

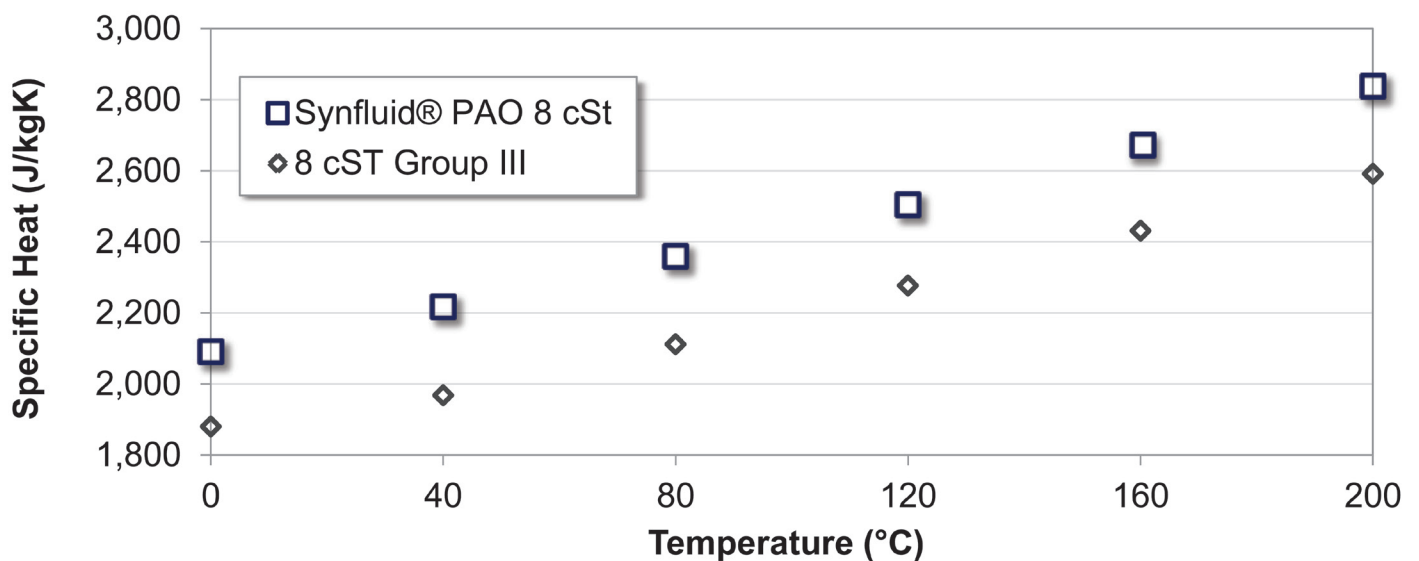
## Synthetic Fluids versus Severely Hydro-Treated Mineral Oils

The question often arises; “Why spend the extra money?” Why buy a synthetic PAO, Diester, PAG or POE rather than a severely hydro-treated “synthetic” petroleum? When one compares synthetic PAO (Polyalphaolefin, API Group IV) to synthetic petroleum (API Group III), one can expect to see the same clear color, similar specific gravity, and similar VI (viscosity index). VI is a measure of how an oil will thin out under high temperature. It is one of the properties used to distinguish synthetic fluids from mineral based fluids and is very important to OEM’s who manufacture hot and cold running equipment.

So what are the benefits that justify the added expense of synthetic PAO? When comparing physical properties from a Technical Data Sheet or MSDS, we should recognize a major difference in pour point. ASTM test method D97, measures the lowest temperature at which a given fluid will flow. A typical PAO will have a pour point of -60°F while a typical Group III will pour down to about -35°F. So, if you are operating equipment outdoors in Northern winter climates, you will see that justification very quickly. However, what if your equipment is safe and warm within your shop or factory? How do I justify synthetics?

A major producer of PAO has recently released data showing significant differences in specific heat and friction factor between PAO and Group III’s. (Graph 1)

### Specific Heat/Thermal Conductivity

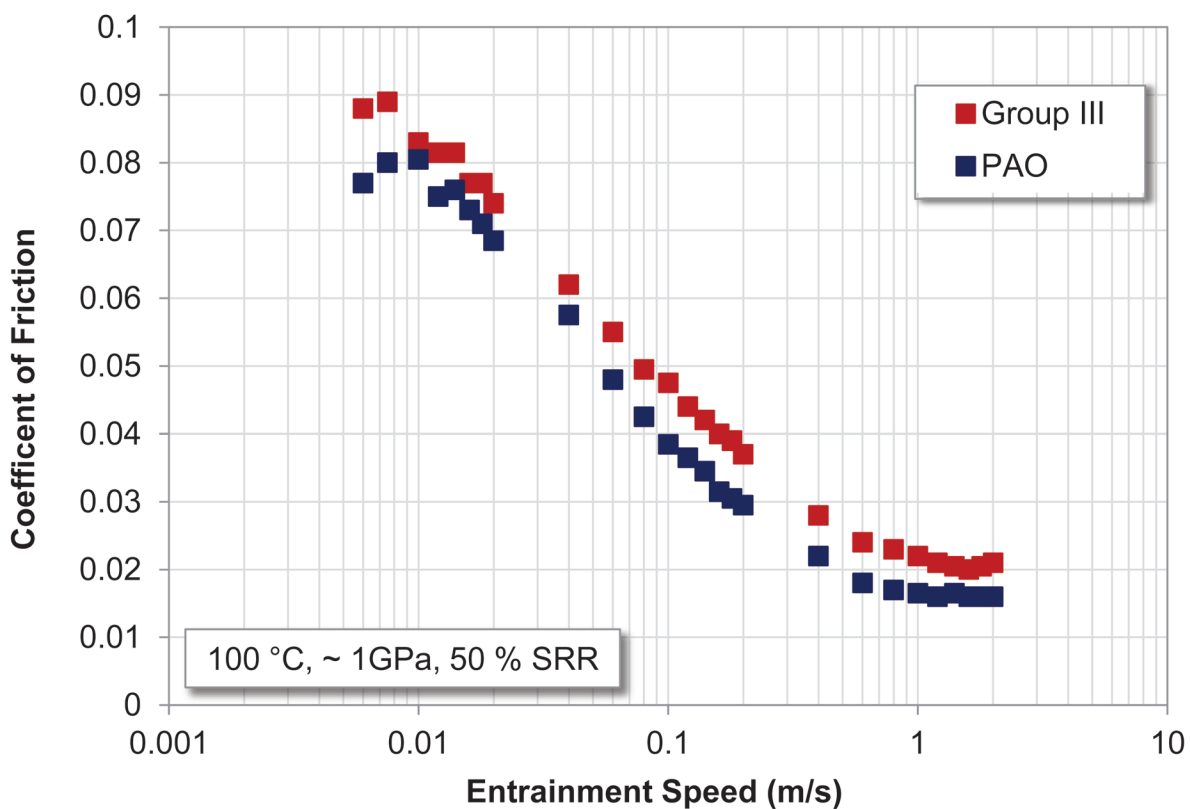


- The higher the specific heat the greater ability to absorb heat.

Specific heat coefficient relates directly to the amount of heat absorbed per pound or per gallon, per degrees. A fluid with a higher specific heat coefficient will absorb more heat with a lower rise in temperature; so your equipment runs cooler. Cooler operating temperatures lead to longer equipment, seal, gasket and hose life.

Friction factor relates directly to the work performed per unit of energy expended. (Graph 2)

### Base Oil Affect on Fuel Economy



#### Friction reduction from Group III to PAO

<sup>4</sup>B. J. Hardy, K. K. Bjornen, S. F. Bell, “Group III Base Oils: Their Role & How to Take Advantage of Them”, 9<sup>th</sup> ICIS-LOR World Base Oils Conference, Feb. 17, 2005, London.

Less energy expended in friction loss equates to more miles per gallon or more scfm compressed per kilowatt hour consumed. Synthetic fluids provide lower friction factors due to the controlled size and shape of the molecules themselves.

**So if you want longer equipment life and lower energy consumption, choose PAO!**