Advanced High-Performance Synthetic Basestocks

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As formulators and original equipment manufacturers increase their demand for high-performance lubricants, ExxonMobil Chemical is responding with a dedicated portfolio of high-performance synthetic basestocks. These basestocks can help formulators find great solutions to tough lubricating challenges. This specialized offering of commercially available high-performance synthetic basestocks includes several products from the SpectraSyn™ polyalphaolefins (PAO) family and novel alkylated naphthalene products.

**SpectraSyn™ 40 & 100 High Viscosity PAO**

SpectraSyn™ 40 and 100 polyalphaolefin products have high viscosity indices for improved flow at low temperatures and increased film thickness at high temperatures. They are attractive blend components for increasing basestock viscosity and upgrading quality.

**Applications include:**

- High-temperature industrial gear and circulating oils
- Refrigeration compressor lubricants in severe service
- Greases for equipment used in wide temperature ranges
- Oils for land-based gas turbines
- Automotive gear and heavy-duty transmission oils.

**SpectraSyn Ultra™ High VI PAO**

SpectraSyn Ultra™ High VI PAO is an innovative PAO blendstock that offers increased film thickness, extra energy efficiency and excellent low-temperature fluidity. Its beneficial features, enabled by a unique molecular structure, include:

- Very high viscosity
- High viscosity index (200-300+)
- Low pour point
- Low surface tension.

SpectraSyn Ultra™ High VI PAO blends expand formulation options. When blended with low viscosity basestocks, SpectraSyn Ultra™ PAO can be used to formulate advanced products that reduce wear, save energy costs, and feature low foaming and good air release.

Using SpectraSyn Ultra™ PAO as a blendstock with conventional PAO not only achieves similar viscometrics to a PAG-based oil, but also enables improved low-temperature properties. In addition, because SpectraSyn Ultra™ is a PAO, it offers the hydrolytic stability of a PAG along with the improved miscibility possible with hydrocarbons and most esters, as well as better compatibility with paints and seals.
Energy-efficiency capabilities also can be realized with blends containing SpectraSyn Ultra™ PAO. For example, the high viscosity index of SpectraSyn Ultra™ PAO in a VG220 oil results in improved operating performance over a temperature range compared to what can be produced with a mineral oil and conventional PAO fluids. The use of SpectraSyn Ultra™ PAO enables an oil to have lower viscous drag at low temperature conditions and increased film thickness at high temperatures. This benefit enables improved energy efficiency.

In summary, the potential benefits include:
- Reduced wear
- Energy savings
- Compatibility with system materials, which reduces replacements of seals, hoses and lines
- Extended equipment life due to non-hygroscopic properties and corrosion reduction
- Improved startup performance at low temperature conditions.

**Synesstic™ Blendstocks**

ExxonMobil Chemical offers innovative Group V alkylated naphthalenes under the trade name Synesstic™ blendstocks. These novel, highly stable Group V blendstocks are formed by the reaction of olefins with naphthalene.

Alkylated naphthalenes offer the hydrolytic stability of a PAO and excellent additive solubility of an ester. They also can help improve additive system efficacy because they are less polar than esters. Lubricants blended with Synesstic™ AN products provide increased hydrolytic and thermal/oxidative stability, resulting in increased oil service and longer equipment life.
Demonstrating extended equipment life was accomplished with two tests. One test featured the evaluation of two VG32 PAO-based industrial circulating oils, according to ASTM D 2619. One oil contained adipate ester blendstock, while the other had Synesstic™ 5 blendstock oil. The oil containing the ester blendstock showed significant hydrolysis and corrosion compared to the oil containing the Synesstic™ AN. This indicates that the oil formulated with Synesstic™ should enable the equipment to last longer.

In the Timken Four Ball test, a VG220 oil containing PAO, Synesstic™ 5 and an additive package showed significantly less wear under heavy loads than a formulation based on PAO, polyol ester and the same additives. The extra wear protection is believed to result from the benefit of alkylated naphthalenes, allowing additives to function at their full potential.

To demonstrate increased oil service life, we used the Compressor Oil TOST (ASTM D943) test. This test evaluated the oxidative stability of inhibited oils in the presence of oxygen, water and metals (Cu, Fe) at an elevated temperature. Formulations tested contained 10 percent of either esters (adipate, polyol) or Synesstic™ 5, and were formulated to meet ISO VG46 using 6 and 40 cSt PAO and additive. The Synesstic™ 5-based formulation showed almost no change in total acid number (TAN) at the end of 2,000 hours of testing. Ester-based formulations showed a dramatic increase in TAN as the test approached 2,000 hours, indicating significant oil breakdown.

**Improve Development Time with Formulation Guide**

ExxonMobil Chemical supports customers with formulation assistance, performance testing, product development assistance and global product registration. One especially valuable tool for formulators is a Synthetic Basestock Formulations Guide. Available to formulators upon request, the guide suggests basestock combinations for common synthetic lube applications. These suggestions can help formulators eliminate extensive basestock screening.

To register to receive the guide, you can contact us at [www.exxonmobil synthetics.com](http://www.exxonmobil synthetics.com).

**Summary**

Through an advanced portfolio of high-performance Groups IV and V synthetic basestocks, ExxonMobil Chemical is helping formulators meet the continued industry demand for high-performance fluids. These fluids can provide formulators with improved blending flexibility to create lubricants with high-performance capabilities. A broad technical support program complements this innovative product line, enabling lubricant formulators to accelerate their development cycle for synthetic lubricants and offer economic value to end-users.

So, are you ready to launch your next great lubricant formulation idea? Think of ExxonMobil Chemical as your source for high-performance synthetic solutions.