

FAST & FORWARD

ISSUE
7

Insights and innovations to help you accelerate performance



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IN THE SPOTLIGHT

New Diesel Engine Oil Specs on the Horizon

By Todd Matvick, Technology Director at Lube-Tech

Modern diesel engines are facing ever-increasing emissions and fuel efficiency regulations. In 2010, the National Highway Traffic Safety Administration and the Environmental Protection Agency introduced new regulations intended to reduce greenhouse gas emissions and set fuel economy numbers for medium and heavy-duty diesel engines. The regulations place new demands on diesel engine oils that are addressed in the new API PC11 diesel engine oil.

The current API CJ-4 spec oil was introduced in October, 2006, and is scheduled to be superseded by PC-11 in March 2017. The proposed PC-11 spec blend (PC stands for Proposed Category) is set to offer diesel users advantages over the current API CJ-4 spec. The new spec oil will address fuel economy and Greenhouse Gas Emissions, and will also offer improved oxidation stability, catalyst compliance, resistance to aeration, shear stability and compatibility with biodiesel fuel.

Improved fuel economy with PC-11 will come as a result of using lower viscosity blends, likely 10W-30, replacing the standard 15W-40. Reduced ZDDP, from 1200 ppm phosphorous to 800 ppm phosphorous, will result in reduced greenhouse gas emissions and longer catalyst life.

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PC-11A will be called API CK-4. It will replace API CJ-4 and is expected to be fully back serviceable with no changes to current viscosity minimums. PC-11B will be called API FA-4 to be distinctly different than current API claims.

OTHER RESOURCES:

Shell Rotella has put together a web site which gives a comprehensive overview of PC-11:
<http://www.whatispc-11.com/>

However, manufacturers and diesel fleet operators have concerns. Marketers and additive companies still have many unknowns, such as viscosity grade read across guidelines and base oil interchange. There's also the concern over back serviceability and there are doubts that the proposed PC-11 spec will work in older diesel engines that produce more soot. Ford has already presented information that PC-11 spec blend, which calls for reduced phosphorous (800 ppm) did not perform well in a 6.7-liter engine calling for API CJ-4. For the first time we may see an API CJ-spec that is not back serviceable. As a result, it is likely there will be an A and B final spec for on-road applications, with one intended for use in older engines.

The NHTSA regulations are only for on-highway applications, so it is also possible we could see separate PC-11 blends for on-highway and off-highway use with the off-highway likely staying as a 15W-40. This would quell some of the back serviceability concerns for off-highway applications. Many OEMs will not be recommending any PC-11 blend for off-highway use, so user education will be important in preventing mis-application here and in many other diesel applications.

MARKET WATCH



Low Crude Prices Keep Market Fairly Stable

By Brooke Sunde, Commodity Sourcing Manager at Lube-Tech

Crude has been hovering around the \$60 per barrel mark since May, heavy viscosity products continue to be tight across the board and several increases were announced. The GI market moved upwards by \$0.10 per gallon on heavy 500SN+ grades (including Bright Stock) and heavy grade naphthenics saw increases due to tightness in the market. Heavy naphthenic base stocks are used

in the production of tires, which is said to be in an upswing on seasonal demand. GII marketers announced a \$.17 - \$.19 per gallon increase on the heavy 600N, while one supplier announced a \$.10 per gallon decrease on their light 110N cut. GIII's are considered balanced and remain stable.

A June LNG Base Oil report summed up the current market: "The increases on the heavy-viscosity cuts were largely driven by a tight supply and demand balance and firm crude prices. In some cases, utilizing feedstocks for fuel products proved to be more lucrative than manufacturing base oils, and many base oil plants have not been running at full capacity. Volatile crude oil values and expectations that crude would continue to hover close to current price levels in coming weeks also helped fuel base stock increases."

The combination of higher seasonal demand, strengthening crude prices and a cutback in throughput at some base oil refineries has put upward pressure on pricing. Prices typically go up this time of year, if not a little sooner, but low crude prices have kept drastic increases at bay.

HEAVY NAPHTHENIC BASE STOCKS ARE USED IN THE PRODUCTION OF TIRES, WHICH IS SAID TO BE IN AN UPSWING ON SEASONAL DEMAND.

Metal Forming Fluids, Additives, Trends and New Technology

Evolving Processes and Regulations Dictate Direction



 By Andy Ellinghausen, Product & Business Development Manager at Lube-Tech

The term metal forming includes a diverse variety of manufacturing processes and applications. This can include the use of one ton mechanical presses down to wire drawing processes. All of these come down to moving metal into a desired geometry. Metal is plastically deformed through force applied that will exceed the yield strength of the metal itself. During this deformation process, friction and heat are generated. The challenge in formulating fluids for metal forming is not to work against heat and friction, but to work with them. The primary functions of removal fluids are::

- **Lubricate:** Reduce friction and wear, thus improving tool life and reducing forces and energy consumption.
- **Cool:** Cool the forming zone, reducing temperature and distortion.
- **Wash:** Clear debris away from the forming zone and dies
- **Protect:** Prevent corrosion on newly-machined surfaces.

All this is done through a precise balance of base fluid and additives to produce fluids with the desired characteristics to apply to each particular process.

BASE FLUIDS

Metal forming fluids can use mineral base stocks, synthetic or renewable base stocks derived from seeds or vegetables. A few decades ago, water-based synthetic lubricants gained favor in the metal forming process. They were environmentally-friendly and reduced costs in post-process. They represented an overall savings over the fluids they replaced. Plus, as suppliers refined the fluids, they produced a better product. Today, more advanced metal compounds often require increased tool forces which lead to more heat and friction. This, along with the desire from customers to use waterless fluids, has caused synthetic emulsions to lose some of their dominance.

OIL VS. EMULSION

Oils have good anti-weld properties and high lubricity. So, in general, neat oils are used in applications where:

- Speeds are low
- Pressures are great
- Metal is tough

Water cools better than oil, so emulsions are used where:

- Speeds are high
- Pressures are lighter

Stock removal is lower

THE CHEMISTRY

In the petroleum industry additives are often explained to the laymen as the ingredients that make oil “work.” In forming fluids, these additives generally consist of phosphorous, fats, sulfur, polymers, soaps and chlorinated paraffins. With the diversity of metals and metal forming applications, the proper selection of additives becomes more dependent on understanding the actual application than in other areas of metalworking fluids. The necessary ability to balance boundary versus hydrodynamic lubrication in the fluid means that multiple additives are often needed. The added emphasis on moving away from chlorinated paraffins for regulatory issues along with the desire for more easily cleaned final parts is making the formulation of forming fluids increasingly difficult. Many advancements have been made with additives for the following areas:

1. Meet increasingly stringent regulatory issues
2. Increase additive solvency in water-diluted fluids
3. Match the demands of newer forming techniques
4. Provide increased performance with the increasing amount of non-ferrous metals, especially aluminum, titanium, and magnesium
5. Easier to clean off after forming
6. Provide corrosion prevention during and after forming
7. Pre-lubes that minimize fluid use and disposal



WHAT IS AN EMULSION?

There are two basic types of emulsions, chemical and physical. Chemical emulsions are formed through the use of emulsifiers, binding agents and the correct manipulation of pH levels. Physical emulsions are formed through physical mixing of different matrixes by mechanical means (hydraulic pumps).

METAL FORMING PROCESSES

Bulk deformation and sheet metal working processes are the two major groups of metal working. Bulk deformation has a low surface area to volume ratio, meaning only small areas of the stock are being worked. Sheet metal has a high surface area to volume ratio meaning large areas of the metal are worked at once.

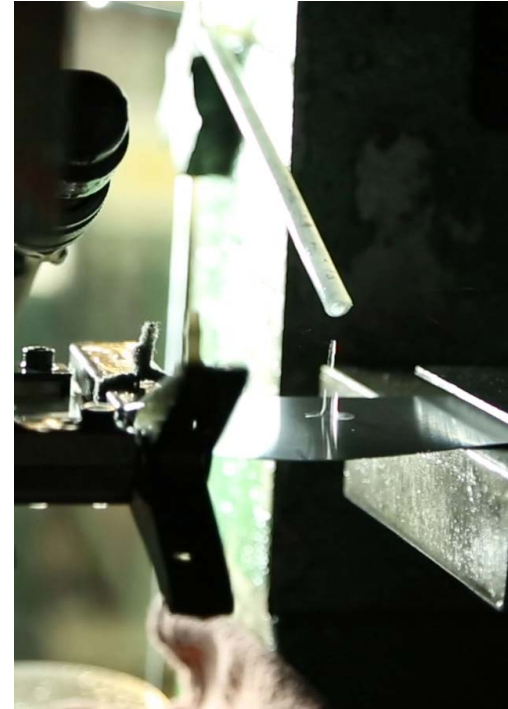
Bulk deformation processes include:

- Rolling deforms the metal by use of rolls. These processes include rotary tube piercing, roll piercing, thread rolling, gear rolling flat rolling and shape rolling
- Forging uses dies to compress and shape metal into the desired form and can be done "cold" as with many heading operations, or "hot" at temperatures above 2000 degrees F.
- Extrusion forces metal through a die opening creating a length of work with a consistent cross section.
- Drawing is similar to extrusion except the drawing process pulls the material through the die opening instead of pushing it.

SHEET METAL WORKING

- Shearing involves cutting the metal and includes punching holes or shapes.
- Bending is the deformation of metal around a certain axis.
- Deep Drawing is a process where a sheet of metal is drawn into a cavity to create a shape.

Again, the term metal forming applies to a wide variety of metals, processes to move that metal, pressures to move the metal, and temperatures at which the metal is moved. The most highly-compounded fluid with the greatest additives and base fluids in the world may be effective in one application but perform poorly in another. The selection of the proper fluid must include normal parameters such as the part and tool metallurgy, but must also include an understanding of the proper application techniques, proper application amounts, and proper timing for application. A strong technical approach to fluid selection is needed to form an optimum solution. Pun intended.



Lube-Tech Moving to GHS Compliance

The Globally Harmonized System of Classification and Labeling of Chemicals is a voluntary International system of identifying and labeling hazardous materials. As Lube-Tech's role as a global lubricants supplier continues to grow larger, it is in its best interests to comply by the rules that govern global commerce. As a result, Lube-Tech's customers may see some new label designs on products they buy from Lube-Tech. Nothing has changed with Lube-Tech's products - only the labels have changed to include GHS compliant information and graphics. This also means transitioning all MSDS to GHS SDS and modifying applicable product labels to contain GHS logos, warnings, format, etc.

Before GHS, most countries had their own standardized systems for labeling hazardous materials. The GHS system was proposed by the United Nations to get all countries on board with the same, uniform system. GHS standards were assembled using systems already in place with organizations such as OSHA, DOT and the EPA as well as other similar organizations around the world (EU, Japan, etc.).

The overall goal is to enhance human and environmental protection and streamline the system. OSHA also says governments should see lower costs from health care and fewer accidents, businesses should increase efficiency, reduce cost, make training easier and make the work environment safer and employees will enjoy a safer work environment and simplified system.

ELEMENTS OF A GHS-COMPLIANT LABEL

LUBE-TECH SUPER-KUT 4100 ← 1

Formulated for use in metal removal applications on all metals

FEATURES
Lube-Tech Super-Kut 4000 series fluids are light colored, translucent cutting oils formulated with advanced additive technology to provide optimum lubricity while maintaining low residue.
• Contain chlorine and in-active sulfur
• Low odor, residue and smoking

SPECIFICATIONS
Formulated for use in metal removal applications on all metals
• Light to severe metal removal applications
• Super-Kut 4410 may be used as a spike

← 2 →

WARNING ← 3

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← 5 →

1. PRODUCT IDENTIFIER
Should match the product identifier on the Safety Data Sheet

2. PICTOGRAMS
Graphical symbols intended to convey specific hazard information visually

3. SIGNAL WORD
Either DANGER (severe) or WARNING (less severe)

4. HAZARD STATEMENTS
A phrase assigned to a hazard class that describes the nature of the products hazards

5. PRECAUTIONARY STATEMENTS
Describes recommended measures to minimize or prevent adverse effects resulting from exposure

6. SUPPLIER IDENTIFICATION
Name, address and telephone number or the manufacturer or supplier

regulated

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LUBRICATION TECHNOLOGIES, INC.
900 Mendelssohn Ave. N.
Golden Valley, MN 55427
1.800.636.7990 / www.lubetech.com

PART # 109750
55 U.S. GALLONS (208.2L)

GHS LABELING

1. Substance Identification
2. Pictogram
3. Signal word – Warning or Danger
4. Hazard Statement
5. Precautionary statement
6. Supplier Information

In the United States GHS falls under the domain of four agencies:

1. Occupational Safety & Health Administration (OSHA)
2. Environmental Protection Agency (EPA)
3. Department of Transportation (DOT)
4. Consumer Product Safety Commission (CPSC)

Lube-Tech Headlight Restoration Kit

Five-Step Process Takes 20-Minutes

Lube-Tech has made restoring faded headlights easy with its Headlight Restoration Kit. The process requires no special tools and can be completed in about 20-minutes. Park the car in a dry, wind- and dust-free area. Be sure to wear safety glasses while using the Headlight Restoration Kit. Kit contents include:

- Correction Lotion
- Restoration Spray
- Non-abrasive lotion pads
- Lint-free towel
- Alcohol wipes

Step 1: Clean the headlight lens with soap and water or other mild cleaner. Dry the lens with the wax/silicone-free towel provided in the kit.

Step 2: Shake the Correction Lotion well, and then apply a quarter-sized dab to one of the non-abrasive lotion pads.

Step 3: Rub the headlight surface with the pad using a side-to-side motion and moderate pressure. If the headlights aren't too clouded it should take about 2-4 minutes of rubbing. For really clouded headlights it might take up to 6-minutes.

Step 4: Wipe residue off the lens. If the lens still appears clouded go over it once more with the Correction Lotion and non-abrasive pad.

Step 5: After all the Correction Lotion is cleaned off the headlight, wipe it clean with one of the alcohol wipes. Be sure the headlight is completely clean and dry.

Step 6: Once the headlight is completely clean and dry, spray it with the Restoration Spray. Start at the top of the lens and make sure the lens is completely coated. Apply two wet coats, not allowing the first coat to dry before re-application. Wipe any overspray off the car before it dries, making sure not to touch the headlight lens.

Step 7: Allow the coating to dry completely before touching. This could take up to 30-minutes. Do not take the car through an automatic car wash for 24-hours after performing headlight restoration.

BEFORE...



AFTER!

Lube-Tech Supports High School For Recording Arts

The High School for Recording Arts is a charter school that operates within and around a professional recording studio. Students earn time in the studio by completing their studies in more traditional areas such as math, science, English and social studies. Love of music drives students who find traditional school challenging or who have even been expelled from traditional school to complete their diplomas while pursuing their passion.

Lube-Tech supports HSRA through volunteer donations and through such things as its Basic Needs drive. During the past school year, HSRA had 80 students who were homeless. Lube-Tech employees and their families were asked to donate such things as gift cards to grocery stores, winter clothes and general clothing items.

Randy Jensen is one of the people at Lube-Tech who drives the company's efforts to help the school. This past Spring Randy received a letter from Tony Simmons, HSRA's Executive Director, thanking Randy for the more than 250-hours he spent helping them.

Mr. Simmons writes, "There is no way we could possibly thank you for all you have contributed to our students and entire operation."

Lube-Tech is proud to have such dedicated, knowledgeable people representing the company. This letter also illustrates how much our charitable giving means to our partners. It is one of the things that makes Lube-Tech such a great company!

At Lube-Tech, we believe in being a part of the community in which we do business. That's why, every year, Lube-Tech employees donate their time and money to help various charities and organizations around the Twin Cities as well as around the globe. Lube-Tech supports these efforts and countless employee volunteer hours by donating a percentage of its annual profits to both local and national charities.

Some of the charities in which Lube-Tech participates include:

[Children's Cancer Research Fund](#)

[High School for Recording Arts](#)

[Social Venture Partners](#)

[Homes for Wounded Warriors](#)

[Little Brothers](#)

[Second Mile Haiti](#)

[Autism Society of Minnesota](#)

[Paul Adelman Children With Disabilities](#)

[Global Action Project](#)

[Camp Courage and True Friends](#)

[Humor to Fight the Tumor](#)

[Breakthrough Twin Cities](#)

[Breakaway, Inc.](#)

[Bobby & Steve's Youth Foundation](#)

[Como Friends](#)

[Pheasants Forever- Full Circle Farms Chapter](#)

[Angel Foundation](#)

[Bame Foundation](#)



To learn more about Lube-Tech, visit lubetech.com.