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FAST & FORWARD

ISSUE 3

Insights and innovations to help you accelerate performance

LUBE-TECH™
Accelerating Performance

IN THIS SPOTLIGHT

IN THIS ISSUE:

The Edge of Biofuel Viability

As the industry shifts to blended fuels and biofuels, usage concerns arise

By Todd Matvick, Technology Director at Lube-Tech

Reducing petroleum-based fuel consumption

Blending gasoline with ethanol and petroleum diesel with biodiesel seems like a great idea — and, for the most part, E10 ethanol-blended fuel and biodiesel have been a success. These fuels are intended to reduce the overall use of petroleum-based fuel and, theoretically, our dependence on foreign oil. But, speaking strictly from a fuel viability standpoint, there comes a point of diminishing returns regarding ethanol-blended fuels and biodiesel. Despite the Environmental Protection Agency's (EPA) ever-expanding approvals for biodiesel use and government quotas for ethanol use, small-percentage blends are proving to be more efficient and user friendly.

In June of 2012, the EPA approved E15 for sale at gas stations and for use in all model year 2001 and newer cars, light-duty trucks, medium-duty passenger vehicles (SUVs) and all flex-fuel vehicles. This group of approved vehicles accounts for more than 75% of the cars and trucks on the road today. Based on current prices, E15 will likely be sold at a discount to both E10 ethanol blends and non-ethanol gasoline. But as the ratio of ethanol rises, so too do concerns that outweigh its lower pump price.

Ethanol raises corrosion concerns

Ethanol is mildly corrosive. Most issues regarding its use in today's cars have been resolved with alternative materials for the hoses and gaskets in the fuel system. The larger problem is ethanol is hygroscopic (soluble in water), so it has a tendency to collect water. Not only is water corrosive (more so than pure ethanol), but when it combines with ethanol, it creates a perfect environment for acetobater, a type of acetic acid bacteria. Acetic acid is highly corrosive and can damage fuel system components.

The shelf life for ethanol-blended fuel is roughly three months. When a tank is being filled every few days such as in a commuter car, there's little worry because new fuel is continually being cycled through the system. However, in machines that see intermittent use, such as outdoor power equipment and seasonal powersports vehicles, this water/acetic acid combination can do severe damage to the fuel system.

Ethanol is not as efficient as gasoline

Another problem with ethanol is that it doesn't contain as much energy as gasoline, so it takes more of it to propel a car down the road or power motorized equipment. In fact, ethanol blends greater than 10% are proving more difficult to integrate into use. So, while E10, E15 or E85 may be cheaper per gallon, you will need more of it to go the same distance you would on a tank of straight gas. In other words, your miles per gallon will go down — typically 2% to 3% for E10, 4% to 6% for E15 and 25% to 30% for E85. And this mileage trade-off is often not offset by the cheaper price at the pump.

There are also fears of drivers misfueling vehicles with E15 or E85. While the EPA has mandated that warning labels be placed on pumps dispensing E15, the low price per gallon may lead to price-conscious drivers of vehicles not approved for E15 use to grab the cheapest pump handle without realizing the risks.

The emergence of biodiesel

Dovetailing with ethanol, biodiesel has made inroads into the diesel fuel market. Made from animal fats, agricultural fats, recycled cooking oil and soybean oil, biodiesel is made through a process called transesterification, in which esters and glycerin are separated, and it is the esters that get used as fuel. It's typically used in blends from 2% to 20%, but a 5% blend has been accepted by all major diesel engine manufacturers.

Like ethanol blends, biodiesel is known and identified by its percentage. So, for example, B20 is 20% biodiesel and 80% petroleum diesel. Biodiesel burns cleaner than petroleum diesel and is said to reduce greenhouse gas emissions anywhere from 57% to 86% compared to petroleum diesel. However, biodiesel is actually worse when it comes to some emissions such as particulate matter, which is more harmful to humans.

As with ethanol-blended gasoline, using biodiesel in a system designed to run 100% petroleum diesel has its hang-ups. While biodiesel doesn't harm the fuel system like ethanol can, it does have a solvent effect and can clog fuel filters upon initial use. Biodiesel also has not proven as temperature stable as petroleum diesel and, in colder climates, can gel quicker (at -40° a B20 blend becomes a solid). Other problems are availability and engine durability. Biodiesel is available on a limited scale at this time, and the jury is still out on the long-term effects of using biodiesel on some diesel engines.

Biofuel use today in the United States

Today, ethanol is blended into 70% of the gasoline sold in the United States. EPA mandates do not require any specific ethanol blend to be sold, rather they call for a specific amount of ethanol to be sold in each state. Any blend of fuel (E10, E15/E85 and E20) can be sold to meet this quota. In 2008, Minnesota was one of three states to mandate the use of ethanol-blended fuels. But as the industry tries to move beyond E10, there has been push-back regarding E15, mainly in the area of powersports, where currently no motorcycles, ATVs, boats or snowmobiles are on the "approved for use" list.

As for biodiesel, on average, the United States uses 40 billion gallons of diesel per year, while in 2012, 1.1 billion gallons of biodiesel were produced nationally. Minnesota is a leader in transitioning to this new fuel and has mandated its use in the state. By 2015, all diesel sold in Minnesota from April through October will have to be B20.

Are E15/E85 and biodiesel the next step in the progression of renewable biofuels? For the most part, the science and the facts would say no, but only time will tell.

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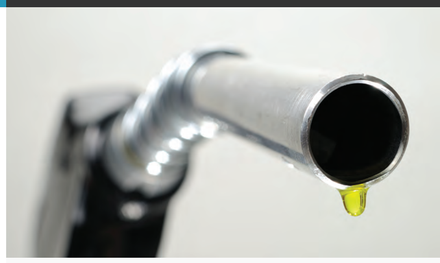
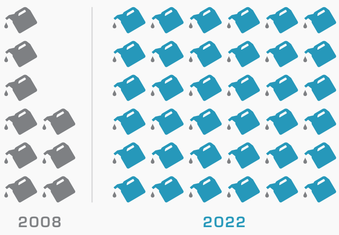


RENEWABLE FUEL STANDARDS



GALLONS OF ETHANOL USE PER STATE (IN BILLIONS)

ETHANOL FAST FACTS

1 GAL = 26+ LBS

1 gallon = 26.1 pounds of corn

One acre of land yields about 7,110 pounds of corn, which can be processed into 328 gallons of ethanol.

It can come from corn, sugar cane or cellulose.

The Ford Model T was the first flex-fuel vehicle.

Produced from 1908 to 1927, it was capable of running on gasoline, ethanol or a mix of both.

When to Go Synthetic

When you look at the benefits, the choice is clear

By Todd Matvick, Technology Director at Lube-Tech

In the life of an engine oil formulator, the decision of when to go synthetic is determined by the performance requirements of the lubricant balanced with the cost the market will bear. For consumers, choosing whether or not to purchase synthetic engine oil involves a similar thought process. Of course, you want to buy the best lubricant for your vehicle, but you have to find a balance between performance and cost as well.

The benefits of synthetic oils

The main component of engine oil is base stock — often greater than 90% of the formulation. Synthetic base stock consists of engineered molecules that exhibit the same beneficial traits of engine oil. They are the result of closely monitored chemical reactions that produce a molecule that has:

- Superior cold temperature flow characteristics
- Superior high temperature lubrication properties
- Increased thermal breakdown resistance

Illustrating the differences

Picture a jar full of marbles and a jar full of rocks of a similar size. The marbles represent a synthetic lubricant — they are smooth and uniform; they pour out of the jar easily; and you can stick your hand into them with little resistance. The rocks represent conventional oil — they are not uniform; they don't pour well; and it's difficult to stick your hand into them because they do not move as easily against one another.

Now, imagine this on a microscopic scale inside your car's engine. You can begin to understand the difference between synthetic and non-synthetic engine oils.

Advantages depend on application

Strictly from a quality of lubrication standpoint, synthetic oil is better than mineral oil. However, it can prove more effective in certain applications. For example, a 1996 Honda probably won't benefit from putting synthetic oil in the engine. But a more modern engine that's designed to perform at higher levels, such as a turbocharged Ford Ecoboost, is a perfect candidate for a premium synthetic oil.

Ford's Ecoboost is just one example of how today's automotive engines run hotter, burn leaner and are built to more precise tolerances than those of even 10 years ago. Proper lubrication is critical, and the role oil plays in engine cooling continues to grow as technologies advance. Without a doubt, synthetics are the best oil choice for the majority of modern automobiles. In fact, most new cars leave the factory with at least a synthetic oil blend, if not a full synthetic, in the crankcase.

The benefits outweigh the costs

Synthetics may cost more up front, but that cost is offset with longer oil change intervals. This, combined with their superior lubrication qualities, can make synthetic lubricants the best choice for budget, performance and overall cost of ownership. The next time you are deciding between a synthetic and conventional oil, you can rest assured knowing that a synthetic will provide strong value for your hard-earned money.

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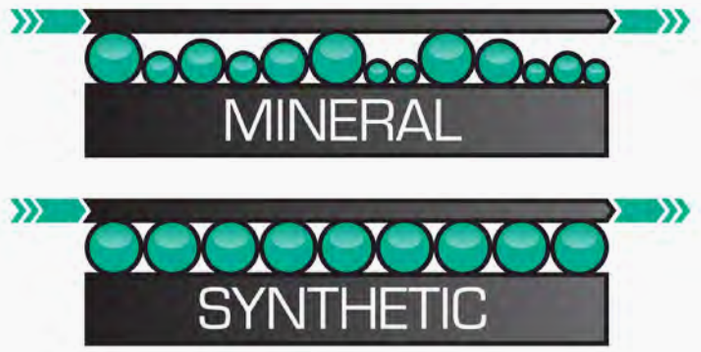

Synthetic lubricants provide far more consistent lubrication compared to mineral oils due to increased uniformity in molecular structure.

"Synthetic lubricants are the best choice for budget, performance and overall cost of ownership."

The Advent of Flexible Packaging for Lubricants

Can applesauce to-go pouches inspire new lubricant packaging?

By Brad Van Gelder, Director of Supply Chain Operations at Lube-Tech

Bringing innovation to market

Last year, Lube-Tech teamed up with Glenroy Packaging to introduce the first flexible stand-up oil pouch in the United States powersports industry. Packaging of this type has been around for decades, but it has only recently begun to replace traditional rigid containers for common consumer items, such as applesauce, soup and, of course, engine lubricants.

Advantages of pouch packaging

Consumer foods companies are discovering that flexible packaging saves time, space and money, and offers a greater opportunity to get the message out about their product. With lubricants, flexible packaging offers a number of benefits over the industry-standard, blow-molded plastic bottles.

- **Pouches offer more real estate to display product messaging:** The Arctic Cat CTEC-2 pouch, for example, has almost 700% more space than a standard plastic quart-type bottle.
- **Pouches require less energy to produce and take up less space in landfills:** Since they contain oil, used blow-molded plastic bottles can't be recycled.
- **Pouches have a higher product-to-package ratio:** Overall, a pouch contains less material than a bottle.
- **Empty pouches require less space to ship, saving trucking costs:** One truckload of quart-sized pouches can be the equivalent of 26 truckloads of one-quart plastic bottles.
- **Lubricant pouches are tough:** Many pouches have been drop-tested and proven to not rupture from drops of up to 20 feet.

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The global flexible packaging market is expected to grow at a compound annual rate of

4.95%

from 2014 to 2018.

Pouches can be tailored to suit any lubricant product and be produced in virtually any size, shape and volume.

The State of the Market

Here's your roundup of recent market activity

By Brooke Sunde, Commodity Sourcing Manager at Lube-Tech

Base oil prices drop

Despite all reports describing the market as being balanced, Motiva announced a $.25 to $.30 per gallon decrease on its base oils in early January, the first since August. On the heels of Motiva's decrease, the remainder of the market has followed with base oil price drops across most grades.

Expect more stability going forward

The market was generally confused by the price declines, given the current thin margins and high production costs. Crude pricing has been volatile, and there were continued complaints of low margins from suppliers, though Motiva is entering a turnaround. January's typical slow demand, combined with the ever-looming presence of the Chevron Pascagoula startup, was the source of the movement. It's believed that Chevron's increased base oil production will maintain downward pressure on pricing this year.

As we headed into February, attention was focused on margins and base oil feedstock costs. VGO (vacuum gas oil), a key base oil input cost, has been hovering around $3.00 per gallon, which was interesting as some base oil grades were selling for the same price. Refineries are rumored to only be producing enough product to cover contractual needs at the current pricing levels, while the spot market remains dry. With the recent bout of freezing temperatures and winter storms in the Midwest and Northeastern United States causing diesel and heating oil prices to rise, refineries will likely focus on more lucrative, non-base oil products.

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BASE OIL DECREASE SUMMARY

GI BASIC MINERAL BASE STOCKS:

$.10–$.14

per gallon decrease by ExxonMobil, Paulsboro, Calumet and HollyFrontier

GII HIGH-QUALITY MINERAL BASE STOCKS:

$.13–$.30

per gallon decrease by Motiva, Conoco, Flint Hills, Chevron and Calumet

GIII SYNTHETIC BASE STOCKS:

$.25

per gallon decrease on all grades by SK Lubricants and Conoco

How Often Should I Change My Oil?

Save time and money when you think beyond the 3,000-mile rule

By Bob Palmgren, Automotive Business Manager at Lube-Tech

General Motors tested the first Oil Life Monitoring system 20 years ago. This pioneering engine management system monitored combustion chamber events, moisture and crankcase temperature to track the life of the engine's oil. Today, engine oil life monitors are common in all types and brands of cars, and what they reveal is interesting. Not only does a car's engine oil last far longer than the accepted 3,000-mile mark we're all so used to, it goes way beyond it — sometimes even beyond the car's own recommended oil change interval.

Emission standards are driving longer intervals

Cars today have to meet far stricter emissions standards so they burn leaner, run hotter and are built with much tighter tolerances. Fuels and engine oils have also become more advanced to meet the needs of these newer, higher-tech engines. Oil change intervals for most new cars fall somewhere in the 5,000–7,500-mile range with some even topping out at 10,000 miles. Even major quick-lube places that base their business on keeping people coming back for frequent oil changes have backed off their 3,000-mile change interval.

Quick tips about automotive oil

Here are a few things you need to know about oil change intervals for your car or truck:

- Follow the recommended oil change guidelines in your owner's manual. The carmaker wouldn't recommend oil changes at 7,500 miles if it was bad for the car.
- Synthetic oil costs more yet lasts longer, so your total cost is typically the same or less than conventional oil.
- Changing oil at 7,500 miles rather than 3,000 miles reduces waste by 33%.
- The average American drives 12,000 miles per year.

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5W-30

WINTER

A multi-grade oil rating tells you both hot and cold viscosities. The **"W"** stands for **"Winter"** and represents the oil's rate of flow when cold.

Even many quick-lube places are backing off the 3,000 mile oil change rule, simply recommending that as the service interval.

Giving Back to Caregivers

Lube-Tech volunteers work Children's Cancer Research Fund dinner

By Jenny Phyle, Events & Programs Coordinator at CCRF

A few times per year, Lube-Tech, a proud Mission Partner of Children's Cancer Research Fund (CCRF), enlists volunteers to help serve food at CCRF's Monthly Dinner Program at the University of Minnesota Amplatz Children's Hospital in Minneapolis. On the second Tuesday of every month, pediatric patients and their families are treated to a complimentary meal, provided by CRAVE Catering, and served by volunteers of CCRF.

A rewarding experience for all

This program was started because parents and other caregivers often feel reluctant to leave the hospital to do anything, even to get a quick meal. The Monthly Dinner Program allows parents and caregivers to stay in the building and eat a delicious, nutritious meal with their child.

The latest CCRF dinner took place Tuesday evening, January 14. Lube-Tech volunteers included Brooke Sunde, Tom Maddox, Robert Bauer, Tonny Heideman, Laurie Reddie, Boris Mahlich, Dave Hayner, Jon Hayner, Joy Tienter and Ka Lee. Lindsey Radcliff also volunteered but wasn't able to attend.

"Lube-Tech volunteers come ready and willing to help with anything, and always with smiles and a good attitude," said Jenny Phyle, Events & Programs Coordinator for CCRF. "I have seen first-hand how this has been appreciated by families being served dinner. Children's Cancer Research Fund thanks Lube-Tech for their unwavering support of our mission."

Leading the way to a cure

Based in the Twin Cities, CCRF is a generous supporter of the Pediatric Cancer Epidemiology Research Program at the U of M, which is internationally recognized as one of the top research programs in the world investigating childhood cancer. It also provides the U of M Cancer Center with funds for exploring new and promising research areas. Every dollar CCRF provides for cancer research generates $15 to $20 in national grant funding.

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Lube-Tech team members were all smiles during their volunteering.

> "Lube-Tech volunteers come ready and willing to help with anything, and always with smiles and a good attitude."
>
> *Jenny Phyle*
> *Events & Programs Coordinator, CCRF*