

Letters to the editor

Bearing life and contamination

I read with interest H.P. Bloch's column "Bearing life and contamination" (*HP In Reliability*, April, p. 19). As usual the article is well written and I am glad the author directed his attention to this topic. In my opinion, the inclusion of contamination factors in the bearing life formulas adds technical support to the use of pure oil mist.

In May 1992, I attended the STLE conference at which Professor Stathis Ioannides presented his paper, "Cleanliness and its importance bearing performance." He was at this time technical director of product research and development for SKF, The Netherlands. In his paper, he introduced the contamination factor "Nc." The basic message was that the presence of hard particles in sizes approaching the bearing clearance/film thickness reduces bearing life. Presented were some interesting charts on the relationship of particle size and hardness to bearing life that could quantify the value Nc. His research clearly showed the benefit that good filtering and clean lubricating oil have on bearing life.

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The April column informs "In tests conducted under ultra-clean conditions where the oil was filtered through a 3 p.m. filter, bearing life was found to increase by a factor of 40 compared to calculated values." We know, from tests conducted by Texas A&M and documented in H.P. Bloch's latest book on oil mist (ISBN 088173-256-7), the mist generator produces very small particles (pp. 171-170). As these particles are transported through the header pipe, the larger particles tend to settle and wet out (pp. 188). An oil mist system can in one way be considered the ultimate filter, as the oil mist does not deliver large-diameter particulate matter to the bearings.

The latest bearing life formulas with their particulate contamination factor help explain why the use of pure oil mist extends bearing life versus splash or wet sump lubrication. I also would like to link the above research and theory with the paper "Field Investigation of Bearing Housing Oil Cleanliness" presented at the 1996 International Pump Users Symposium. The authors took more than 150 samples from oil sumps and analyzed them

1. Very little is done to prevent contamination of unused oil in storage.

2. Lubricant oil in pump rolling element-bearing housings in this field study have had particle contamination levels at least 10 times greater than recommended levels, 54% were more than 100 times greater. None of the samples analyzed contained less than the recommended maximum particulate contamination.

3. The type of bearing housing closure device--labyrinth, lip or magnetic seal--shows no significant correlation with either particulate or water contamination levels.

4. The frequency of oil changes (from one month to indefinite) shows no significant effect on the moisture or particulate content of the oil

5. There is no significant difference in levels of contamination in lubrication oils in pumps operated outside of under covered conditions.

If these findings are representative of industry and the importance of clean lubricants is recognized in the bearing life formulas, how can anyone expect maximum bearing life with sump lubrication? One of the follow-up actions recommended in the paper was that "the contamination levels (moisture and particulate) of oil mist systems should be investigated." It would appear the authors were unfamiliar with oil mist, as they wanted to make such a study. I recall a question asked during the Q & A session that followed the presentation: "Why not just use pure mist without the sump, as has been done at Exxon and other reliability-conscious user companies, and thus eliminate the sump contamination?" The presenter had no direct response.

Mr. Bloch hit the bull's eye and I wanted to share with your readers that a lot of data and research agrees with his April column. It all supports pure oil mist as the lubricant application method of choice. Thanks for your timely editorials, we enjoy learning from them.

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