16. Bearing Damage and Corrective Measures

While it is of course impossible to directly observe bearings in operation, one can get a good idea of how they are operating by monitoring noise, vibration, temperature and lubricant conditions. Types of damage typically encountered are present in Table 16.1.

Table 16.1 Bearing damage and corrective measures

Damage	Description	Causes	Correction
Flaking	The surface of the race-way begins wearing away. Conspicuous hills and valleys form soon afterward.	• Excessive loads or improper handling. • Improper mounting. • Improper precision in the shaft or housing. • Insufficient clearance. • Contamination • Rust. • Drop in hardness due to abnormally high temperatures.	• Review application conditions. • Select a different type of bearing. • Reevaluate the clearance. • Improve the precision of the shaft and housing. • Reevaluate the layout (deign) of the area around the bearing. • Review assembly procedures. • Review lubricant type and lubrication methods.
Seizure	The bearing heats up and becomes discolored. Eventually the bearing will seize up.	• Insufficient clearance (including clearances made smaller by local deformation). • Insufficient lubrication or improper lubricant. • Excessive loads (excessive pressure). • Skewed rollers.	• Check for proper clearance. (Increase clearances) • Review lubricant type and quantity. • Review application conditions. • Take steps to prevent misalignment. • Reevaluate the design of the area around the bearing (including fitting of the bearing). • Improve assembly procedures.
Cracking and notching	Localized flaking occurs. Little cracks or notches appear.	• Excessive shock loads. • Excessive interference. • Large flaking. • Friction cracking. • Inadequate abutment or chamfer. • Improper handling. (gouges from large foreign objects.)	• Review application conditions. • Select proper interference and review materials. • Improve assembly procedures and take more care in handling. • Take measures to prevent friction cracking. (Review lubricant type.) • Reevaluate the design of the area around the bearing.
Retainer damage	Rivets break or become loose resulting in retainer damage.	• Excessive moment loading. • High speed or excessive speed fluctuations. • Inadequate lubrication. • Impact with foreign objects. • Excessive vibration. •Improper mounting. (Mounted misaligned) • Abnormal temperature rise. (Plastic retainers)	• Review of application conditions. • Reevaluation of lubrication conditions. • Review of retainer type selection. • Take more care in handling. • Investigate shaft and housing rigidity.

Damage	Description	Causes	Correction
Smearing and scuffing	The surface becomes rough and some small deposits form. Scuffing generally refers to roughness on the race collar and the ends of the rollers.	• Inadequate lubrication. • Entrapped foreign particles. • Roller skewing due to a misaligned bearing. • Bare spots in the collar oil film due to large axial loading. • Surface roughness. • Excessive slippage of the rolling elements.	• Reevaluation of the lubricant type and lubrication method. • Review of operating conditions. • Setting of a suitable pre-load. • Improve sealing performance. • Take care to handle the bearing properly.
Rust and corrosion	The surface becomes either partially or fully rusted, occasional rust could occur along the rolling element pitch lines.	• Poor storage conditions. • Poor packaging. • Insufficient rust inhibitor. • Penetration by water, acid, etc. • Handling with bare hands.	• Take measures to prevent rusting while in storage. • Improve sealing performance. • Periodically inspect the lubricating oil. • Take care when handling the bearing.
Fretting	There are two types of fretting. In one, a rusty wear powder forms on the mating surfaces. In the other, brinelling indentations form on the raceway at the rolling element pitch.	• Insufficient interference. • Small bearing osscillation angle. • Insufficient lubrication. • Fluctuating loads. • Vibration during transport.	• Review the interference and apply a coat of lubricant. • Pack the inner and outer rings separately for transport. When the two cannot be separated, apply a pre-load. • Select a different kind of lubricant. • Select a different type of bearing.
Wear	The surfaces wear and dimensional deformation results. Wear is often accompanied by roughness and scratches.	• Entrapment of foreign particles in the lubricant. • Inadequate lubrication. • Skewed rollers.	• Review lubricant type and lubrication methods. • Improve sealing performance. • Take steps to prevent misalignment.
Electrical pitting	Pits form on the raceway. The pits gradually grow into ripples.	• Electric current flowing through the rollers.	• Creates a bypass circuit for the current. • Insulate the bearing so that current does not pass through it.
Dent and scratches	Scoring during assembly, gouges due to hard foreign objects, and surface denting due to mechanical shock.	• Entrapment of foreign objects. • Dropping or other mechanical shocks due to careless handling. • Assembled misaligned.	• Improve handling and assembly methods. • Take measures to prevent the entrapment of foreign objects. • Should the damage have been caused by foreign particles, thoroughly check all other bearing locations.
Slipping or creeping	Slipping is accompanied by mirrorlike or discolored surfaces on the ID and OD. Suffing may also occur.	• Insufficient interference in the mating section • Sleeve not fastened down properly. • Abnormal temperature rise. • Excessive loads.	• Reevaluate the interference. • Reevaluate operating conditions. • Review the precision of the shaft and housing.