Tower Oil
& Technology Co.

WHY WATER QUALITY?

With environmental regulations on the increase, companies engaged in the use (and/or disposal) of metalworking lubricants have generally come to accept that the quality of water used in a manufacturing operation affects quality of the product, efficiency of the process, maintenance costs of the process machinery and useful life of any machine sump. It is important to recognize generally, as the purity of the water increases, useful sump life increases. Likewise, as purity of the water increases, the amount of disposable waste material decreases dramatically.

Metalworking fluids that are water soluble or emulsifiable generally consist of fluid concentrate diluted from five to ten percent with water. Hence, water consists of more than ninety percent of the metalworking fluid in a coolant sump.

Various physical properties associated with the assessment of water quality are hardness, chlorides, sulfates and pH. Hardness consists of carbonates of calcium and magnesium and is typically expressed as grains per gallon or parts per million. Increase hardness affects metalworking fluids by causing instability in the fluids, which will promote microbial growth. Corrosion problems associated with water diluted solutions or emulsions are related to the presence of low pH and/or chlorides, which increase vulnerability of metal surfaces to oxidative attack. Sulfates serve to potentiate the propagation of anaerobic bacteria, which are responsible for the liberation of hydrogen sulfide (Monday morning odor) in metalworking sumps.

An analysis of the available water should be conducted to determine its properties and compatibility with a candidate metalworking fluid. If water quality is impaired, consideration should be given to the most cost efficient method of improvement available. The installation of water treatment equipment such as water softening, deionization, reverse osmosis or a combination thereof should be considered. Water softening is a process by which “hard” calcium and magnesium ions are exchanged for “soft” sodium ions by passing through an ion exchange resin bed. The total dissolved solids in “soft” water are not significantly different from “hard’ water, but sticky gummy residues may be reduced in coolants. However, softened water, because of increased chloride content, can actually increase corrosion. Deionization consists of passing water through a cation/anion exchanger, which produces water equivalent in quality to distilled water. Reverse osmosis also produces relatively pure water by forcing water through a semi-permeable membrane, which filters out a majority (90%) of dissolved ionic material. However, the membranes have relatively unpredictable lives and are costly to replace, and about half the water fed to the system goes down the drain. Moreover, it should be recognized that water softening and deionization units can serve as an environment for production of microbiological contamination.

A careful study should be made to determine the specific treatment needed to produce water of quality that best serves the needs of the specific plant’s operation requirements. On a overall basis, purified water quality lowers coolant consumption, reduces machine cleaning and pump out costs, in addition to reducing corrosion on machine and production parts. A small investment in water quality improvement will, in the long run, produce significant savings in overall efficiency and maintenance costs in metalworking fluid usage.

4300 SOUTH TRIPP AVENUE ● CHICAGO, ILLINOIS 60632 ●USA
OFFICE: (773) 927-6161●FAX: (773) 927-3105●WEBSITE: www.toweroil.com