

Microbiology of HWB hydraulic fluids

Biocides may be needed in water-containing hydraulic fluids because microbes can grow in such fluids and cause machine shutdown.

L. A. Rossmore

Microorganisms, like all living things, need water to survive. When water condenses in a straight-oil hydraulic system, it provides a medium for bacterial growth with attendant problems such as bad odors and filter clogging.

Fire-resistant invert emulsion hydraulic fluids, typically 35-50% water in combination with a high viscosity mineral oil, more often than not contain antimicrobial chemicals — biocides — in their formulation: these fluids include biocides because their high percentage of water makes the fluids open targets to microbial attack.

If straight oils *sometimes* experience microbiological growth problems, and if invert emulsions *often* have such problems, similar situations can obviously be expected with HWBFs, which usually contain 90 to 95% water. It would be correct to assume that HWBFs are more prone to invasion by microbes. The 90-95% water content and the remaining constituents — i.e., mineral oil, synthetic materials, and other additives — make an ideal breeding ground for bacteria and fungi.

To head off the development of microbial growth, an appropriate biocide should be incorporated into the fluid concentrate. Many

fluid formulators include biocides in their HWBF concentrates. These antimicrobials are sometimes the products of the formulators themselves, but more often than not, they are made by chemical companies which tend to specialize in the manufacture of biocides.

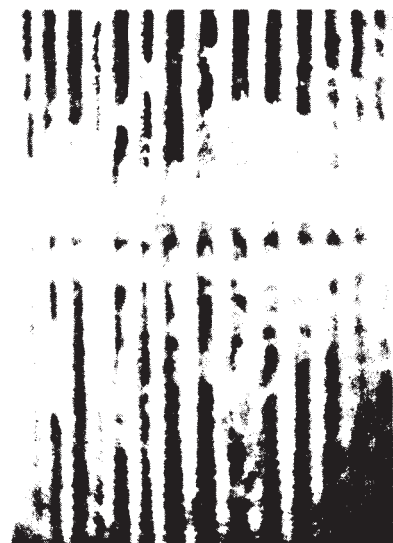
If a HWBF concentrate does not contain a biocide, it would be wise to contact the fluid formulator to see which one is recommended. If the formulator cannot recommend one, there are many independent laboratories which can conduct appropriate tests to determine which biocide best suits your fluid — as well as your budget.

Microbiology research needed for HWBFs

To learn something about the microbiology of HWBFs, we studied HWBFs from two companies; included among the fluids were synthetics, emulsions, and a micro emulsion. Rather than repeat the raw data here (presented at an SME confer-

ence*), it would be wiser to discuss the microbiology of HWBFs in general.

We cultivated bacteria and fungi previously isolated from *invert emulsion hydraulic fluids*. The original bacterial growth culture contained 1 billion organisms/ml; the fungal culture contained 10,000 organisms/ml. These cultures were mixed and added at 10% by volume to the final diluted samples of HWBFs. Thus, when testing began, the fluids contained 500 million bacteria/ml and 500 fungi/ml. All of the HWBFs were shaken mechanically for 96 hours at 130 F, the temperature at which the fluids were most likely to operate within a hydraulic system.



Hydraulic cartridge filter plugged with microbial slime.

*L.A. Rossmore's presentation entitled "Present Microbiological Considerations" was given during a round table discussion of high water base hydraulic fluids; at the Society of Manufacturing Engineers' 1980 International Conference, April 30, Cleveland, Ohio.

Leonard A. Rossmore is laboratory manager, Biosan Laboratories, Inc., Ferndale, Mich.