DURATHERM
Heat Transfer Fluids

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 affecting service life is mainly the type of fluid being used. However, process temperatures and production rates are just a few of the more minor 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. 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 93°C (200°F) coming in contact with air. While oxidation is nearly unavoidable, there are key steps that can be taken to minimize your oil's exposure. Oil above 93°C and open to the atmosphere will oxidize very rapidly. This can be a problem in reservoirs where the oil is not cooled before it's returned to the tank. Heat exchangers are an integral part of the system needed to keep the fluid from experiencing oxidation. They are designed into the system to keep the reservoir oil temperature below the required 93°C mark. If for some reason they get fouled – on either the water or oil side – their reduced efficiency can substantially impact your oil life.

Regularly checking the tank or reservoir temperature with a temperature probe is the easiest way to determine your heat exchanger's efficiency. A properly operating system should have a tank temperature of less than 93°C.

Thermal Degradation: This 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 with the barrel heater bands left on to maintain barrel temperature. This is normal and expected during startup periods and for short periods of idle time. However, for extended periods, equipment should not be left in heat only modes as

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this leaves either non or slow-circulating oil in the barrel wraps under high heat for far too long.

During system shutdowns, equipment and oil should always be cooled before turning off circulating pumps. This is key to preventing stagnant oil from being trapped near heat sources and potentially overheating the oil. This is especially important with the screw extruder's temperature controllers regardless if they are built-in or stand-alone portables. After determining your oil's life cycle, it is important to maintain regular oil changes just as you would with your car. As the oil ages it begins to darken and form acids as a result of oxidation and these acids are eventually what polymerize to form sludge within the system.

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 used oil is left in a system, it will contaminate your new oil. This will immediately turn any new oil dark and will speed up the degradation process leading to a reduced service life for any newly added oil.

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's, you can estimate the volume of fluid that was left in the system during an oil change.

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 when refilling your system with new oil.

If you 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 continue to run uninterrupted while in use. Otherwise care should be taken to remove sludge build-up and residual oil before refilling the system in order to get the maximum service life and value from the fresh oil.