BENFITS OF DIONIZED OR REVERSE OSMOSIS WATER

Preface:

Coolant emulsions as a standard are typically greater than 90% water. This means the base is "water." Often, we do not consider what tap water might contain. Detroit City water is one of the finest water supplies in the country. Consistently the highest quality. However, even this premium water is only marginal for creating chemical mixtures. It will contain some or all the following: **CALCIUM, MAGNESIUM, SULFATES, CHLROIDES, and NITRATES.**

When creating a strong emulsion, we need to look at all the components. Today's premium coolants will perform best when provided "Pure Water." Typically, we use the following guidelines: absence of Mag, calcium, chlorides, sulfates, and nitrates. A product that is < 10 PPM is normally an excellent beginning.

How do we get Premium H2O

In this case we are beginning with a premium water source. However, if we enhance it with a three-step approach, we will offer the finest H2O to make our emulsion.

1. Pre-filter in coming water through a standard two step cartridge system
    a. Step one is a 20" 5-micron cartridge filter
2. Water softener to remove the magnesium and calcium. This is accomplished via an ion exchange of sodium salts for magnesium and calcium salts. This should be performed prior to step 3 because RO systems prefer sodium salt over magnesium and calcium. Mag and calcium are sticky/tacky and shorten the life of the RO membranes and reduce efficiency
3. Reverse Osmosis system to complete the filtration process. The Industrial Reverse Osmosis (RO) system will strip or remove all unwanted dissolved solids from the water and thus providing the perfect product to mix chemical or in our case prepare an emulsion.

Benefits of Deionized or Reverse Osmosis for Emulsions

Using DI water will create a strong emulsion. Coolants go through a process we refer to as the "Tea Kettle" effect. As the fluid evaporates, we only lose pure water. When we replenish the water/coolant, unless we are using pure water the emulsion increases in dissolved solids. It becomes "Strangulation by Accumulation." Over time this weakens the emulsion, and it will degrade. However, if we replenish the emulsion with DI/RO water we are using pure water and

thus not adding solids, we greatly improve its sump life. The machine tool sump only has a finite space for the additional atoms. These are positively and negatively charged ions. As we reduce their area to exist, they begin bouncing into one an another and losing energy and eventually losing their ability to attract and repel. When this occurs, the coolants will begin to fail on various levels.

Additionally, the performance of the coolant will be enhanced by removing other dissolved solids such as “Chlorides.” Chlorides are naturally occurring (not to be confused with Chlorine). Chlorides are negatively charged ions that can cause havoc with coolants and chemical mixture. They will often cause a waxy or sticky residue to build up. When using 100% synthetic coolants, chlorides are detrimental. Chlorine is a useful and is the most abundant element on earth. The only way to remove chlorides from water sources is DI/RO.

Caution

It is important to note that while better water will extend sump life, it is only one building block. We still need to continue to have good practices: monitoring Brix, pH, removing unwanted solids and controlling unwanted chemical contaminations from such things as cleaners and tramp oils. We know that lower cost way lubes and hydraulics will contain sulfur and zinc. Both are unwanted in the sump and will have a negative effect on sump life. Many of todays CNC machines still use way lube while many have gone to greased ways, where way lube is being used, we should use a sulfur free product. In most cases these products are similar in cost to the sulfur and zinc products. When cleaning the outside of the machine we should recommend using the coolant in a spray bottle to perform simple maintenance. Blaser coolants are excellent cleaners and when used instead of Simple Green or Windex will not have a negative effect on the sump.

Conclusion

Today’s premium fluids are designed for multiple years of service when properly cared for. Technology has created better and better emulsions. They require higher quality bases in order to form better solutions. In the end, we are still simply introducing oil into water, but now, we are super charging it with other performance enhancing properties. While “better” water quality is just one part of the equation, it is a large building block to a longer lasting and higher performing machine tool coolant.
