Base stocks: Engineered fluids to drive business performance

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It is not uncommon for many in the industry to view base stocks more or less as a commodity where quality is assumed as the same no matter the supplier, and its value is defined by price. So when an oil marketer approaches a base oil supplier, the question is not "what value can this bring to my business?" but often rather "what is the price?" and "is your product cheaper or more expensive than the alternative?"

What is missing in this conversation are questions around the technology and engineering that go into every individual base stock, and the potential benefits of choosing the right base stock for each application.

Base stocks typically make up between 75-99 percent of finished lubricant formulations. With such a critical role, carefully chosen, differentiated base stocks are complex and intricate fluids tailor made with lubricant marketers' specific requirements and applications in mind.

More than just a commodity defined by price, these base stocks are "engineered fluids" that enable lubricant marketers to differentiate their own product offer and drive more value for their business.

Base stocks complexity explained

Given crude oil is a naturally occurring substance, feed composition can vary significantly by source. Base stock producers deliberately determine the best way to eliminate this variability, from the unique hydrocracking catalyst technology used, to a multi-layer quality system to ensure product integrity.

This engineering is integral to protecting lubricant integrity and is why a base stock supplier can influence critical aspects of the finished lubricant marketer's business. For instance, the compositional parameters within the crude source determine how a skilled base stocks producer processes that particular crude supply.

The amount of effort and complexity it takes to ensure lubricant marketers receive consistent, high-quality product every time exemplifies why base stocks are differentiated "engineered fluids." Multiple, complex processes are established – such as physical separation, moderate conversion catalytic hydroprocessing and high conversion catalytic hydroprocessing – to transform crude oil into a high-quality base stock that is robust and consistently suitable for use in finished lubricant formulations.

On top of that, the processes used are also adjusted in order to account for the varying base stock properties required in specific application uses.

With a majority stake in formulations and contribution between half to three-quarters of the overall finished lubricant cost, base stocks are an important component in determining the performance and commercial viability of a lubricant, and why deliberate thought and technology should go into every molecule in a formulation.

Why this matters in the end

Lubricants are used in a wide range of applications, and as a result, require a different molecular makeup with specific sets of properties for each. Both base stocks and additives play a unique role that impacts lubricant formulation performance. As a dominant part of the formulation, base stock quality and

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performance cannot be ignored. There are specific base stock performance attributes finished lubricant marketers should assess when considering its use for an application including volatility, thermal stability and oxidative stability, shear stability, and solubility.

- Lubricant base stocks exhibit different volatility levels based on their molecular structures and component distribution. As base stock viscosities are reduced, their volatility tends to increase. Higher quality base stocks have lower volatilities at lower viscosities, allowing the formulation of fuel-efficient lubricants that meet engine manufacturer's volatility requirements.
- Thermal and oxidation stability of a base stock is one of the most important properties when it comes to preventing lubricant degradation and engine failure during use. This is because the more resistant a base stock is to oxidation, the less likely it will form deposits or other destructive by products in an engine application, and the more resistant it is to undesirable viscosity increases during use.
- Shear stability of a base stock enables the fluid to stay in grade and not lose viscosity during mechanical shearing, allowing it to continue to perform as designed in the application.
- Solubility is an often-overlooked base stock attribute, especially in industrial and marine applications. The attribute is important because it helps solubilise additives used in formulating lubricants, and it also influences the dissolving of deposits that can cause equipment issues.

Choosing the right "engineered fluid" to support a finish lubricant formulation is becoming an increasingly difficult task, given the increasing complexity of meeting changing industry specifications and OEM claims.

By expanding the conversation with base stock suppliers beyond price, finished lubricant blenders can take a more calculated approach to choosing the right engineered base stock that can unlock performance and growth opportunities for their businesses.

LINK
www.ExxonMobil.com/Basestocks