3.1 Rolling bearing failures

**FATIGUE FLAKE**

*Characteristics*

Flaking with conchoidal or ripple pattern extending evenly across the loaded part of the race.

*Causes*

Fatigue due to repeated stressing of the metal. This is not a fault condition but it is the form by which a rolling element bearing should eventually fail. The multitude of small dents are caused by the debris and are a secondary effect.

**EARLY FATIGUE FLAKE**

*Characteristics*

A normal fatigue flake but occurring in a comparatively short time. Appearance as for fatigue flake.

*Causes*

Wide life-expectancy of rolling bearings. The graph shows approximate distribution for all types. Unless repeated, there is no fault. If repeated, load is probably higher than estimated; check thermal expansion and centrifugal loads.

**ATMOSPHERIC CORROSION**

*Characteristics*

Numerous irregular pits, reddish brown to dark brown in colour. Pits have rough irregular bottoms.

*Causes*

Exposure to moist conditions, use of a grease giving inadequate protection against water corrosion.

**ROLLER STAINING**

*Characteristics*

Dark patches on rolling surfaces and end faces of rollers in bearings with yellow metal cages. The patches usually conform in shape to the cage bars.

*Causes*

Bi-metallic corrosion in storage. May be due to poor storage conditions or insufficient cleaning during manufacture. Special packings are available for severe conditions. Staining, as shown, can be removed by the manufacturer, to whom the bearing should be returned.

**BRUISING (OR TRUE BRINELLING)**

*Characteristics*

Dents or grooves in the bearing track conforming to the shape of the rolling elements. Grinding marks not obliterated and the metal at the edges of the dents has been slightly raised.

*Causes*

The rolling elements have been brought into violent contact with the race; in this case during assembly using impact.

**FALSE BRINELLING**

*Characteristics*

Depressions in the tracks which may vary from shallow marks to deep cavities. Close inspection reveals that the depressions have a roughened surface texture and that the grinding marks have been removed. There is usually no tendency for the metal at the groove edges to have been displaced.

*Causes*

Vibration while the bearing is stationary or a small oscillating movement while under load.