# Biolubes: Hope or Hype?

After 20 years of steep investing, tireless research, enthusiastic selling and even government prodding, lubricants and greases made from biobased materials have made little headway in the market. Will biobased lubes ever break out of their tiny niche? What's holding them back? And are the seeds of change finally in place, as our August issue suggested?

To find out, *Lubes'n'Greases* staff writer Joe Beeton reached out to experts at companies big and small, and asked them two critical questions.

1) Why don't biobased lubricants seem to be earning a greater share of the lubricants market?

2) What will it take to spur wider acceptance and increased use of biolubes? Government incentives/subsidies? Less-constrictive labeling regulations? OEM approvals, better performance, price parity? Or something else ...

In this Executive Round Table, we present their thought-provoking replies to *Lubes'n'Greases* readers.

## Cost, Cold Weather Are Still Drawbacks

*Jarrett Flegel*

*Jarrett Flegel*
*President & COO*
*BOSS Lubricants*
*Calgary, Alberta, Canada*

Biobased lubricants are still challenged by their performance limitations, particularly in cold weather, and the cost to buy. Consumers feel the environmental benefit isn't attractive enough to switch from products like conventional hydraulic fluids.

Better performance, better price points, OEM endorsements, and government incentives would in fact garner higher acceptance of biobased fluids.

## Buyers Must Want Sustainability

*Chris Donaghy*
*Sales Director, Polymer Additives and Lubricants*
*Croda Inc.*
*New Castle, Del.*

The penetration of biobased lubricants has been minimal to date in the overall lubricants market. The main reason for the lack of penetration is that there has been little market or consumer pull for biobased materials outside of Europe.

*Chris Donaghy*

Customers in the lubricants market demand performance and have had little concern regarding the origin of the raw materials. Biobased is a nice-to-have feature, but cost-in-use is still the number one performance criteria that drives buying decisions. Although materials that are derived from renew-

able raw materials are used throughout the market, they are typically utilized due to their performance benefits, not because they are biobased. Biobased materials are still in certain circles wrongly considered a lower-performing product if they are marketed only for the renewable content and not their performance characteristics.

Sustainability has begun to penetrate the buying wants of consumers across many different applications. Wider use of products that have attained certification in the U.S. Department of Agriculture BioPreferred program through some type of subsidy would have a benefit in seeding the market for biobased lubricants. Increased utilization of the BioPreferred program would incentivize more manufacturers to develop biobased products but also demonstrate that biobased materials can perform in use across a wide range of applications. With established performance and increased consumer awareness of sustainability, the market for biobased materials should develop.

# I'm Looking for Leapfrog Technologies

*John Cummins*
*Vice President of Product Development and Partner*
*Hydrotex Partners*
*Farmers Branch, Texas*

*John Cummins*

Most biobased lubricants focus on using vegetable oils that have too many negative attributes to overcome. The U.S. Department of Agriculture is heavily involved in vegetable oil based lubricants to support the farmer growing oilseed crops, without looking at the real tribological requirements of the lubricant application. There are always unintended consequences originating inside the D.C. beltway. Most customers are not going to purchase or pay more for biobased lubricants simply for altruistic reasons. I think that is why there is not much market share for biobased lubes.

At Hydrotex, we have been producing a trademarked product line of "Lubricants for a Healthier Planet" for about five years now which meet our 4P Goals: Planet, People, Performance and Profitability. You need to focus on all of them!

I believe that wider acceptance and increased use of biolubes must be based on performance and profitability for both the end user and the producer; that is what spurs innovation. More government incentives, subsidies or legislative quotas only interfere with the process and lead to many wrong paths for technical achievement. We are investigating renewable chemicals, biobased synthetic base stocks and non-toxic, non-bioaccumulating advanced materials from sustainable suppliers. I'm looking for leapfrog technologies that provide performance as well as environmental stewardship.

# Products Must Deliver Value

*Tyler Housel*
*Vice President, Lexolube Division*
*Inolex Inc.*
*Philadelphia, Pa.*

As background, Inolex manufactures synthetic esters that are made from various carboxylic acids and alcohol feedstocks. Our ingredients can be bio-derived or petroleum-derived, so our esters span the entire range from 0 percent to 100 percent biobased. Therefore, we have a good feel for the benefits and struggles of biobased lubricants in our part of the world.

In the industrial era, most equipment has been lubricated with mineral oil based fluids, so machines were designed around their performance. Biobased lubricants have different performance characteristics and cannot directly replace existing fluids. As long as lubricants are expected to be backward compatible into older equipment, biobased lubricants will not have universal acceptance until the older equipment becomes obsolete.

*Tyler Housel*

Biobased lubricants have made a lot of headway in applications that require their unique and often superior performance attributes. Demand is growing for biobased lubricants because they have lower volatility, toxicity and flammability than mineral oil based products.

The characteristics of natural feedstocks are characterized by carbon chain length and unsaturation. Chemical modification

and purification removes double bonds and paraffins from mineral oil to convert API Group I to Group III. Similarly, selective breeding and fractionation techniques reduce polyunsaturates and waxes from vegetable oils. Today, very high performance biobased feedstocks are available.

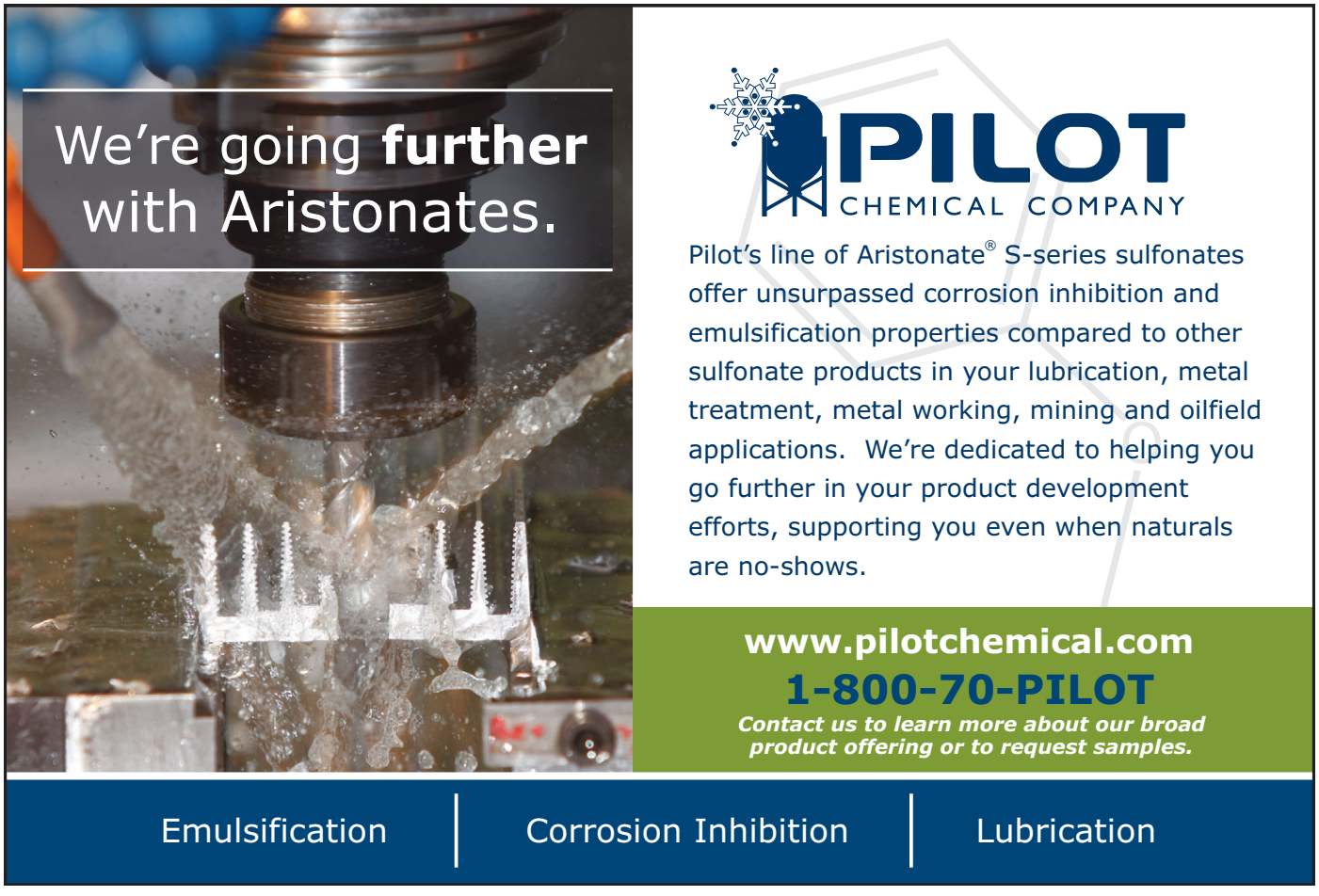
Government and consumer feel-good incentives can be an important incentive to develop biobased lubricants. However, sustainable growth in market share demands that the product delivers performance and provides an overall value to the end user. At the end of the day, no one feels good about using a bad product.

## Don't Jeopardize Future Success

*Apu Gosalia*
*Head of Global Competitive Intelligence & Chief Sustainability Officer*
*Fuchs Petrolub SE*
*Mannheim, Germany*

Despite the many drivers that propel the development and growth of biolubricants, a few restraints and challenges seem to be holding back their full-fledged success. One is the ongoing performance-and-cost debate. The old objections concerning performance — in terms of oxidation stability as well as low-temperature operating properties — can be countered with hard facts about modern biolubricants, up to biobased racing engine oils. However, those high performing lubricants are not based directly on vegetable oils but on synthetic esters. And at this stage we have to consider the cost debate: High performance esters are more expensive, especially as long as only little volumes are used. Thus, cost is a major concern as the market share for biolubricants remains small, which stops manufacturers from producing them in large volumes, which

*Apu Gosalia*



would subsequently reduce the market price of these products; vice versa, an economy of scale can be assumed.

As well, many OEMs prefer tried-and-tested lubricants from mineral oil sources; these OEMs represent the biggest consumers in the current lubricant market. When such OEMs are reluctant to use biolubricants because of performance and cost concerns, end users, who purchase products directly from these OEMs, tend to think likewise.

Another challenge is the lack of environmental awareness in different parts of the globe; for example, environmental awareness in regions such as Africa and Southeast Asia remains at a low versus mature continents such as Europe and North America. Yet even in the more developed countries we see that voluntary change to biolubes is not distinct without strict recommendations or legislation by authorities.

The prefix "bio" was originally perceived as an indication of biodegradability; a "biolubricant" is expected to biodegrade in the environment. On the other hand, the term biolubricant also strongly conveys the idea of natural origin, of the biological world. Today we often see the intentional dissemination of confusing, ambiguous or misleading information with regard to biolubes. This should be prevented in order not to jeopardize future success as well as the credibility of the industry itself.

As a first stage, it is necessary to understand the term "biobased lubricant" as well as the term "biolubricant" in both senses: containing a minimum percentage of biomass *and* biodegrading in the environment to a large extent. Claims of biodegradability should be supported by appropriate standards.

Helping to bring clarity is the European Committee for Standardization and its CEN Technical Report 16227, "Bio-lubricants — Recommendation for Terminology and Characterisation of Bio-lubricants and Bio-based Lubricants." The definition published there is an umbrella for all kinds of lubricants, comprising minimum requirements for biodegradability, toxicity and biobased content.

It also would be worthwhile studying the possibility of mandating the use of biolubricants (e.g. total-loss lubricants and hydraulic fluids) in environmentally sensitive areas, for example, via soil protection and water protection legislation. National governments and environmental organizations could work together to promote the use of biolubricants.

Another factor could be the emergence of biotech-modified renewable raw materials that have superior lubricating properties, better cost/performance ratios and could serve as the feedstock for biolubricants.


RE-REFINE
YOUR BUSINESS

ADVANTA

**It's time to take another look at the re-refined base oil advantage.**

Introducing Advanta ECO, Newalta's new brand for base oils. Inspired by the movement towards advanced sustainability, Advanta ECO is a premium quality, Group II base oil. Produced exclusively through our closed loop re-refining process, we are proud to stand by the Advanta ECO name as a quality sustainable choice for you and your customers.

**Make Advanta ECO your re-refined base oil choice for environmental and financial performance.**

AdvantaECO.com

NEWALTA

The position of OEMs in the development of biolubricants can also not be undermined as they are important consumers and thus remain an important link in the value chain of the global market.

The world market for environmentally compatible biolubricants could grow substantially within the next decade, accelerated by environmental acceptability and responsibility, renewability of natural oil and rising fuel prices, biotechnology advancements and technology collaborations and improvements. Then it may be possible for biolubricants to stand on par with mineral oil based lubricants in terms of performance and cost, plus to offer better environmental values.

*Milind Phadke*

## Limited Supply Dampens Growth

*Milind Phadke*
*Industry Manager*
*Kline & Company*
*Pune, India*
*&*
*Geeta Agashe*
*Vice President of Energy*
*Kline & Company*
*Parsippany, N.J.*

*Geeta Agashe*

We agree that biobased lubricants continue to be a niche market. There are several reasons for this situation. Biobased lubricants are generally considered expensive for the performance they deliver. For applications and markets which do not value the ease of end-of-life disposal or where other alternatives for disposal exist, biolubes do not have any advantage. And such markets and applications form the large majority of the demand.

Another factor that prevents widespread use is that supply of biolubes is quite small and can never hope to match the scale and reach of mineral or even synthetic products. That itself dampens its use. Also, these lubes are not consistently available globally which restricts their usage by the global marketers and end users. Lastly, the quality of products is not consistent.

Besides the factors *Lubes'n'Greases* mentions [OEM approvals, government incentives, etc.], greater availability, more performance data, and consumer and end-user education will help drive wider acceptance of biolubes.

## Lift Performance to Petroleum's Level

*Jeffrey Brown*
*President & CEO*
*Novvi LLC*
*Emeryville, Calif.*

*Jeffrey Brown*

Biolubricants are making headway in the market, but it may not be as fast as some desire. We have seen lots of growth but it remains a niche market. The significant reasons are performance and cost. There are very high performance synthetic ester products but they have high cost. Unfortunately many of the vegetable- or seed oil-derived biolubricants do not have the necessary performance and this has hurt the market.

Historically, biolubricants have been ester molecules. It is difficult to replace petroleum products with these if you keep the performance expectations the same. However, we believe this is changing very rapidly with the development of new base oil and biolubricant technologies.

As to spurring growth, the largest factor that we see is performance. Global base oils are more than 95 percent hydrocarbon based; until a biobased material can provide similar chemical characteristics, the market will face a challenge. At Novvi, our technology addresses this through renewable hydrocarbons, and will open the door to widespread use of biolubricants and drive down prices.

There will be a lot of new technologies entering the market in the next 10 years and we must be careful to create a supportive regulatory environment that does not promote performance-challenged biolubricants like vegetable oils over better alternatives. I would prefer to see regulations and mandates that consider the full life cycle of the product and not just the renewable source.

*Continued on page 28*

*Continued from page 26*

# Lack of Global Standards a Hindrance

*Graham Gow*
*Business Development Manager*
*Axel Christiernsson International*
*Nol, Sweden*

*Graham Gow*

In my opinion, the most significant factor restricting the widespread use of biobased greases is cost of compliance. The testing required for verification of compliance is comprehensive, and perhaps more importantly, very expensive indeed. In our particular niche of the market, some of the stipulated tests are quite simply not applicable to multiphase systems like lubricating grease.

In the absence of a global system for the classification of lubricants formulated with regard to a minimal impact on the natural environment, different systems have been adopted in different parts of the world. This causes havoc for international companies operating on a global basis where product stewardship requires identical formulations no matter where in the world they are manufactured or sold. Legislation could well be the answer but, once again, this will only help locally unless a more harmonized system is initiated.

So, progression from a fundamental and understandable drive to implement the use of biobased greases into any real market breakthrough is very slow. Bio-greases: what everyone wants, but nobody buys.

# Educate Customers and OEMs

*Bill Smith*
*Vice President, Finance & Operations*
*BioBlend Renewable Resources*
*Elk Grove Village, Ill.*

At BioBlend, we've seen significant increases in our lubricant volumes within specific segments: oil and gas drilling, hydraulic fracturing, mining, elevators, and hydraulics for mobile equipment. We have proven that the lubricants perform as well as their petroleum-based counterparts, are priced competitively, and are better for the environment. Over the years, it has seemed like we were doing missionary work, day in and day out, to educate the customers about biobased lubricants, but we're turning the corner to wider adoption. We are on the cusp of turning a niche category in the lubricants industry into one of global significance.

Having more original equipment manufacturer approvals is definitely at the top of the list when it comes to factors that will help spur global demand. A case in point for BioBlend was our OEM approval with ThyssenKrupp Elevator. We worked with them for two years to test and validate our products in their hydraulic elevators. That's an example of one customer, one product, and one application that will translate into several hundred thousand gallons annually in the U.S. alone.

*Bill Smith*

A second factor is pricing. Many of the biobased products in the industry sell at a premium of 10 to 25 percent or more over their petroleum counterparts. As individual companies and the industry grow, economies of scale come into play and that will translate into price parity with petroleum-based lubricants.

If a biobased product performs as well as its petroleum competition, is priced at or below, is renewable, is sustainable, and is biodegradable when released into the environment — you have the recipe for mass adoption in the lubricants industry.

# A Sea Change is Coming

*Bruce Marley*
*Senior Vice President, Sales and Marketing*
*Biosynthetic Technologies*
*Irvine, Calif.*

With the advent of highly functional synthetic oils engineered from bio sources (biosynthetic base oils) that eliminate the

*Continued on page 30*

*Continued from page 28*

inherent deficiencies of vegetable oils in oxidative stability, thermal stability, pour point and other key performance metrics, we are seeing tremendous interest in these products. Lubricant manufacturers now have the tools to exceed their customers' performance requirements, while also offering a more environmentally friendly product line.

***Bruce Marley***

In this category, Estolide base oil made by Biosynthetic Technologies is quickly becoming a key component to several fully certified, biosynthetic lubricant formulations, including passenger car motor oil. These oils are dispelling the perception that products derived from bio sources such as vegetable oils are not capable of competing with the highest quality synthetic base oils. Further driving interest is the fact that these base oils can be made and sold at a lower price points than most API Group IV and Group V base oils.

The key drivers to any new product category are price and performance. With price-competitive biosynthetic base oils that exhibit excellent environmental properties and exceptional technical performance becoming available, the penetration of biobased products into the lubricants sector will be rapid.

Further ... the availability of biosynthetic base oils now gives legislators and regulators the ability to [require] the use of environmentally acceptable lubricants (EALs). For example, in March 2013, the U.S. Environmental Protection Agency issued its Vessel General Permit rule, which requires all ships operating in U.S. waters to use EALs in all oil-to-sea interfaces. In June, the USDA added biobased motor oil to the BioPreferred program list of products to which government agencies and contractors are required to give preference in purchasing. Finally, we know that several U.S. states ... are developing legislation and regulations that will require the use of more environmentally friendly biosynthetic base oils in lubricant formulations. All of this combined will certainly cause a "sea change" in the lubricants sector in coming years.

Feige
FILLING
A HAVER Brand

TYPE 81-86

Automatic
Drum Fillers

• Automatic Opening, Closing & Sealing
• Stainless Steel & Acid Protection
• 255 Filling Parameters
• Up to 120 Drums/Hour
• Conveying & Palletizing

HAVER FILLING SYSTEMS, INC.
1-888-96-HAVER
info@haverusa.com
www.haverusa.com

Automatic
Drum Fillers

TYPE 84

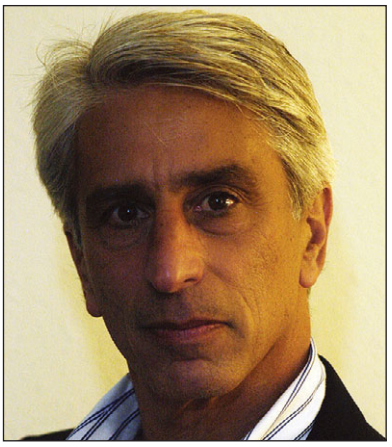
Our Industries:
• Automotive Oils • Industrial Oils • Process Oils
• Greases • Metalworking Fluids • Food-Grade Lubricants

# "Once Bitten, Twice Shy"

*Mark E. Miller*
*Executive Vice President*
*RSC Bio Solutions/Terresolve Technologies*
*Mentor, Ohio*

There are several reasons biobased products are not making as much headway as they should. First, there have been and still are many underperforming products that have failed in application. People and industry remember these failures — "once bitten, twice shy," as the saying goes. Second, in the industrial sector there is extreme resistance to change. No one has ever been fired for maintaining the status quo. Third, thus far biobased lubricant developers have been unable to achieve the performance required for every application.

Fourth and finally, there is no advantage in using a biobased product from a spill-and-clean-up perspective. Notwithstanding, oil is oil and subject to the same clean up and fines. A release of biobased lubricant requires the same costly initial response as if it were petroleum based.



*Mark E. Miller*

To move forward, the first step would be legislative differentiation for spill clean up based on environmental specifications. (There does exist the Edible Oil Act but it doesn't help; all it says essentially is that federal agencies must evaluate edible oils separately from non-edible oils — but does not stipulate how.)

For the future prospects, any meaningful form of legislation would be helpful. The USDA BioPreferred program, to the best of my knowledge, has had little to no impact. Finally, improved performance and proper application of products are needed. ▮