# Synthetic lubricants for extruders?


Synthetic lubricants for extruders?
Vol. 21 #3, December 1994

To increase production and reduce maintenance costs, plastics manufacturers are turning to synthetic lubricants for the drive systems in extruders.

Synthetic lubricants have been around for almost 50 years. Now, however, because of their performance advantages compared with mineral oils, there is increasing interest in using them for just about any lubrication task.

Synthetic lubricants can be "tailored" to meet predetermined physical and chemical qualities and optimized for each particular application. On the other hand, no matter how well they are formulated, conventional mineral-oil lubricants are still compromises.

Among the most common synthetic lubricants in use today are the synthesized hydrocarbon fluids, specifically polyalphaolefins. The others include polyglycols, also know as polyalkylene glycols; organic esters, phosphate esters and silicones. The synthetic gear lubricants most commonly used in extruder drives to increase output are either polyalphaolefins or polyglycols. Both share these advantages over mineral oils:

1. Lower internal friction, and low traction characteristics mean lower operating temperatures, translating into in creased efficiency and reduced power usage. Gearset manufacturers have uprated speed and horsepower ratings up to 15 percent with synthetics.

2. Higher film strength due to higher viscosity index and unique molecular structures results in superior performance in boundary lubrication situations of high loads and low speeds or high speeds, high torque, and high horse power.

3. At high temperatures a synthetic lubricant provides a thicker lubricant film than a conventional mineral oil of the same viscosity grade, reducing the chance of wear from metal-to-metal contact. It also resists oxidation byproduct deposit formation and lubricant break down.

4. Resistance to sheardown. Additives of long-chain polymers are often used to enhance conventional mineral oil’s high and low temperature performance. In service, however, these additives tend to shear down and lose effectiveness. Synthesized hydrocarbon lubricants do not need these additives and are completely shear-stable.

Based on the experience of dozens of users of synthetic lubricants, bearings, gears, and other components last much longer when synthetic lubricants are used. Synthetic lubricants also do not need to be changed out every six months or a year as is often common with mineral oils, reducing total oil consumption and used oil disposal costs.

To retrofit existing machines with synthetic lubricants, several key points should be followed:

1. Specification - Generally, a user would switch to a synthetic lubricant of the same viscosity grade as the mineral oil in use. However, depending on the application and the anticipated loads and speeds, the user may want to go up to down one grade. In addition, there is the choice between a rust and oxidation-inhibited polyalphaolefin or one with EP (extreme pressure) additives. We have found an EP additive synthetic is not necessary in extruders.

2. Changeover - Polyaphaolefins are the easier to convert to than polyglycols. They are compatible with the same seals and paints as mineral oils, and compatible and miscible with mineral oils. However, the operator must do more than drain and refill, since any dilution of synthetic lubricants with mineral oils detracts from their performance.

- If the gearbox is relatively clean, it can be drained and wiped clean. The system should be operated for several hours with enough polyaphaolefin based synthetic to operate the extruder, then drained. The new

charge of synthetic is then added. I f the gearbox is dirty, a solvent should be added to the mineral oil in use, run for approximately one or two shifts, then drained and flushed as mentioned. If the seals are in good shape, they probably do not have to be replaced.

- If the change is to a polyglycol, the gearbox should be drained, cleaned, and then flushed with a charge of the polyglycol for several hours before draining and refilling. This assures that the polyglycol and mineral oils do not mix, for they are neither miscible nor compatible. Unless the seals are known to be compatible, they should be re placed with seals recommended for use with polyglycols.

- In addition, polyglycols do not separate from water as readily and the usual methods of lubricant/water separation do not apply. There should be maximum protection against water leakage and condensation. Lubricant piping must be designed to accommodate the higher density fluids, particularly on the suction side. Suction filters should be avoided.

3. Lubrication practice - Just because a user changes over to synthetics doesn’t mean abandoning good lubrication practices, such as testing or monitoring for contamination, following good lubricant storage and handling practice, keeping temperature controls operative and monitoring and maintaining fluid levels.

Because synthetic lubricants do not need to be changed regularly, it is recommended that they be tested once a year to make sure they are satisfactory or continued use, covering variables such as viscosity, water, color, contamination, and wear metals. The analysis should include interpretation based on established limits for these variables.

While the changeover to a synthetic lubricant from a mineral oil is a little more involved than just draining and refilling, it pays off in realizing the full benefits of the synthetic lubricant for a long time.

- S.C. Rudd

See also:

- Gearbox design ratings
- Mixing myths
- Ten myths about gear lubrication

Return to Consultants' Corner