EVALUATION CRITERIA FOR DIESEL ENGINE BEARINGS

MATERIAL: Electroplated copper-lead bearings alloy

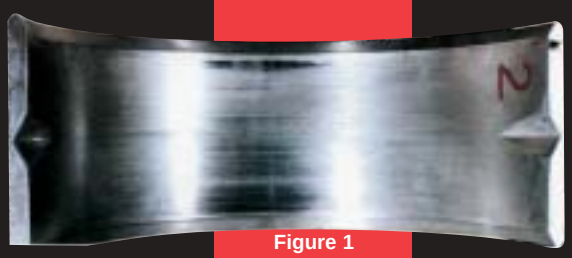

Figure 1

Both halves display a good "running" appearance. The overplate is well preserved and the contact pattern with the crankshaft is correctly located in the center. The scoring from foreign matter, visible in the bottom shell, does not impair the reliability of the bearing. This pair can be reused.

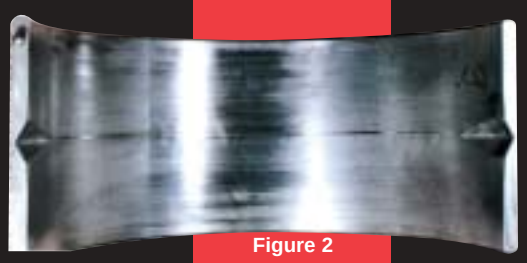

Figure 2

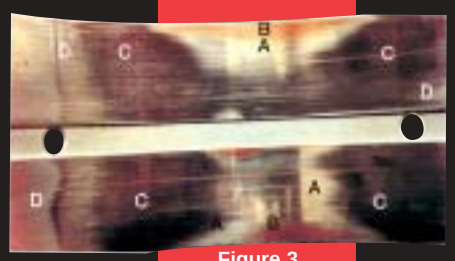

Figure 3

This shell displays small areas (A) of visible nickel barrier, areas of exposed copper-lead lining (B), a darkened running layer – due to tin migration – (C) and no signs of wear on the overplate. This bearing may be reused.

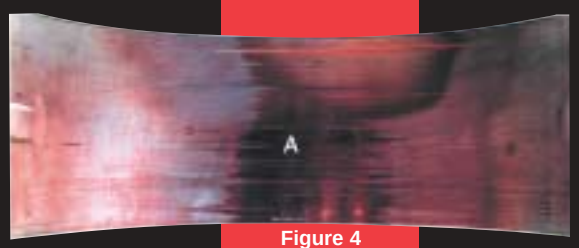

Figure 4

The dark area (A) displays the remains of the overplate, which is only preserved in about 70% of the contact area. Some circumferential scoring lines, caused by hard particles, are also visible. Although the wear condition appears normal, this bearing could be only conditionally used.

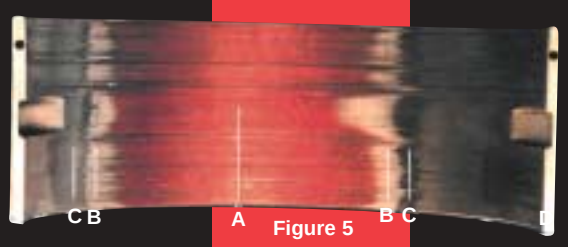

Figure 5

After 39,000 hours of service this bearing displays normal wear, but it must be replaced due to (A) lining exposure because of wear, (B) worn nickel barrier, and (C) darker discoloration due to tin migration.

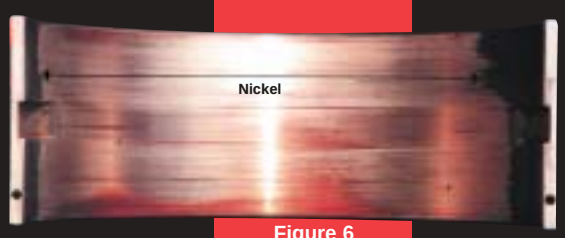

Figure 6

In this example, the overplate is almost totally gone due to mechanical wear and corrosion. Large areas of the nickel barrier are visible, with no transitional phase in the wear pattern. This bearing must be replaced because it has no "running in" capability.

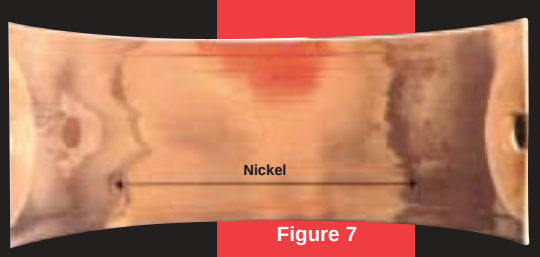

Figure 7

The electroplated running layer of this bearing has been worn out in a large area by corrosion and mechanical wear – also notice the exposed nickel barrier. This bearing must also be replaced.

MATERIAL: Aluminum alloy bearings

Since the light scoring observed has no influence in the performance of the bearing, and the good, uniform contact pattern is across the entire surface, this shell can be reused.

Figure 1

This is another example of a good, uniform, contact covering the whole bearing width. This bearing may be reused.

Figure 2

The contact pattern has uniformly developed, covering the whole bearing width. The circumferential scoring on this bearing is caused by minute solid particles in the lubricating oil. The bearing may be reused ONLY if the depth of these scores is not measurable or tangible.

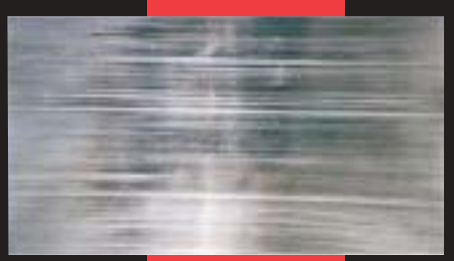

Figure 3

The contact pattern of this bearing displays highly loaded areas toward the edges as well as corrosion within the aluminum alloy running layer. The cause of these damages have to be investigated and eliminated before the replacement of the bearings.

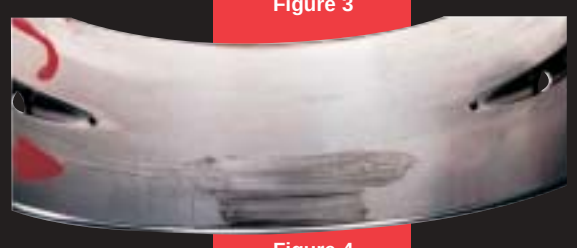

Figure 4

A large damaged area, with different degrees of seizure, is evident on this shell. The bearing is not reusable and its cause of distress must be determined before replacement.

Figure 5

This bearing shows fatigue cracks and particle detachment in the aluminum alloy lining. The surface structure at the bottom of the cracked off areas, indicates good bonding of the aluminum alloy to the steel back. It is obvious that this shell can not be reused.

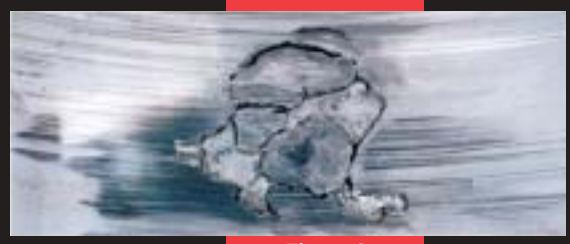

Figure 6

This bearing displays similar damage as the example above but in a further stage of destruction. Again, the surface structure of the bottom indicates excellent bonding of the aluminum alloy to the steel back.

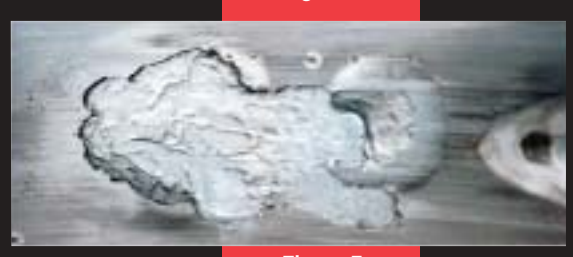

Figure 7