Creating Value with High-Performance Synthetic Basestocks

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Engine makers and lubricant formulators have more reasons than ever to consider synthetic basestocks and blendstocks. From Detroit to Munich to Tokyo and Beijing, the demands are loud and clear for improved fuel economy, lower emissions and high performance in extreme temperatures—all hallmarks of synthetic lubricants.

Synthetic basestocks continue to evolve to meet those increasing demands. ExxonMobil Chemical is leading the way with its Group IV and Group V product technology. The result is a comprehensive line of high-performance synthetic basestocks that address the toughest lubrication challenges.

Group IV Innovation

Over the past four years, ExxonMobil Chemical’s innovations and capacity increases for Group IV products have grabbed much of the industry’s attention.

- In 2004, SpectraSyn Ultra™ High VI PAO was introduced, providing lubricant formulators with a basestock characterized by increased film thickness, improved energy efficiency and excellent low-temperature fluidity.
- In 2005, the company introduced SpectraSyn Plus™ advanced low-viscosity polyalphaolefins (PAO) to address requirements for a synthetic basestock with the unique combination of low volatility and low-temperature fluidity.
- In 2007, the company announced completion of several debottlenecking projects at the ExxonMobil Chemical Synthetics Plant in Beaumont, Texas, to increase capacity to meet growing customer demand for SpectraSyn Ultra™ High VI PAO and SpectraSyn™ 40 cSt and 100 cSt high viscosity PAO. SpectraSyn Ultra™ High VI PAO production capacity in Beaumont was increased by 40 percent, while SpectraSyn™ capacity was boosted by 15 percent.

These advances enable ExxonMobil Chemical to offer customers worldwide the widest range of PAO basestocks, from 2 cSt to 1000 cSt. A strong technology group, devoted to synthetic basestock development, is focused on new innovations.

Synesstic™ AN Blendstocks

Group V Fluids

While the benefits of Group IV basestocks are well known to OEMs and formulators,
To meet growing demand for AN, the company recently completed a debottleneck project at its Specialties Plant in Edison, New Jersey, that increased capacity by 40 percent.

the benefits of alkylated naphthalenes (AN) — a Group V fluid — may be less understood.

Market conditions make this an especially good time to take a fresh look at the effectiveness of AN products and their ability to improve the performance of Group II, Group III and Group IV basestocks in finished lubricants.

ExxonMobil Chemical has a long history of AN production. Today, the company is the world’s largest producer of AN. Synesstic™ is the company’s brand name for AN, which is produced in Edison, New Jersey.

Tests Show Improved Oxidative Stability

One of the first things formulators notice about AN is that it is a hydrocarbon material containing an aromatic group. Unlike esters, it contains no hydrolyzable linkages. For many formulators, the biggest surprise is AN’s effect on oxidative performance, especially in blends with other basestocks.

The increase in oxidative performance is demonstrated, in part, by the Rotary Pressure Vessel Oxidation Test (RPVOT). In Figure 2, the synergistic effect on oxidative stability of two Synesstic™ AN fluids blended with PAO can be seen.

Typically, it is expected that a weighted average of the oxidation time for each of the respective components would be observed, giving a straight-line correlation. The observed convex curve is believed to be the result of a synergistic effect from blending AN with PAO.

Synesstic™ AN’s oxidative stability is further demonstrated by a modified bulk oil oxidative stability test, ASTM D 4636 (Figure 3).

Formulation Guide Helps Save Development Time

To help customers reduce their product development time, ExxonMobil Chemical supports customers with formulation assistance, performance testing, product development assistance and global product registration.

One of the most valuable tools for formulators is the Synthetic Lubricant Basestocks Formulation Guide, available to formulators upon request at www.exxonmobilsynthetics.com. Performance product specialists, recently added in the U.S. and Europe, also are available to discuss applications. For more information, call 800-892-4449.
This simple four-day test is an excellent way for a formulator to determine the effectiveness of AN at controlling evaporation, total acid number (TAN), viscosity and sludge buildup in a range of formulations.

Generally, improvements were seen in all four aspects when Synesstic™ 5 was added to Group II, Group III and Group IV basestocks. The addition of Synesstic™ AN to Group II and III basestocks delivered performance closer to that of PAO.

In a Group II basestock, Synesstic™ AN showed a dramatic improvement in sludge reduction (Figure 4). The results suggest that less filter plugging, cleaner equipment and fewer engine problems may occur when Synesstic™ AN is added.

The testing of Synesstic™ AN in Group III basestocks showed a pronounced, synergistic effect in viscosity control. Blends with Group IV resulted in better acid stability and improved viscosity control.

### Increased Additive Effectiveness

Solubilizing additives continues to be a challenge for formulators. Examples of Synesstic™ AN solubility benefits may include the following:

- Low affinity for the metal surface allows additives such as friction modifiers to function to their full potential on the metal surface.
- Competition between esters and additives for the metal surface can be reduced by replacing ester with Synesstic™ AN, allowing for greater effectiveness.

### Summary of AN Benefits

When compared with other lubricant base fluids, Synesstic™ AN Blendstocks offer step-out hydrolytic stability and outstanding thermal-oxidative stability. These qualities make Synesstic™ fluids ideal for enhancing and extending the performance of many automotive and industrial lubricants.

Synesstic™ AN Blendstocks also offer improved solubility vs. other base fluids and have outstanding compatibility with seals. They may even offer formulators more cost-effective formulations. Synesstic™ AN Blendstocks are available in high and low viscosity grades.

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