UNDERSTANDING HEAT TRANSFER FLUIDS AND YOUR EXTRUDER

All hot oils (heat transfer fluids) have a limit to the time they can be utilized in an extruder. The key factor is mainly the type of fluid being used. However process temperatures and production rates are just a few of the many smaller factors involved in determining the length of time between fluid changes.

Use of a proper heat transfer fluid intended for extrusion is always recommended. However, while there are many fluids available only a few premium fluids contain the additives necessary to enhance their performance and to significantly extend the time required between oil changes in an extruder.

Furthermore a fluid analysis program should be utilized to track the life cycle of your oil and determine the oil change interval best suited to your application and type of oil. Most heat transfer fluid vendors should provide a no cost or nominally charged oil analysis service.

MAXIMIZING FLUID LIFE

All fluids degrade with time and if not changed on time will leave deposits. The key is finding the right balance between maintenance schedules and production requirements.

To help understand the stress an extruder puts on a fluid - the same fluid that would last 2500 hours in an extruder could last 12 to 15 years in a larger system with no exposure to air.

There are a number of factors involved in oil breakdown. There are also a number of easy techniques that can be applied to maximize your oil's life.

Heat transfer fluids generally breakdown in two ways:

Oxidation - the result of a heat transfer fluid with a temperature above 200˚F coming in contact with air. While oxidation is nearly unavoidable there are key steps that can be taken to minimize your oils exposure. Oil above 200˚F coming in contact with air will oxidize very rapidly. This can be a problem in reservoirs where the oil is not cooled before its returned to the tank. Heat exchangers are an integral part of the system, they are designed to keep the reservoir oil temperature below 200˚F. Fouled exchangers on either the water or the oil side can reduce their efficiency and subsequently reduce your oil life.

Regularly checking the tank temperature with a temperature probe is the easiest way to determine your heat exchangers efficiency. A properly operating system should have a tank temperature less than 200˚F.

Thermal Degradation - occurs when a system heats the oil past its maximum rated operating temperature. In most cases this should not be a concern, however, there are a few circumstances where this could occur.

During extended periods of idle operation, equipment is often left in a constant heat only mode (barrel heater bands left on to maintain barrel temperature). This is normal and expected for start-up periods and for short periods of idle time. However for extended periods, equipment should not be left in heat only modes. This leaves either non or slow circulating oil in the barrel wraps under high heat.

During system shutdowns, equipment and oil should be cooled before turning off circulating pumps. This prevents stagnant oil being trapped near heat sources and potentially over heating the oil. This is especially important with the screw temperature controllers regardless of being built in or stand-alone portables.

After determining your oil's life cycle it is important to maintain regular oil changes. As the oil ages it begins to darken and form acids as a result of oxidation. These acids are eventually what polymerize to form sludge.

Proper Draining Techniques

When changing your oil it's important to allow the maximum amount of oil to drain before refilling. This includes not only the reservoir but also circulation lines, filter housings, heat exchangers etc.. If excessive amounts of oil are left in a system they will contaminate your new oil causing it to turn dark and speed up the degradation process.

An easy way to evaluate the efficiency of an oil change is through a 'Before and After' analysis of the oil. If you compare the 'after' sample's TAN (total acid number) against the 'before' sample you can estimate the volume of fluid being left in the system during an oil change (most fluids have a virgin TAN just slightly higher than 0.0). For example if the TAN of your before sample was 1.0 and the after TAN was 0.2 you could reasonably estimate that 20% of the oil is being left in your system.

What to do if you don't always get to your oil changes on time.

If you have overextended the life of your oil but not yet begun to form deposits, a simple flushing fluid (usually available from your fluid supplier) can be used to help reduce the amount of residual fluid left in a system after an oil change. This reduces the potential of contamination with your new oil. If your have or suspect you have started to form deposits in your system there are a few cleaning products currently available to assist removing them. Some of these products actually allow for production to run uninterrupted while in use. Otherwise care should be taken to remove sludge buildup and residual oil before refilling with fresh oil.