Rolling Bearing Damage

**Symptoms** • **Causes** • **Remedies**

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**False Brinelling**

**Symptoms:** Slight wear marks in axial direction at the rolling element pitch, no raised edges or opposed to each other due to incorrect mounting. These marks are not a result of rolling.

**Causes:** Incorrect mounting, looseness in the housing.

**Remedies:** Adjust bearings, correct the housing looseness.

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**Overheating**

**Symptoms:** Overheating of the rings, rolling elements and cages from gold to blue. Temperatures in excess of 400 °F can anneal ring and rolling element outer surfaces, creating a wear surface.

**Causes:** Excessive loading of the rolling elements; insufficient clearance, inadequate heat paths, insufficient cooling or lubrication when loads and speed are excessive.

**Remedies:** Slightly rounded fractured edges indicate that a bearing has been overheated; replace the bearing and/or consider redesigning to use a bearing with a greater calculated fatigue life.

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**Outer Ring Fracture**

**Symptoms:** Normal fatigue cracks or split at the load carrying area.

**Causes:** Accidental overload of the bearing or severe impact to the bearing, such as using a hammer to install the bearing, dropping a bearing onto the shaft by applying force to the inner ring.

**Remedies:** Check and/or consider replacing the bearing selection; re-examine the bearing for adequate load capacity.

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**Misalignment**

**Symptoms:** Slight roundness and flatness of the raceway edges caused by misalignment.

**Causes:** Incorrect mounting; forcing the bearing into an area where it is not square to the thread axis.

**Remedies:** Inspect shafts and housings for runout and ensure correct adjustment of bearings.

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**Slippage Tracks**

**Symptoms:** Denting of rolling elements and raceways, marked wear paths along the raceways, and fringes at the raceway edges.

**Causes:** Bearing slippage; rotation of inner ring on an un lubricated bearing, low load, or at the load is low and lubrication is poor.

**Remedies:** Use of the appropriate and correct amount of lubricant; avoid grease, and follow appropriate wear life calculations; ensure proper bearing fit and control preload to reduce bearing temperature.

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**Lubricant Failure**

**Symptoms:** Discolored rolling elements (blue/brown) and rolling element tracks. Excessive wear of rolling elements, rings, and cages; rolling; resulting in increased radial clearance and catastrophic failure.

**Causes:** Restricted lubricant flow, or excessive temperatures that degrade the lubricant.

**Remedies:** Use of the appropriate and correct amount of lubricant, avoid grease use, and follow appropriate wear life calculations; ensure proper bearing fit and control preload to reduce bearing temperature.

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**Corrosion**

**Symptoms:** Brownish marks on the surface of the bearing or raceway, corrosion of steel in the unloaded zone and accelerated surrounding parts.

**Causes:** Insufficient lubrication; increased load or load on the load; lubricant not suitable to the application.

**Remedies:** Support currents from flowing through the bearing by re-machining or grinding out, or use current insulated bearings.

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**Fretting**

**Symptoms:** Fretting; the generation of fine metal particles which stick, leading to a destructive brown color. Wear at the fitting surfaces causing noise and rubbing, and reduction of life.

**Causes:** Misalignment between fitted parts where the fits are too loose in relation to the mating forces.

**Remedies:** Follow FAG mounting instructions for appropriate fit recommendations.

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**Seizure**

**Symptoms:** Particulate knee-jerk welding and deep scratches in the lip and roller face areas. Also lubricant usage is this area.

**Causes:** Unnecessary lubrication with high loads and high speeds (quantity or operating viscosity of lubricant too low); inadequate lubrication with high loads and low speeds (lack of a hydrodynamic lubricating film between the roller face and lip); detrimental pre-load due to heat expansion; disordering of rollers due to no grease or oiling; excessive load too high for the square of rolling surface.

**Remedies:** Improper lubrication (increase viscosity, EP additives, increase quantity) and ensure correct adjustment of bearings.