Oil rings vs. flinger discs

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As observant equipment maintenance and reliability professionals know, some oil-lubricated bearings have their lube oil levels set to reach the center of the lowermost (“6 o’clock”) rolling element. Allowing lube oil to reach the center of the lowermost bearing ball of, say, a 70 mm bearing is acceptable at 1,500 and 1,800 rpm. So, why are there still oil rings in some of those bearing housings if, in fact, the oil covers one-half of the lowermost rolling element?

When used with rolling element bearings at these— for pumps— relatively moderate speeds, oil rings serve only to keep the oil well-mixed and to thus avoid hot oil to “stratify” and float near the top. Then, there are many rolling element bearings where the oil level is set well below the bearing and where the oil rings serves another purpose. Here, in Figure 1, or in the sleeve bearing shown in Figure 2, an oil ring must physically feed, or transport oil into the bearing.

The dimensions typically used for oil rings used with either sleeve or rolling element bearings are given in Figure 3. Ring diameters can vary from 1.5 to 2.2 times shaft diameter. A multiplier of 1.7 is shown here; it represents an experience-based optimum, as does the 30-degree included angle.

And why, or when, should the oil level be set so low that oil rings are needed? Field experience under load shows that at 3,000 and 3,600 rpm and with bearing bore diameters of roughly 55 mm (~2.2 inches) and up, allowing the lube oil to reach the center of the lowermost rolling element is likely to result in excessively high lube oil temperatures. The oil levels of pumps operating at 3,000 and 3,600 rpm are, therefore, customarily set well below the bottom of the lowermost ball or cylindrical rolling element. Mechanical means are therefore employed to feed, lift, spray or splash the lubricant into pump bearings. Whereas at lower speeds the function of an oil ring or flinger disc was confined to just mixing the oil, loose oil rings (“slinger rings”), Figures 1 through 3, or preferably flinger discs, Figure 4, must now serve a more important purpose. They must either create a dispersion of oil drop-
lets in air, or must in other ways deposit lubricant into the bearings of 3,000 or 3,600 rpm pumps.

Unlike oil rings, flinger discs are only used on equipment furnished with rolling element bearings. On slow and moderate speed pumps where the oil level reaches the center of the lowermost ball and mixing the oil is its only purpose, flinger discs serve as the functional equivalent of an oil ring.

But, while there are many flinger disc geometries in addition to the retrofit- suitable “trimmable” version of Figure 4, they are often much preferred over oil rings. In fact, a few manufacturers furnish pumps with flinger discs only. They, and reliability-focused users, recognize that oil rings can become unstable at certain higher speeds and/or larger shaft diameters. Many users prefer flinger discs when the DN-value (inches of shaft diameter times rpm) exceeds 8,000, or even 6,000. That’s because oil rings are sensitive to small deviations in shaft horizontality, ring eccentricity, oil immersion and lube oil viscosity. In higher speed equipment where the oil level must not be allowed to even reach the lowermost periphery of the rolling element bearing, flinger discs (or their more limited precursors, the traditional oil rings) must pick up oil and fling it into the bearing.

By the way, there never exists reasonable justification for oil levels higher than through the center of the lowermost rolling element of the bearing. Higher-than-needed levels only increase “churning” and cause bearing oil temperatures to rise.

Regardless of oil level and application method, consider using AESSEAL’s MagTecta II magnetic double-face bearing housing protectors to prevent external contaminants from reaching the bearings. Their cost justification has been demonstrated for a wide spectrum of equipment in many industries.

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A b o u t t h e a u t h o r

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