Lubrication Oils and their Effects on Waterbased Metalworking Coolants

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Article published on December 7th 2011 | Business

Lubrication oils are a necessary element in any metalworking operation. As much as these oils are the lifeline to equipment operation, they can also impact metalworking coolant operation. In order to better understand how these systems interact with water based metalworking coolants, one must first understand the basic technologies that are used to operate such machining centers and press systems in todayâ€™sâ€™ manufacturing environment.

Hydraulic oils, gear oils, cylinder oils and way lubricants all have specific roles in manufacturing operations. When one speaks of hydraulic oils, we are describing the oil based lubricant used to operate presses and machine pumping units. (Hydraulic means the ability to transfer energy via fluid movement.) These fluids are thermally (heat) and hydrolytically(water) stable and contain complex additive and additive packages to produce performance requirements.

Typical components found in hydraulic oil can be:

â€¢ Dispersants

â€¢ Defoamants

â€¢ Rust Inhibitorsâ€“Some types of sulfonates

â€¢ Antiwear Systems-normally zinc containing ZDDP

â€¢ Demulsifiers-To produce total water rejection

â€¢ Antioxidantsâ€“To minimize base oil degradation and sludge formation

â€¢ Base Oil

Concentrations of total additive system can be as low as 1.0% in formulated base oil to produce premium antiwear hydraulic fluids. Even at low levels such additive systems can produce unfavorable conditions in a water based metalworking fluid when system is contaminated.

Aside from mixing additional petroleum oils into water based coolants systems which would encourage microbial growth, additives such as demulsifiers and typical antiwear chemistries can contribute to the overall system instability in a metalworking sump. Other issues that may arise from system contaminated with high levels of hydraulic fluids are:

1. Corrosion resulting from either microbial growth or, from hydrolytic instability of some additive package components. (Presence of water can hydrolyze additives forming compounds that are corrosive.)

2. Defoamants used in hydraulic oils are silicone based. Problems associated with silicone contents in metalworking systems can arise such as cleaning issues, paint adhesion etc.

3. Dispersant packages sometimes used may result in chip suspension in water based metalworking coolants.

4. Residue and sludge formation can also result due to chemical incompatibilities of water based systems and oil soluble hydraulic components.

5. Lower levels of hydraulic oils can be emulsified readily, disrupting overall system balance and producing poor cooling.

It should be noted that leakage of hydraulic oil into a water based metalworking coolant system is a common occurrence. Most metalworking fluids systems can accommodate small levels of oil contaminants, including hydraulic oils. However, such systems should always be monitored closely for any performance issues that may occur.It is always best to minimize such occurrences.

Another type of lube oil found in manufacturing is that of gear lubricants. Gear lubricants are used on gears not running in oil to reduce gear noise.

Types of gear lubricants fall within two classifications: straight mineral oil and extreme pressure lubricants. Straight mineral oil gear lubricants are normally petroleum oil based systems fortified to provide oxidation resistance and superior antiwear properties. Extreme pressure gear lubricants are fortified tp produce high film strength (EP) as well as be non-corrosive to both copper and steel. Like hydraulic oils, most gear oils are sold based on viscosity grade. They are more viscous than most hydraulic oils and additive chemistries are different.

Article Source:
http://www.articleside.com/business-articles/lubrication-oils-and-their-effects-on-waterbased-metalworking-coolants.htm - Article Side

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Headquartered in New Providence, NJ, Chemetall Americas has been developing, manufacturing, and supplying state-of-the art specialty chemical products since 1909. Our speciality in a metalworking fluids, coolants, a Pretreatment, Surface Treatment.

Article Keywords:
Pretreatment, Advanced Pretreatment, Metal Working Fluids, Coolants, Rust Preventatives, Wire Drawing, Tube Drawing, Aluminum Pretreatment, Surface Treatment, Phosphates, Zink Phosphating, Iron phosphating, manganese phosphating, phosphate coating, Metal

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