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CENTRAL PETROLEUM COMPANY
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Happy Thanksgiving

Paul T. Webster III

This Thanksgiving there is much we can all be thankful for. Our Country is still showing positive signs of recovering from the last recession. Our troops worn out from repeated deployments are hopefully coming home soon. Everything considered, many of our customers are having better yields than projected while others are actually approaching record yields.

Currently Central is showing another yearly increase in both incoming and shipped dollar sales. While crude oil continues its wave action of repeated up and down pricing, the extreme price peaks from past years have eased allowing for more price stability in the market place.

Having the best Quality products possible still positions the company and its independent sales people to help their customers achieve the maximum return on their expensive equipment by consistently reducing down time and extending equipment life.

We can all be proud of the fact that our products are American made and our American workers are still dedicated to producing superior products that save fuel and our customers' money.

I would like to thank everyone involved with our organization for making our 102nd year potentially our biggest and best year ever.

Less Heat Equals Better Fuel Efficiency

By Blaine Ballentine

We have heard time after time that Cen-Pe-Co lubricants lower temperatures in gear boxes and hydraulic systems. We know what relates directly to longer component live, longer hose and seal life, longer fluid life, and more efficient operation. It also confirms fuel savings.

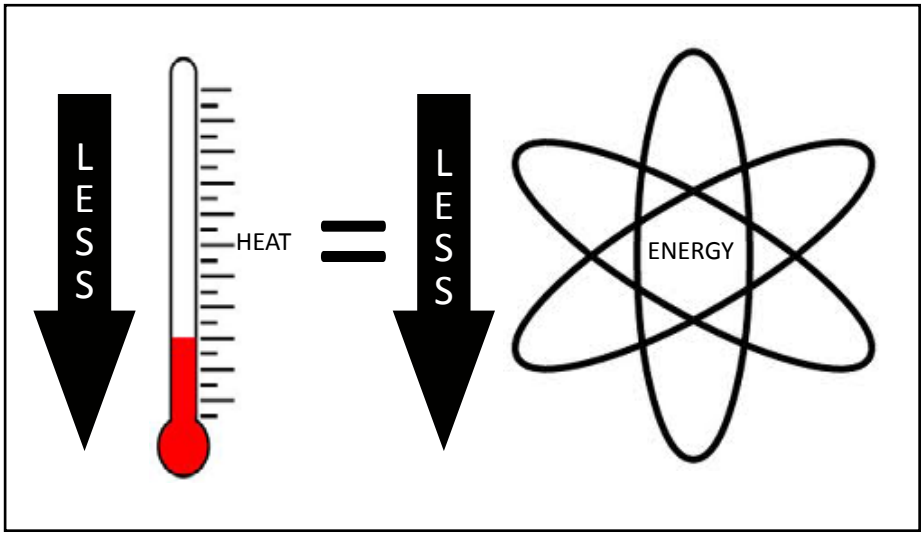
SCIENCE CLASS

Remember the science teacher that said, "Energy is neither created nor destroyed, it just changes form." In physics, it is called the Law of Conservation of Energy.

We can use this law to show improved fuel efficiency.

MECHANICAL LOSSES

Horsepower at the flywheel is higher than horsepower at the wheels due to friction. In really rough numbers, you can figure a 15% loss in a rear wheel drive car and a 10% loss in a front wheel drive car.



We know from the Law on Conservation of Energy that the power is not really lost, it just changed forms. The loss in power at the wheels is found in overcoming friction and producing heat in the transmission and differential.

We can reduce this to a simple equation:

Input Energy - Friction - Heat = Output Energy

In gearboxes and hydraulic systems, heat comes from friction. So, a reduction in one means a reduction in the other. So, we can rearrange the equation above as:

Lower Temperature = Better Energy Efficiency

If input energy is held constant and a lubricant change reduces heat energy, output energy is increased. Conversely, if output energy remains the same and a lubricant change reduces heat, less input energy was used. Either way, lower gearbox or hydraulic system temperatures are a demonstration of energy savings. Depending on the unit, the energy being saved may be diesel fuel, gasoline, electricity, etc.

It is difficult, almost impossible, to measure a change in fuel economy from a change in drive train lubrication. However, temperature is relatively easy to measure and a lot of heavy duty trucks have temperature gauges for the differentials right on the dashboard. Lower temperature means fuel savings.

Proponents of low viscosity oils or synthetic oils do not get to argue fuel savings because of less drag. This is straight forward physics—lower drive train or hydraulic temperatures under the same conditions mean better fuel efficiency.

CONCLUSION

The next time a client tells you that Cen-Pe-Co hydraulic oil, transmission fluid, gear lube, or grease made his hydraulic system, transmission, differential, industrial gear box or bearings run cooler go ahead and point out the obvious. He is getting longer component life, hose life, and seal life. Then explain that lower temperatures are a direct measurement of better fuel efficiency.

Diesel Fuel Update

We are a few years into Ultra Low Sulfur Diesel fuel, and the changes to equipment that made it necessary. Let us take a look at fuel quality today and what we have learned.

Quality

Infineum recently published data from a Worldwide Winter Diesel Fuel Survey 2012[1]. Fuels from the Midwest were nearly always within U.S. requirements for lubricity, sulfur content, viscosity cetane, and distillation.

In other words, refiners did a good job of meeting their legal obligations. However, that does not mean the fuel was problem free or that the fuel is what engine manufacturers recommended.

Cold Filter Plugging Point (CFPP) averaged -9° F with a range of -43° to 20° F. CFPP is a measure of winter operability, and the average fuel was not adequate to deal with the coldest winter days. That is the reason we heard reports of gelled fuel among those that were not using our fuel additives.

The minimum cetane requirement in the U.S. is 40. The average cetane in the survey was 47 with a range of 41 to 55. This sounds great, until you consider the cetane level on other countries and what the engine manufacturers recommend.

Engine manufacturers from around the world laid out their fuel specification recommendations for their engines in the Worldwide Fuel Charter[2]. Since it is worldwide, and some countries are further developed than others, they divided their recommendations into five categories, depending on the level of emissions requirements.

The minimum cetane recommendation for markets with no emissions controls is 48. Minimum cetane recommendations increase with the level of emissions equipment. The minimum cetane recommendation for markets like the United States with advanced emission controls, including after-treatment for nitrogen oxides (diesel exhaust fluid) and particulate matter (diesel particulate filter), is 55.

Although most diesel fuels comfortably meet specifications, when the average cetane is 47 and the need is 55, the Midwest offers a huge opportunity for cetane improving additives.

Cleanliness

Of course, quality is always relative to need. Needs have changed because equipment has changed.

Old diesel engines may have injection systems that operate at 3,000 PSI. Engines built 10 to 15 years ago typically had injection pressures of 10,000 to 15,000 PSI. Today, injection system pressures of 30,000 PSI are routine[3].

Then there are the nozzles themselves. Today's injectors spray fuel through holes as small in diameter as a human hair[4].

The injectors fire five to ten times per combustion cycle, so they are less tolerant of deposits, wear out more quickly, and are more expensive to replace.

Needless to say, the tolerances and need for cleanliness are much greater when injection pressures are increased by a factor of 10 and nozzle holes are a fraction of their predecessors'. Much tighter filters are needed, which are more prone to plugging from debris or cold fuel.

Ultra Low Sulfur Diesel fuels seem to be working against us from a cleanliness standpoint. Water is more of a problem, corrosion is more prevalent, and infestations with bacteria are more frequent.

Biodiesel

The National Renewable Energy Laboratory released results earlier this year of a survey of biodiesel samples tested in 2011 and 2012. The results showed 95% of the samples met ASTM D6751 specifications[5].

This is a big improvement over a few years ago. In 2006 only 40% of biodiesel samples met specifications[6].

Even so, one out of every 20 biodiesel samples being out of spec is not an impressive result.

Even when biodiesel is within specifications, it is less stable than diesel fuel. According to John Deere Power Systems' senior fluids engineer, Brian Schmidt, biodiesel blends have relatively short shelf lives, perhaps two to three months, compared with 6 to 12 months for conventional diesel fuel[7].

When biodiesel breaks down, or oxidizes, it forms gums and acids that can lead to filter plugging, injector nozzle coking, and injector corrosion[8].

Cold Filter Plugging

Everyone knows biodiesel blends are more likely to cause filter plugging in cold weather, but here is why. North American ULSD typically contains 2 to 2½ % paraffin wax that can fall out in cold temperatures and plug filters[9]. Depending on its source, biodiesel blended into the fuel at 5% can add an additional 2½% wax. B5 can have twice the wax content as the base fuel to which the biodiesel was added.

Biodiesel Impurities

Oils and fats are converted into biodiesel to remove glycerides. Unfortunately, they are not always removed completely. At single digit temperatures, glycerides fall out of solution and plug filters[10].

Phosphorus, sodium, potassium, calcium, and/or magnesium are used as catalysts in making biodiesel, and some of those metals find their way into the finished fuel. They leave ash behind after the fuel is burned. Therefore, when biodiesel blends are used, it may necessitate more frequent cleaning of diesel particulate filters[11].

Crankcase Effects

Biodiesel is different than petroleum diesel fuel. These differences not only affect the fuel system, but also the crankcase[12,13].

Fuel dilution of the engine oil occurs when liquid fuel makes it to the crankcase, such as after start-up and during idling. A worst-case scenario for fuel dilution is a light duty engine that does not have a separate injector in the exhaust pipe to regenerate the DPF. During regeneration, a significant amount of fuel can wash down the cylinder and be dragged into the crankcase by the rings.

Fuel dilution is usually not a big deal. Diesel fuel generally vapors off under heat, having little effect on the oil

Biodiesel can be another matter, because it is less volatile than diesel fuel. . Because of its lower volatility, biodiesel does not simply vapor off. It tends to accumulate and thin the oil. With time and heat it breaks down, leaving contaminants which tie up some of the oil's detergents

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and dispersants.

Even the relatively small amount of biodiesel used in biodiesel blends have crankcase effects that vary with the level of biodiesel in the blend. The worst-case engines mentioned above should not run biodiesel levels above B5[14].

As biodiesel and its degradation products build up in the crankcase it causes piston deposits, sludge, and wear[15,16,17,18]. It can also affect the oil's pour point, turning a 15W-40 into a 20W-40[19]. This does not sound like a big deal, but if the oil forms a gel structure that allows starting, but does not allow the oil to feed the pump, a catastrophic failure can occur in cold weather.

Testing with B20 has shown reduced TBN, increased TAN, higher piston deposits, increased oxidation, and additional wear of lead, copper and tin.

It is not hard to connect the dots. Biodiesel builds up and then degrades in the crankcase, creating acids and insolubles. The acids increase corrosive wear and the insolubles overwhelm the dispersants, causing deposits and mechanical wear.

The fix is simple. Use a high quality oil with additional detergents or dispersants and change it more often. That is why John Deere recommends reducing drain intervals by 50% when using biodiesel blends greater than B20[20].

Cat "strongly recommends" oil analysis for engines using biodiesel blends up to B20, and "requires" oil analysis for blends above B20[21]. Cat also "strongly recommends" using Cat Diesel Fuel Conditioner for biodiesel blends to control fuel system deposits, although we recommend an alternative.

Oil quality makes a difference in an oil's ability to resist the effects of biodiesel. Biodiesel compatibility was originally included in the upcoming API diesel engine oil specification, but it has been dropped due to constraints of time and funding[22].

Fuel Additive Help

Fuel additives can help alleviate most of the issues mentioned above. Although additives are no substitute for good tank hygiene, Cen-Pe-Co fuel additives reduce filter plugging. Heat or time cause insolubles to fall out of fuel. The dispersants and anti-oxidants in our additives make the fuel more stable. This reduces solids, whether they arise from the heat of the injection system, or periods of storage.

Cen-Pe-Co additives also help separate water. If condensation occurs, they prevent rust below the surface of the water and in the head space above the fuel level in the tank.

Cen-Pe-Co additives give microbes a less comfortable environment in which to grow and reproduce. Therefore, customers that use our additives consistently have fewer problems with bacteria, algae, and other microbial slimes that plug filters.

Cen-Pe-Co anti-gel additives improve the cold flow properties of diesel fuel and biodiesel blends, allowing equipment to operate at lower temperatures.

Cen-Pe-Co cetane improving additives improve diesel combustion, saving fuel and improving power.

The newer fuels and equipment are different, giving us some challenges, but the challenges can be managed and Cen-Pe-Co additives can help.

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Personal Experience

A couple of years ago, a British car owner (the owner was British, not the car) found me on the internet and emailed me a copy of an oil analysis. He was not really sure what the numbers meant, and asked for my help.

The vehicle was a new diesel car that used in-cylinder late post-injection to regenerate the DPF. The owner used B5, which was the leanest biodiesel blend available due to environmental regulations.

The analysis was at about 5,000 kilometers, or 3,100 miles. The SAE 5W-30 engine oil had diluted down to the middle of the SAE 20 grade. The dealer was providing the first oil changes at no charge and told his customer to continue running the oil to the scheduled drain at about 10,000 km. Needless to say, I recommended an immediate oil change, even if the owner had to pay for it.

The owner explained that he had the analysis run because he heard that biodiesel could build up in the crankcase during regeneration. Obviously, he heard right.

-Blaine