LUBE TECHNI-GRAM

FROM:

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THE IMPORTANCE OF MAINTAINING PROPER VISCOSITY

Viscosity is defined as follows: *viscosity is a measure of an oil's resistance to flow*.

This definition hardly conveys the importance of viscosity in relation to lubricants. Lubricant experts agree that maintaining the proper film thickness, or viscosity, of a lubricant between the surfaces of moving parts is **the** most important lubricant property. This is because friction reduction between moving parts is accomplished by maintaining this film of lubricant between the surfaces of the parts.

Viscosity affects heat generation in bearings, cylinders and gear sets, in relation to the oil's internal friction. Viscosity governs the sealing effect of oils and the rate of oil consumption. Viscosity determines the ease with which machines may be started or operated under varying temperature conditions, particularly in cold climates. Oils which are "thick" or "heavy" offer great resistance to flow (**high viscosity**) and oils which are "thin" or "light" flow easily (**low viscosity**).

All oils will **thin** when hot and **thicken** when cold. It is important to remember that not all oils respond in the same way to a given change in temperatures. Many oils contain an ability to resist changes in viscosity due to a change in temperature, and this property is referred to as the oil's viscosity index or VI. The higher the VI of an oil, the less its viscosity is altered by temperature changes.

The benefits of oils with a higher VI are:

1) A general increase in viscosity at higher temperatures, which results in lower oil consumption and less wear.
2) A reduced viscosity at lower temperatures, which will improve starting and lower fuel consumption.

So what does all this mean to the end user? It means that the viscosity of an oil is the first and most important consideration when selecting an oil for a specific application. For the most effective lubrication, the viscosity must conform to the speed, load, and temperature conditions of the lubricated parts.

Trouble-Shooting Viscosity Changes

When there is a significant change in an oil's viscosity after use, it is meaningful. If in use, an oil's viscosity remains stable, it is generally an indication that many of the negative things that could be happening to an oil are not yet occurring. These include oxidation, shear thinning, thermal degradation and many other common condemning conditions.

Generally, as an oil's resistance to flow (viscosity) increases, it is indicative of oil thickening, which can be caused by excessive contamination, oil oxidation and/or additive depletion. Decreases in viscosity can generally be traced to outside contamination (fuel, addition of lower viscosity oil to a higher viscosity oil) or shear thinning of VI improver and lubricant cracking.

Basically, to change the viscosity of an oil, the average size of the molecules needs to change. Most mineral oils of a particular viscosity have molecules of an assortment of sizes. However, if the oil viscosity is high, the predominant size is large. In a "light" or low viscosity oil, smaller molecules will be predominant. Heat will definitely take its toll on viscosity, as a hot-running oil can boil off some small molecules, thus creating an increase in viscosity. A decrease in viscosity can occur when molecules "cleave" or crack into pieces when they are exposed to extremely high temperatures, causing the oil to "thin" or decrease in viscosity.

Possible Causes Of Viscosity Changes

If viscosity increases,
investigate these causes:

1. Oxidation
2. Soot loading
3. Wrong oil
4. Volatilization
5. Emulsified water
6. Anti-freeze in oil

If viscosity decreases,
investigate these causes:

1. Fuel contamination
2. Wrong oil
3. Base oil cracking
4. VI improver sheardown
5. Oil contamination
   (solvents, refrigerants, etc.)

Solution

SWEPCO Lubricants are manufactured using only solvent refined, hydrotreated, high viscosity index paraffinic base stocks. The High Viscosity Index is characterized by having a viscosity index of 95 or higher and, depending on the weight, a high flash point of 400-600°F. This high VI base stock allows SWEPCO Lubricants to remain as close as possible to the optimum viscosity value despite wide differences in temperature change. This provides exceptional low temperature fluid characteristics, or good low temperature flow properties, and excellent high temperature oxidation stability and protection against sludge, gum, varnish, and carbon build-ups.