As Original Equipment Manufacturers (OEMs) strive to develop high-performance engines offering better fuel economy and lower emissions, certification bodies such as API, ILSAC and ACEA are implementing higher standards for engine oils and commercial lubricants. The ability of finished oil blenders to meet these higher standards requires improvements in basestocks.

ExxonMobil Chemical is at the forefront of making these basestock improvements through an expanding portfolio of SpectraSyn™ polyalphaolefins (PAO). Recently, the company introduced 4 and 6 cSt grades of SpectraSyn Plus™, a next-generation low viscosity PAO. The “Plus” refers to an innovative combination of low volatility and low-temperature fluidity that is unmatched in conventional PAO.

This combination also favorably adds to the balancing act (Figure 1) that basestock producers face in addressing the parameters of high-quality finished lubricants.

**Innovations In Synthetic Lubricant Basestocks**

As seen in Figure 2, SpectraSyn Plus™ PAO produce lower volatility at a given viscosity than conventional PAO produce. Through our proprietary process, SpectraSyn Plus™ PAO also fundamentally shift the volatility low-temperature fluidity of PAO. That’s why we think of SpectraSyn Plus™ as a Group IV+ product. It extends what the industry considers as Group IV.

In fact, SpectraSyn Plus™ PAO are made with the same type of feedstocks as conventional PAO. The improved properties of SpectraSyn Plus™ are accomplished through our proprietary process and optimized manufacturing conditions. The results are best-in-class PAO with significantly improved volatility and low-temperature performance. SpectraSyn Plus™ PAO will also maintain the excellent oxidative and thermal stability benefits of PAO.

**A Path To 0W-XX Oils**

The combined features of low-viscosity SpectraSyn Plus™ make it an excellent blend component for upgrading feedstock volatility, low-temperature fluidity, quality and blending economics. For formulators challenged to produce a 0W oil with a significant quantity of conventional Group III min-

---

**Figure 1**

Modern Basestock Quality Drivers

<table>
<thead>
<tr>
<th>Performance Parameter</th>
<th>Desired Basestock Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved Fuel Economy</td>
<td>Low Viscosity</td>
</tr>
<tr>
<td>Low Emissions</td>
<td>Low Volatility</td>
</tr>
<tr>
<td>Extended Drain Interval</td>
<td>Good Stability</td>
</tr>
<tr>
<td>Low Temp. Fluidity</td>
<td>Low MRV, Brookfield, CCS</td>
</tr>
</tbody>
</table>
eral base oils, SpectraSyn Plus™ makes a valuable contribution (Figure 3).

Oil volatility affects both engine emissions and oil consumption, and reducing that volatility should have a positive impact on emissions and consumption. A thermogravimetric analysis (Figure 4) confirms the improved volatility of SpectraSyn Plus™ 4 versus conventional 4 cSt PAO. Run in nitrogen, this analysis also indicates the ability of SpectraSyn Plus™ to withstand high temperatures without decomposing.

A close look reveals why SpectraSyn Plus™ PAO have better blending properties than conventional PAO. Viscosity blends logarithmically in favor of the lower viscosity component, while volatility blends linearly. Studies indicate that significant quantities of Group III basestock blended with SpectraSyn Plus™ PAO will yield viscometric properties very similar to blends of conventional 4 and 6 cSt PAO. This is due to the combination of volatility and low-temperature viscosity advantage of SpectraSyn Plus™ vs. conventional PAO.

Because SpectraSyn Plus™ PAO contain no sulfated ash, phosphorous and sulfur (SAPS), they will have no effect on the SAPS of a finished lubricant.

Multiple Grades Available
SpectraSyn Plus™ is applicable in more than just passenger car engine oils and heavy duty diesel engine oils. Benefits may be achieved, we believe, in transmission oils, aviation oils and industrial oils.

SpectraSyn Plus™ 4 cSt PAO (Figure 5) provide an unmatched combination of low volatility and low-temperature fluidity. Viscosity, Noack and Cold Cranking Simulator characteristics support the choice of SpectraSyn Plus™ PAO for a wide range of applications.

SpectraSyn Plus™ 3.6 cSt PAO offer unique benefits in low viscosity PAO, making them ideal for high-performance, low-temperature applications such as greases and drive-line fluids.
SpectraSyn Plus™ 6 cSt PAO (Figure 6) are a step-change improvement in volatility for 6 cSt PAO. No other 6 cSt PAO product on the market can match the combination of low volatility and low-temperature fluidity. They are well suited to automotive and industrial applications that require excellent low-temperature and low-volatility performance.

Benefits
SpectraSyn Plus™ PAO add capabilities that may help formulators deliver lubricants with the following:

- Extended drain intervals.
- Improved fuel economy.
- Outstanding low-temperature fluidity for enhanced blending flexibility.
- Blending with mineral base oils to meet low-temperature and volatility performance criteria.

Blending Flexibility
For the formulator looking to provide the very best lubricants, SpectraSyn Plus™ PAO should offer numerous performance advantages, including better volatility, improved CCS and excellent pour point.

All grades of SpectraSyn Plus™ PAO are scheduled for availability in commercial quantities in the fourth quarter of 2005.

For more information, contact Page Greenwood, PAO marketing manager, ExxonMobil Chemical Company at 281-588-4561.

©2005 Exxon Mobil Corporation. To the extent the user is entitled to disclose and distribute this document, the user may forward, distribute, and/or photocopy this copyrighted document only if unaltered and complete, including all of its headers, footers, disclaimers, and other information. You may not copy this document to a Web site. ExxonMobil does not guarantee the typical (or other) values. Analysis may be performed on representative samples and not the actual product shipped. The information in this document relates only to the named product or materials when not in combination with any other product or materials. We based the information on data believed to be reliable on the date compiled, but we do not represent, warrant, or otherwise guarantee, expressly or impliedly, the merchantability, fitness for a particular purpose, suitability, accuracy, reliability, or completeness of this information or the products, materials, or processes described. The user is solely responsible for all determinations regarding any use of material or product and any process in its territories of interest. We expressly disclaim liability for any loss, damage, or injury directly or indirectly suffered or incurred as a result of or related to anyone using or relying on any of the information in this document. There is no endorsement of any product or process, and we expressly disclaim any contrary implication. The terms, “we”, “our”, “ExxonMobil Chemical”, or “ExxonMobil” are used for convenience, and may include any one or more of ExxonMobil Chemical Company, Exxon Mobil Corporation, or any affiliates they directly or indirectly steward. ExxonMobil, the ExxonMobil Emblem, the “Interlocking X” Device, SpectraSyn and SpectraSyn Plus are trademarks of Exxon Mobil Corporation.