In today's demanding marketplace, die casters can save time and money through better understanding of process fluids

**CARE & MAINTENANCE OF WATER GLYCOL HYDRAULIC FLUIDS**

Today, a die casting manager is asked to handle more responsibilities than ever before. In addition to effectively managing an operation to meet production schedules, he needs to manage costs in order to keep the cost/price ratio to a minimum.

Today’s manager is mandated by the government, whether Federal, state or local, to control his plant effluent and discharge. One way to manage effluent is to keep process fluids like water glycols out of the waste stream. In order to do this, a die casting manager must first understand what water glycols are, and how they can be managed to extend fluid life and maintain performance.

**Water Glycol Fluids**

A little known and seldom published fact is that water glycol hydraulic fluids are the closest thing to a permanent hydraulic fluid being offered on the market today. If you were to design a sealed or pressurized reservoir that isolated fluid from the atmosphere and you were able to render the system virtually leak free, water glycol hydraulic fluids could be installed and they would never need to be changed.

Unlike petroleum oil or anhydrous synthetic fluids like phosphate esters or polyol esters, water glycol hydraulic fluids are not degraded by heat or metal in the system that act as catalysts.

To make the most of a water glycol hydraulic fluid in a system, it is first necessary to examine and understand the fluid composition. A water glycol fluid is composed of polyglycol thickener, glycol (ethylene, diethylene, propylene, etc.), water and additives. It is important to note that additives usually account for between five and 10 percent of the total fluid composition. These additives include corrosion inhibitors for the liquid phase and vapor phase, lubrication, metal passivators, such as copper, brass and bronze and dye.

The water glycol composition will have major effects on a system’s design criteria. Water is the one component in a water glycol fluid that will strongly effect design. Water has a higher vapor pressure than oil, so it is more prone to cavitation. Higher vapor pressure requires that the pump inlet be free of restrictions.

A die casting manager should seek low lift, where the pump is not set too far above the. Positive head or mounting the pump below fluid level and allowing the weight of the fluid to super charge the inlet of the pump is an excellent way to offset the affects of water’s high vapor pressure in a water glycol fluid. Inlet strainers should be no finer than 100, with 60 mesh as the optimum. If return line filtration is in place, and a filter breaker is being used, no strainer is required. This will eliminate any possibility of cavitation due to a clogged strainer.

**Filter Systems**

With regard to system filtration, filter elements should be compatible with alkaline water solutions. Elements can be as fine as three microns absolute - the normal recommendation for servo application. Filtration can be pressure, return line, or a side stream loop built onto the reservoir.

Once a die caster understands the nature of water glycol fluids and how fluid composition affects his system, it becomes easier to recognize what needs to be managed in the fluid for extended life and performance maintenance.

The two keys to extending life and maintaining performance are viscosity and pH. Viscosity measurements are an indicator of water content. For water glycol users, pH is a measure of the corrosion inhibiting properties of the fluid.
High viscosity is an indication that water is being lost, probably through evaporation. This is a natural occurrence. When viscosity increases to the level approximately 50 SUS @ 100 degrees Fahrenheit above the viscosity of new fluid, water adjustments should be made. Water addition charts used for adjustments are normally available from the fluid supplier.

It is critical that water be distilled, soft, deionized or boiler condensate. Hardness must not exceed 5 ppm. Zero hardness as calcium carbonate is preferred for making water adjustments.

Low viscosity in a water glycol fluid is usually a result of too much water in the fluid. In the case of an over adjustment to correct a problem, the addition of too much water is an attempt to bring high viscosity fluids into specification.

If soft distilled or deionized water is used for this adjustment, one half of the low viscosity fluid should be removed from the system. It can be used as makeup in systems where the viscosity is high. This low viscosity fluid need not be discarded.

In the case of a heat exchanger leak, the water used for cooling in heat exchangers is typically “city” water or cooling tower water. The calcium and magnesium ions present in this water will react with the lubricant additive in water glycol fluids.

The reaction product is a white, soapy solid that can be filtered out of the fluid. Hard water permanently damages water glycol fluids, and those that have been contaminated should be removed from hydraulic equipment and disposed of properly. Viscosity measurements can be done using a Visage, which is available from Louis C. Eitzen Co., Glenwood Springs, CO.

Examination of pH should be instituted to determine the corrosion inhibiting properties of a fluid. pH is defined as the inverse of the logarithm of the hydrogen ion concentration. In order to inhibit rust in a hydraulic system, the pH of water based fluids must be maintained at 8.0 or above. This is an alkaline or basic pH, with a neutral pH at 7.0 on a scale of values ranging from 1 to 14.

Due to heat and evaporative water losses, the pH of a fluid will most likely drift downward. This downward movement of pH is due to loss of the vapor phase corrosion inhibitor. As water adjustments are made to reduce viscosity, amines, the basic materials that contribute to pH are not being replenished. Fluids with a pH of less than 8.0 should be removed from the hydraulic system and disposed of properly. pH measurements can be done in your plant using either pH paper or a portable pH meter. These products are readily available through a scientific products distributor.

In today’s demanding marketplace, a die casting manager can save his company both time and money by understanding the various aspects involved in extending the life of water glycol fluids and maintaining fluid performance. By knowing all elements of fluid composition and the effects on a hydraulic system, as well as the important roles of viscosity and pH, die casters can improve plant efficiency and cost-effectiveness, while meeting today’s stringent regulations.