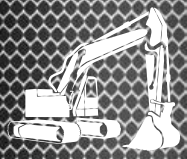
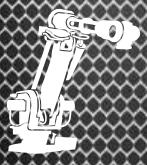
DUNLOP™

BEARINGS

Ball, Tapered and Roller Bearings





Dunlop BTL Ltd - Ashford
European Distribution Centre

MPT House, Brunswick Road
Cobbs Wood Industrial Estate
Ashford, Kent
TN23 1EL , United Kingdom

Dunlop BTL Ltd - Consett
UK Manufacturing Centre

Unit 46, Werdolh Way,
No 1 Industrial Estate,
Consett, County Durham
DH8 6SZ , United Kingdom

Contact us

+44 (0)1233 663340

+44 (0)1233 664440

sales@dunlopbtl.com

www.dunlopbtl.com

Manufacturing Facilities

UNITED KINGDOM
FRANCE
GERMANY
ITALY
SPAIN
POLAND
CZECH REPUBLIC
SLOVAKIA
SERBIA
CHINA
USA

DUNLOP™

11. BEARING DEFECTS AND DAMAGE

Just as other mechanical components, roller bearings can also undergo premature failure or housing defects for various reasons. One must differentiate bearing durability determined by loan fatigue during operating speeds and bearing service life, which determines the bearing uptime, before a bearing is for various reasons decommissioned.

Durability and the systemic approach to calculating fatigue damage is described in chapter 5. Determining bearing size. Bearing durability is affected, e.g. by improper installation, poor selection of bearings, produc-tion errors when manufacturing connecting parts, handling of bearings by unqualified personnel, the entry of contaminants into bearings, or improper lubrication. If bearings show signs of damage or other deficiencies, the cause of such damage must be determined to enable the adoption of measures that would prevent their recurrence.

This often involves more than a simple analysis, especially if there are several concomitant factors or if the damage is so extensive that the initial site of damage cannot be ascertained. Incipient damage is usually demonstrates during operation by increased vibration, temperature, or noise. Sophisticated housing designs should thus be monitored during operation with diagnostic systems and the equipment should be shut down in the initial stages of damage.

11.1 Main types of damage

Examples of main types of roller bearing damage are illustrated in the following figures.

Flaking of the surface

Unacceptable tearing off of material due to thermal overloading of the bearing is shown in fig. 11.1 and 11.2.

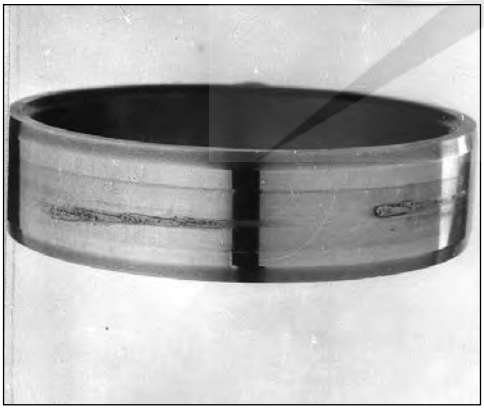


Fig. 11.1

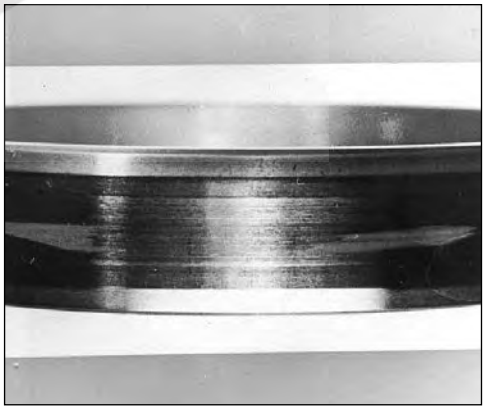


Fig. 11.2

Typical fatigue effect – pitting, which forms on the bearing rings, is shown on fig. 11.3 and 11.4. This damage is the result of cyclical loading of bearing components and is caused by normal fatigue of the material. The first cracks emanate from miniature non-homogeneities in the material at a particular depth below the surface. They are often, however, caused by overloading, insufficient lubrication, or other operating influences. Their timely identification can better help analyse and eliminate the cause. The figures illustrate unacceptable wear.

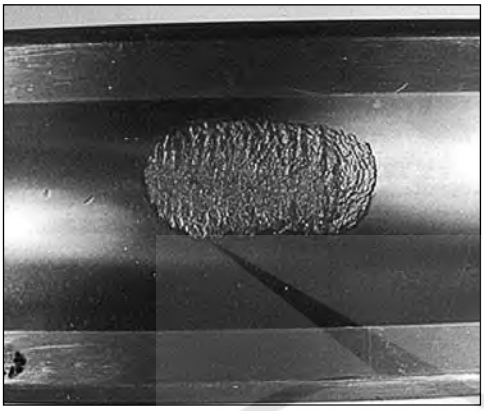


Fig. 11.3

Fig. 11.4

Depressions and pressure damage

Damage to bearing rings caused by indelicate installation (fig. 11.5) and shallow depressions in the race-way caused by beading of solid impurities during bearing operation (fig. 11.6). The extent of damage in both illustrated cases is unacceptable and may form the initial site of progressive fatigue damage – pitting. Damage to raceway caused by improper installation are usually easily discernible because they are located within the pitch of the roller elements. Pressure damage caused by stationary overloading or by equipment vibrations when transporting over long distances , e.g. during shipping, also present a danger.

Fig. 11.5

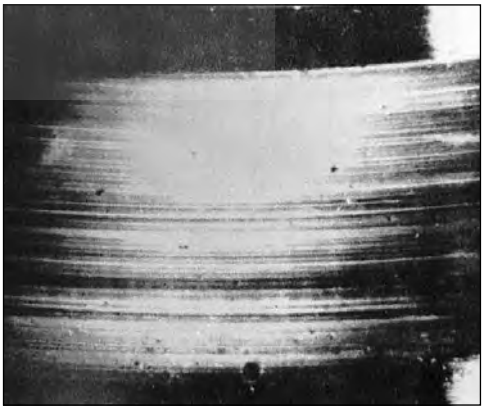


Fig. 11.6

Abrasion

Ball glazing due to overloading and lubrication failures (fig. 11.7) and abrasion of the race due to spinning within the seat (fig. 11.8). The condition in both cases is unacceptable.

Fig. 11.7

Fig. 11.8

The formation of grooves and craters due to the passage of electric current

Damage to the ball (fig. 11.9) and the raceway (fig. 11.10) by the passage of electric current through the roller contact. This type of damage is unacceptable. This forms when sparking occurs over a thin layer of lubricant. Burned-out cratering forms on such sites and are a source of bearing vibration and increased noise. This type of damage in motor housings and other roller-contact seats of rail vehicles with electrical traction are prevent, for example, by the use of bearings with an insulation layer on one of the rings and by the use of hybrid bearings with ceramic balls.

Fig. 11.9

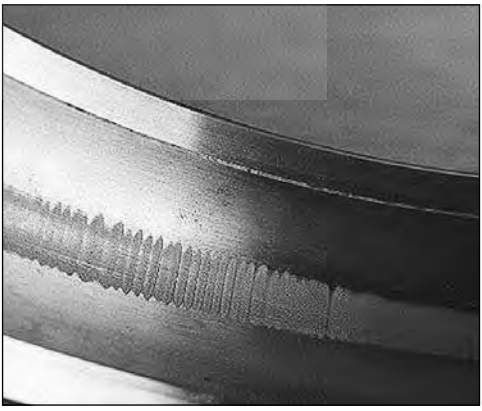


Fig. 11.10

Wear

Wear on the rolling surfaces of cylindrical rollers (fig. 11.11) and races (fig. 11.12) are caused by lubrication failure without flaking of material. Such damage may occur primarily in areas, where maintenance of the lubricating film is hindered, such as bearing ring faces or on roller faces. Undesirable wear may also occur due to slippage of rolling elements towards the bearing rings. Wear is characterized by traces of seizing and slippage, which is often accompanied by brownish spots on the raceway. This is unacceptable wear.

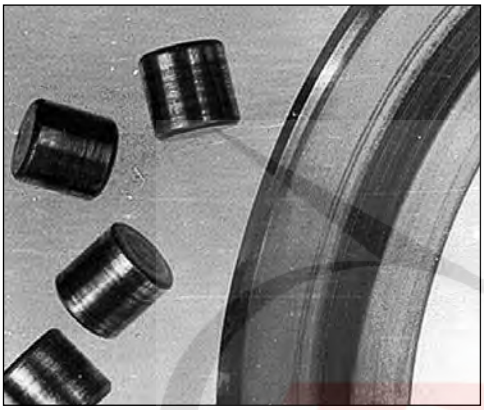


Fig. 11.11

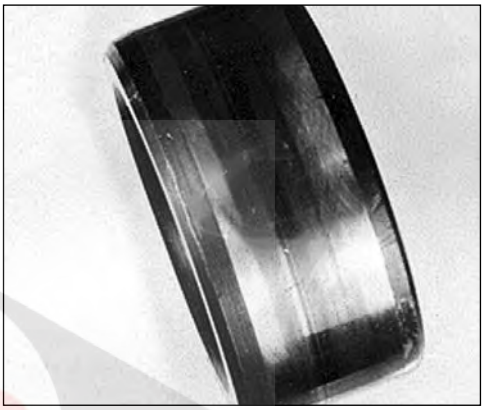


Fig. 11.12

Corrosion

The first picture (fig. 11.13) shows traces of acceptable contact corrosion on the raceway and the second (fig. 11.14) show inner ring corrosion. Corrosion resulting from inadequate protection against moisture or the use of an unsuitable lubricant is always impermissible. Areas affected by rust formation may progressively become initial sites of flaking of operating surfaces, which can lead to deteriorated operating precision and decreased bearing durability. Corrosion occurs when atmospheric moisture condenses, which can occur under improper

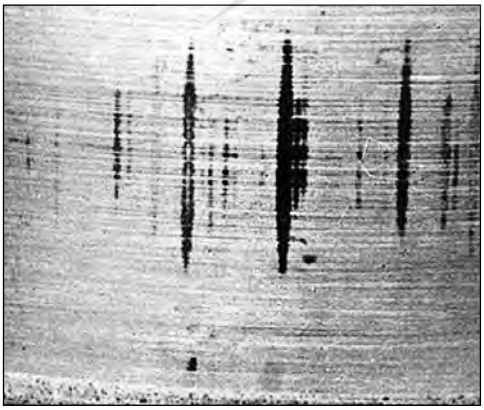


Fig. 11.13

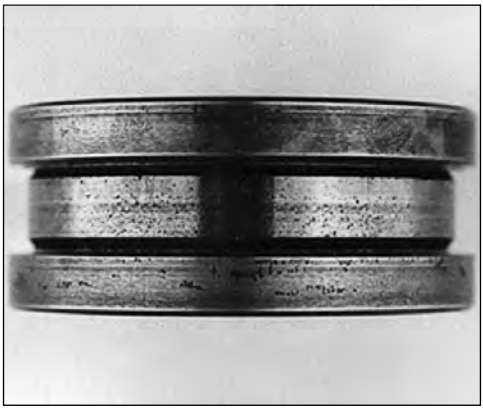


Fig. 11.14

www.dunlopbtl.com

"We are proud to be a European manufacturer; it is a privilege to supply our products to some of the world's most prestigious original equipment manufacturers in the Agricultural, Automotive, Construction, Industrial and Motor Sport sectors".

"Our distributor network is vital to the continued global growth of the DUNLOP brand and our valued distributor partners form the perfect link between manufacturer and end user".

"Our commitment to our staff, our customers and the environment is of paramount importance to our company, we will continue to develop our organisational skills to further enhance our company's potential, to engage in sustainable practices and anticipate the needs and expectations of our customers".

"We love our products".

Ray Mifsud, *Managing Director.*

#WeLoveOurProducts

DUNLOP

DUNLOP™

BEARINGS

DUNLOP BTL Ltd, MPT House, Brunswick Road, Cobbs Wood Industrial Estate, Ashford, Kent TN23 1EL, UK
T: +44 (0)1233 663340 • F: +44 (0)1233 664440 • E: sales@dunlopbtl.com • W: www.dunlopbtl.com