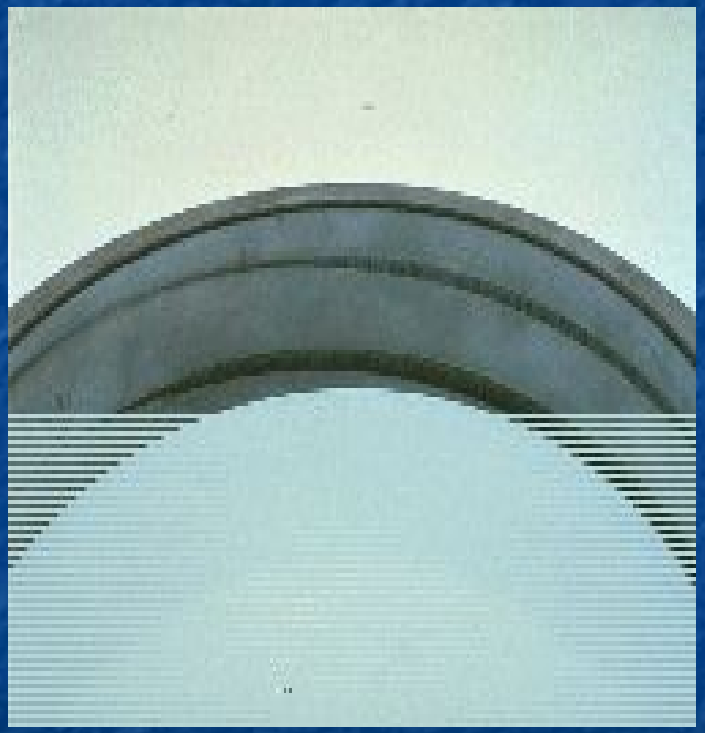
Electrical Fluting

- It occurs when a current is passed through the bearing.
- Frequently seen in electric motors can be eliminated by ceramic-coating the OD of the bearing



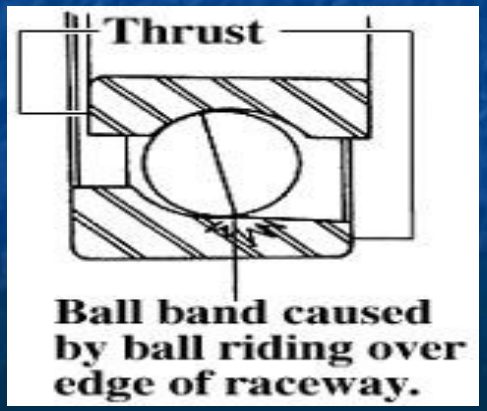
Misalignment Failure

- Bent shaft
- Burrs or dirt on the shaft or housing shoulders.
- Shaft threads are not square with the shaft seats.



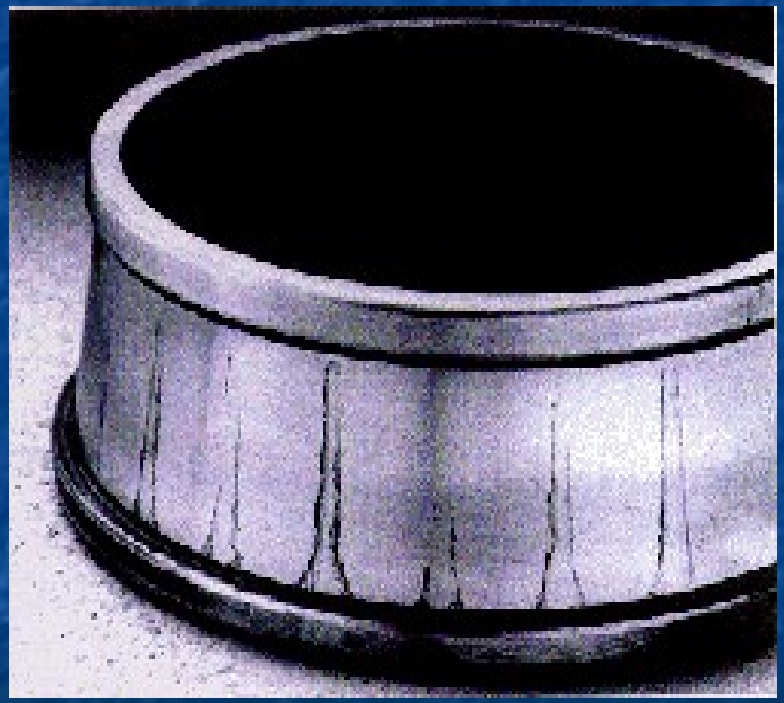
Reverse loading

- Occurs when loads shift direction in bearing that can only take axial load in one direction
- The thrust load applied to the wrong bearing face result in a wear band on the balls



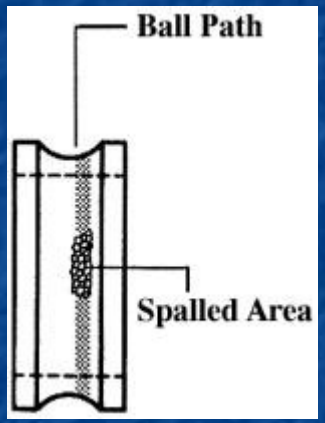
Corrosion Failure

- It result from the chemical attack on the bearing materials by hostile fluids or atmospheres.
- It increased vibration followed by wear, with subsequent increase in radial clearance.



Excessive load failure

- Excessive load normally causes premature bearing failure.
- It show heavier ball wear paths and more widespread and deeper spalling.

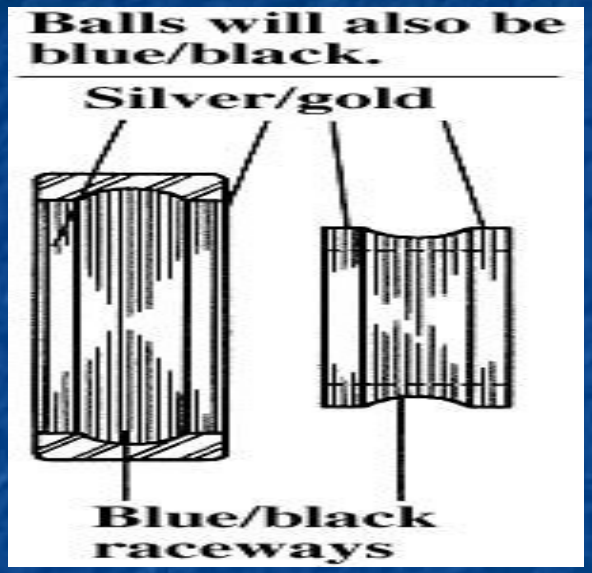


Loose fit failure

- Caused by relative motion between parts which, in turn, causes fretting
- This normally occurs through outer ring slippage in the housing due to improper fits

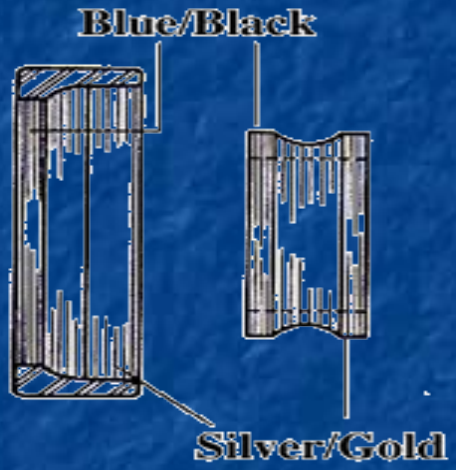
Lubrication failure

- Restricted lubricant flow or excessive temperatures that degrade the lubricant property cause failure
- It lead to excessive wear, overheating and subsequent bearing failure.



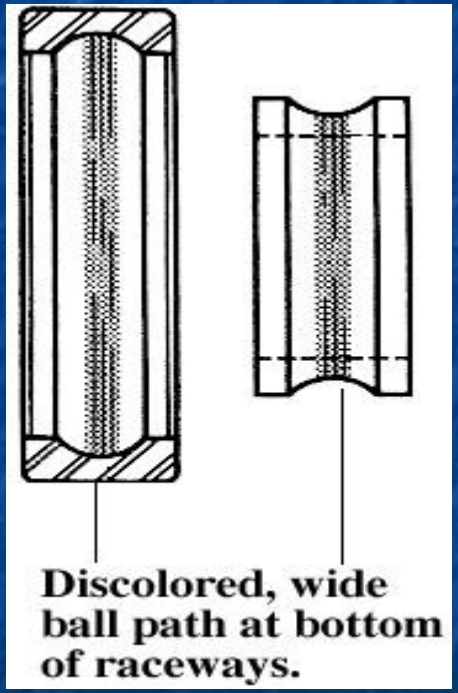
Overheating

- It discoloration of the ring, balls/rollers and cages from gold to blue
- Temperatures in excess of 400 degrees C.
- Result in deformation of balls and ring.



Preload failure

- If interference fits exceed the internal radial clearance, the rolling become preloaded.
- Continued operation can lead to rapid wear and fatigue



Fatigue failures

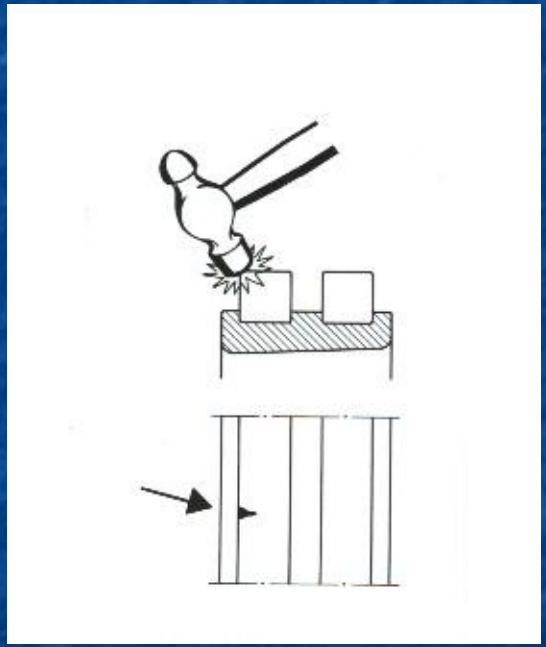
- Metal fatigue is caused by repeated cycling of the load.
- Variation in the stress ratios can significantly affect fatigue life.
- The most commonly used stress ratio of the minimum stress to the maximum stress.

Preventing fatigue failure

- To improvement in design.
- Avoid sharp surface tears.
- Prevent the development of surface discontinuities.
- Reduce or eliminate tensile residual stresses caused by manufacturing.
- Improve the fabrication procedures.

Installation damage

- Occurs when a sharp impact is applied incorrectly to a bearing during mounting or dismounting
- To prevent it use proper method.



Reducing bearing failure

- Proper bearing selection.
- Bearing handling and storage.
- Bearing installation and handling.
- Ongoing bearing lubrication.
- Bearing maintenances and care.

Conclusion

- By examining a damaged bearing, it is possible, in the majority of cases, to form an opinion on the cause of the damage and to take the requisite action to prevent a recurrence.

QUEARIES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