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2024 VOL. 30 ISSUE 10

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PUBLISHER'S LETTER



HOWARD BRISKIN is publisher & president of Lubes'n'Greases. Contact him at HBriskin@ LubesnGreases.com

Catch Us at a Conference

Lubes'n'Greases has been an important news source for the lubricants industry since its conception in the mid-1990s. From its humble origin nearly 30 years ago to its now-global footprint, the Lubes'n'Greases team has worked tirelessly to deliver the most timely and important information about the lubricants industry.

ne way that we are able to stay connected to the ever-evolving lubricants landscape is by attending as many industry meetings and conferences as possible. Such events as the ILMA Annual Meeting, the ICIS World Base Oil and Lubricants Conference and the Lubricant Expo—just to name a few—are crucial to understanding the intricacies of our industry. Our sincere thanks go out to the

organizers of these important events.

The Lubes'n'Greases team frequents such events for a few reasons, chief among them being that these events allow us to connect face-to-face with those of you who work on the front lines of the industry. We find immense value in speaking with you in person and learning about what is happening in each segment of the industry as well as what challenges you are facing and how you are navigating those challenges.

So please don't hesitate to reach out to our editors, Sydney Moore, Gabriela Wheeler, Simon Johns and Tim Sullivan. They would love to hear from you. And if you happen to be interested in advertising with Lubes'n'Greases, look for our sales team, Dave Stanworth and Matt Rogers.

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HELPING YOU NAVIGATE THE LUBRICANTS INDUSTRY

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Lubes'n'Greases (ISSN1080-9449), an independent trade magazine, is published monthly by LNG Publishing Company, Inc. Copyright 2024, LNG Publishing Company, Inc. Printed in USA.

Subscriptions are \$279 per year (\$150 for 6 months) for print and digital editions or \$259 (\$130 for 6 months) for digital only. To subscribe, visit www.LubesnGreases.com/subscribe. Subscription enquiries can be sent to CS@LubesnGreases.com.

ny, Inc. Printed POSTMASTER: Send address corrections to Lubes'n'Greases, LNG Publishing Company, Inc., 7389 Lee Hwy., Suite 300, Falls Church, VA 22042 USA.

CANADA POST Agreement 40064709. Return undeliverable Canadian addresses to: IMS, P.O. Box 122, Niagara Falls, ON L2E 6S8

Periodicals postage paid at Falls Church, VA and additional mailing offices.

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BASE STOCKS | NORTH AMERICA

Can the Market Finally Breathe a Sigh of Relief?

Slowing demand, healthy supply levels, falling crude oil prices and the need to start clearing inventories at the end of the most active period of the hurricane season were thought to be behind a series of posted base oil price decreases that emerged in early September.

Some participants deemed the initiatives slightly premature, as the industry was not out of the woods in terms of severe weather exposure. Indeed, at the time of writing, a storm with the potential to become a hurricane and cause significant damage was forming in the Gulf of Mexico, and a predicted path put it over Texas and Louisiana, where several base oil plants are located.

Some players believed that the granting of steep temporary value

Base Oil Report

October 2024

Base oil prices are lowest U.S. postings of the month for mid-vis grade before applicable discounts. Crude prices are monthly averages.



Historic and current base oil pricing data are available for purchase at www.BaseOilPrices.com

allowances during contract negotiations in August precipitated the posted price decreases. Motiva was the first to step out with a decrease announcement, and several other API Group II and III initiatives quickly followed. At the time of writing, no Group I adjustments had been announced.

The decreases varied, depending on each producer's supply conditions, but the higher decrease amounts generally seemed to apply to the Group II mid- and heavy-vis-



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cosity grades. Motiva lowered the posted price of its Group II 100N grade by 18 cents per gallon and its 220N and 600N grades by 40 cents/ gal. The company's Group II+ 2- and 3-cSt grades decreased by 15 cents/ gal, while its Group III 4-cSt grade was revised down by 25 cents/gal and its 6- and 8-cSt grades by 15 cents/gal, effective Sept. 1.

On the same date, Excel Paralubes lowered its Group II 70N by 30 cents/ gal, its 110N by 20 cents/gal, and its 220N and 600N by 40 cents/gal.

SK Enmove informed customers that the company would be reducing the posted price of its Group III 4-cSt grade by 10 cents/gal and its Group III 8-cSt grade by 18 cents/gal as of Sept. 1. The company's Group II+ base oils and Group III 6-cSt re-



Sources: Lubes'n'Greases research, U.S. Energy Information Administration

mained unchanged.

Chevron's Group II 100R was adjusted down by 20 cents/gal, and its 220R and 600R cuts fell by 50 cents/ gal on Sept. 3.

Calumet announced a paraffinic price decrease of 18 cents/gal on its Group II 75/80N, 100N and 150N grades and 40 cents/gal on its 325N grade, which went into effect on Sept. 6.

According to reports, ExxonMobil also communicated posted price decreases, effective Sept. 7. The initiatives lowered the company's Group II+ EHC 45 by 20 cents/gal and its Group II EHC 65 and EHC 120 by 40 cents/gal. Petro-Canada and Safety-Kleen announced similar decreases shortly after.

The posted price decreases did not come as a complete surprise; suppliers typically focus their efforts on finding buyers for additional volumes at a time when demand weakens following the end of the summer driving season. While the hurricane season is not officially over until Nov. 30, most storms occur between August and September. Shortly after this period, producers often start to offer discounts to find buyers for their



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OCTOBER BASE OIL REPORT

surplus volumes.

A lengthening of the heavy-viscosity Group II cuts and the Group III grades started to exert downward pressure on spot prices in August. Group III supplies became more plentiful given regular shipments from Asia and the Middle East. Domestic production of Group III base oils increased earlier in the year. While most Group III producers used these base oils for their downstream operations, it resulted in additional supplies becoming available. Concurrently, steady buying interest for U.S. cargoes from Europe, Africa and



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Latin America supported Group I and II export prices.

There was a temporary tightening of Group II and III domestic supplies, as a refiner suffered a brief unplanned outage in late August, but the unit was restarted shortly after. A rerefiner also resumed output following a short shutdown and was expected to have limited extra base oil availability for several weeks.

Feedstock prices also declined, with vacuum gas oil values showing significant losses since the last base oil posted price increases in April. Crude oil futures plummeted by over 9% during the first week of September-the biggest weekly decline in 11 months-on expectations that Libya would resolve a dispute that led to supply disruptions and that OPEC+ could potentially increase output in October. Data showing a manufacturing slowdown in China and the U.S. also fueled oil demand concerns. On Sept. 6, West Texas Intermediate front-month futures settled on the Nymex at \$67.67 per barrel, compared to \$75.53/bbl on Aug. 27.

On the naphthenic base oils front, supply and demand were described as largely balanced, offering stronger support to prices than on the paraffinic side. Naphthenic base oil suppliers explained that pale oil values were less likely to be revised as prices had been comparatively lower than paraffinic values and demand had held up better as well. However, with crude oil prices having dropped significantly and demand slowing down, naphthenic suppliers eventually acquiesced and announced 20 cent-per-gallon decreases to be implemented in the second half of September.

A hurricane or other unpredictable event might cause supply disruptions and quickly turn the market on its head. But hopefully this will not be the case, and the industry will be able to enjoy generally stable conditions throughout the last guarter of the year.



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www.ith industrial operations becoming more demanding, the use of high-quality premium lubricants is essential for optimizing machinery performance and extending its lifespan.

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Selecting the most appropriate lubricant can have a significant impact on the performance of industrial machinery. Common lubricant categories identified by OEMs include Rust and Oxidation (R&O), Anti-Wear, and Extreme Pressure lubricants.

Although mineral oils derived from crude oil are widely used due to their cost-effectiveness, premium industrial lubricants often employ synthetic oils or blends. These synthetic oils offer superior performance under extreme conditions with enhanced thermal stability, better lubricating properties at high temperatures, and improved oxidation resistance.

Such attributes ensure more efficient machinery operation - especially in high-stress environments. Additionally, the rise of biodegradable lubricants offers an environmentally friendly alternative that supports sustainability efforts without compromising performance.

Viscosity, or the resistance of a lubricant to flow, is also crucial for maintaining effective lubrication and preventing machinery wear. The correct viscosity ensures that a lubricant can reduce friction between moving parts while maintaining a protective film. Using a lubricant with the wrong viscosity can lead to increased wear, overheating, and even catastrophic machinery failure.

Premium industrial lubricants are formulated to provide optimal viscosity across a range of temperatures, as indicated by a high Viscosity Index. A lubricant with a high Viscosity Index remains stable in both hot and cold conditions. This ensures consistent lubrication and reduces the need for frequent maintenance or component replacements - ultimately leading to significant cost savings.

Maintaining lubricant cleanliness is vital to its effectiveness. Contaminants like dirt, metal particles, and water can degrade lubricant performance, resulting in increased friction and wear that lead to equipment failure.

Filtration systems can be implemented to remove contaminants before they enter the lubrication system and help to ensure lubricant cleanliness. Regular monitoring through routine analysis of lubricant samples helps identify contamination levels, allowing for timely interventions. Proper storage practices - such as keeping lubricants in clean, dry environments - also prevent contamination. Regular maintenance of machinery and lubrication systems further reduces the risk of contamination, extending the life of the machinery and the lubricants.

Film strength refers to a lubricant's ability to maintain a protective layer between moving parts under pressure. High film strength is critical for preventing metal-to-metal contact, which can cause wear and equipment failure. Premium industrial lubricants are engineered to provide superior film strength, enabling them to withstand extreme loads and harsh oper-



ating conditions. This enhanced film strength not only protects machinery but also contributes to smoother operation, reduced heat, and lower energy consumption. By minimizing friction, high-quality lubricants help machinery operate more efficiently, leading to lower energy costs and improved productivity.

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AUTOMOTIVE LUBRICANTS | NORTH AMERICA

ILSAC GF-7: A Meaningful Upgrade

October is upon us, and we are only five months away from the first allowable use of ILSAC GF-7. In the August issue, I introduced the new category and noted that not all stakeholders showed enthusiastic support for it. In fact, some voted "no" or abstained on the final ballot. The ballot passed because most of the comments were either commercial or ruled non-persuasive.

n Part II of the series on GF-7, I'll discuss the benefits that come with the new specification as well as some of the concerns stakeholders had but have now moved on from. I'll also discuss how stakeholders are preparing to introduce the new category. I approached Afton and Infineum for their thoughts on some of these key items.

Danny Pridemore, Infineum's industry liaison manager, said: "Infineum is ready with ILSAC GF-7A and GF-7B solutions for our customers ahead of first licensing on March 31, 2025. Like prior categories, we anticipate the North American market will quickly upgrade to ILSAC GF-7, and Infineum is primed to deliver."

Brent Calcut, Afton Chemical's director of the Americas OEM relationship team, noted that "as with the transition to previous categories, Afton expects that most marketers in



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AUTOMOTIVE

North America will be able to meet the requirements of ILSAC GF-7 at the time of its first licensing, demonstrating the industry's readiness for this advancement."

A major driver of the new category was the introduction of the new aged oil LSPI (low-speed pre-ignition) test, as there were concerns that the fresh oil LSPI test did not maintain protection throughout the oil drain. Development of this modified test began around the same time ILSAC GF-6 was introduced and detailed in the May 2020 issue of Lubes'n'Greases. The hope is that the new test will eliminate some warranty repair concerns due to LSPI issues, but sources noted that the vast majority of ILSAC GF-6 oils already passed the new test (at proposed limits). At least some observers expect little or no impact in the field, and some felt introduction could have waited. However, to Ford and other OEMs, this was a key driver of the new category.

As with every new performance category, fuel economy improvement is a key driver, and GF-7 is no different, as passing the Sequence VIE or VIF will be more of a challenge to meet the increased requirements. The debate that occurred during the development of the specification concerned delivering both improved fuel economy performance and piston deposit protection while still meeting the proposed timeline.

Ford and Stellantis felt that ILSAC oils should deliver similar protection as General Motors does in their dexos1 specification. They did not see it impacting the desire to increase fuel efficiency or prohibiting it from meeting the proposed timing. Japan OEMs did not see a need to increase piston deposit protection at this time. Technically, some components used to deliver higher levels of deposit protection are known to be a debit to fuel economy, and this was a reason for some to vote against raising the WPD limit. This argument was deemed non-persuasive, because while the comments are true, the additive companies demonstrated that targets for both could be met during the tech demo period for ILSAC GF-7.

"A general trade-off has been observed between higher piston cleanliness ratings in the Sequence III engine test and Sequence VI fuel economy performance," Pridemore said. "This was reported during the development of ILSAC GF-4 and noted in subsequent category developments. Components, such as dispersants and detergents, which improve piston cleanliness, may adversely impact fuel economy. Formulators understand this concern and select the proper type and concentration of components to deliver a balanced formulation."

Delivering both fuel economy and higher protection was not a surprise, as we have seen many premium products—including dexos1—deliver increased engine protection over the years while meeting the proposed fuel economy targets. It should also be emphasized that base stock selection plays a major role, along with the different formulation approaches used by marketers, OEMs and the additive companies.

Actual test limits have increased by 10%-20% for retained FE performance over GF-6 for the key SAE viscosity grades in ILSAC GF-7. Piston

deposit protection will increase from 4.2 to 4.6 weighted piston demerits at the same time for GF-7A but will not increase for GF-7B, which covers only SAE 0W-16 and is primarily used by the Japanese OEMs. It is worth noting that GF-7 will introduce a new sulfated ash maximum limit of 0.9. This may impact formulations, since ash-containing detergents that help improve WPD will be restricted by this new requirement. Ironically, it will likely have its largest impact on the most premium engine oils going forward, as they tend to have higher levels of ash-containing detergents.

Other changes are less impactful but include an improvement in MRV low-temperature performance by lowering the maximum value from 60,000 centipoise to 40,000 cP. It is worth noting that Ford tried to lower the MRV limit via the SAE J-300 specification but was voted down by the SAE committee due to its potential impact globally. Essentially, all current ILSAC products in use for North America today meet the limit. The chain wear test will see a slight reduction to its maximum limit, and new seal materials and limits have been introduced—again without any concerns or impacts to the additives used. A potential new gelation test, which was not ready in time for the new specification, is included as a rate-and-report item. This is likely not an issue, but there is always some risk that some oils will perform poorly. Then how do you handle this, since the product will still meet the specification? It is possible that the test will not be approved by first allowable use!

Continued on Page 16

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"However, a new category should never be driven by new engine tests; it should be driven by performance needs."

Continued from Page 14

A key debate around this new specification concerned its impact on test capacity and hardware availability, specifically the Sequence VH sludge test and Sequence VIE/F fuel economy tests. If hardware runs short, will this advance a need for another new category and make GF-7 a short-lived category, or can GF-7 be maintained for at least four years? There is no complete resolution to this debate, although there are many actions that should allow GF-7 to last until 2028/29 after the introduction of PC-12, and many tests have projected life spans as late as 2037.

"ILSAC GF-7 utilizes the same engine tests as ILSAC GF-6, and the introduction of a new category will naturally increase the demand for engine testing. During the development of GF-7, independent test labs projected the lifespan of hardware based on robust historical data. Their confidence in these projections assures us that there is ample hardware to last through GF-7," Calcut said. "OEMs are also actively engaged in identifying or developing replacement engine tests in parallel to GF-7 category development. The focus of ILSAC GF-8 should be on the performance improvements required for future engines, not on replacement engine tests."

He added: "CLOG introduced replacement engine tests into ILSAC GF-5, as the previous tests ran out of hardware before GF-6 first licensing. There is precedence for doing this, if needed, even though it's best to introduce new engine tests with a new category. However, a new category should never be driven by new engine tests; it should be driven by performance needs. The Sequence VJ is already in development to replace the Sequence VH, which is good. ILSAC still needs to identify how best to replace the Sequence VIE and VIF, and several options are being considered."

Pridemore further noted that "the original ILSAC GF-7 request targeted an introduction in 2Q 2028 with intent to assist OEM compliance efforts for the proposed (now finalized) MY2027 - 2031 emission and fuel economy regulations. This date allowed sufficient timing and focus to address test life concerns, such as developing replacement for the Sequence V and Sequence VI engine tests, and continued enhancements of formulation technology to meet the desired performance targets. Quality engine test development is complicated and takes time, focus and resources. As ILSAC GF-7 qualification testing ramps up, the industry will increase test usage, and expected life dates may shorten. It's critically important that we proactively protect the future viability of our lubricant qualification systems. With ILSAC GF-8 still anticipated in 2028 to address test life concerns and other needs, the industry has significant work to complete in the next four years. Starting early is never a bad approach."

It has raised some eyebrows that

ILSAC decided against advancing lower-viscosity SAE grades, such as SAE 0W-8 or 0W-12, for GF-7 or the proposed GF-8 category. Japan OEMs do specify these grades today, so why would OEMs not want to cover them via the established API licensing system and the ILSAC Shield or another mark?

(Note: API does allow you to license the S category portion but not to use the ILSAC symbol.)

In the short term, some Japanese OEMs will specify JASO GLV-1 oils for these lighter grades, but it is not clear how they will be monitored or deployed in the market. Some wonder if this is where the new IFC system may compete with API.

"Though API allows API SP RC licensing of SAE 0W-8/0W-12 viscosity grades, limited read-across guidelines often require a core program to be run," Pridemore said. "End users may choose to use JASO GLV-1 oils per OEM owner's manual recommendations as deployed by marketers." Time will tell, since volumes of these light viscosity grades are almost non-existent in North America today!

"Afton's early support for GF-7 was driven by the benefits it offers. Afton believes in meaningful, manageable and regular category upgrades that support OEM needs," Calcut said. "ILSAC GF-7 is a significant upgrade, especially for OEMs, as it helps them meet the recently finalized and demanding EPA fuel economy and emission regulations starting in model year 2027." ●





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Dramatic shifts in consumer preference, original equipment manufacturer hardware, fuel availability, and more are on the horizon for the North and South American vehicle markets. For the lubricants industry, forging meaningful partnerships across the value chain and leveraging optimized new technology will be necessary for ongoing growth and success.



THE EVOLVING ROLE OF THE LUBRICANT IN THE AMERICAS

By Keith Corkwell

odern transportation as we know it is undergoing revolutionary change across the globe. As the world seeks to improve sustainability and cut carbon emissions, regulatory bodies are acting, and vehicles as we know them are changing.

Against this backdrop, it is worth examining the specific circumstances impacting lubricant markets throughout North and South America. Though global forces are prompting change, there are regional considerations that must be accounted for by lubricants stakeholders who are seeking to seize continued success wherever they operate.

For example, new lubricant performance categories—including ILSAC GF-7, API PC-12, and a broad range of OEM specifications—require enhanced fuel economy as well as improved performance across all criteria for both passenger car and heavy-duty applications. These specifications—developed in response to OEM demand for assistance in hitting lofty new fuel efficiency targets established by the United States Environmental Protection Agency (EPA)—will impact vehicles sold throughout both North and South America. Meanwhile, in South America, especially in its most populous country, Brazil, decarbonization is key. Here, heavy hybridization will be the trend of the future, while biofuels will proliferate in pumps throughout the continent—each of which have specific demands of lubricant performance.

For our industry to deliver, several things must happen. We must continue to advocate for the role of the lubricant in modern drivetrains, focusing on its ability to deliver substantive performance gains in every application. We must continue to apply the right technologies in order to achieve those gains. And we must work together to do it all.

In this article, we will explore the major trends shaping mobility in the

Americas in 2024 and beyond, how those trends will impact required lubricant performance, and how collaborative partnership and the right additive technology will continue to push mobility forward in the years and decades to come.

Intersecting Trends Will Contribute to Complexity

A quick evaluation of the forecasted vehicle parc in the Americas over the next decade can provide a good overview of the complexity that awaits the lubricants space and why widespread application of higher-performing products will be an absolute necessity for contemporary vehicles to meet their full potential.

Throughout Latin America, projected production of vehicle types will shift dramatically over the course of the next decade. North America will continue to see a proliferation of both battery electric and hybrid vehicles, whereas South America will see greater production of hybrid vehicles. S&P Global Mobility predicts that by 2035 mild- and full-hybrid vehicles will represent many vehicles produced in Argentina, Brazil and Columbia. The uptick in hybrid production in Latin America follows the larger global trend away from ICE-only vehicles.

What are the implications for the lubricant? While modern internal combustion engine (ICE)-only vehicles have their own unique set of engine oil requirements, the needs of hybrid engines are partially tied to lower overall operating temperatures. For example, recent hybrid engine field trials conducted by Lubrizol showed that hybrid engines had significantly higher fuel dilution compared to internal combustion engines. The trial also showed a tendency for water ingress and viscosity instability. Taken together, these issues can impact fuel efficiency and engine life through sludge and deposit formation, along with overall oil degradation. This necessitates unique performance characteristics for lubricants intended for hybrid applications.

Intersecting with the widespread hybridization in Latin America is the rapid proliferation of alternative fuels throughout the marketplace. Especially in Brazil, fuels with elevated ethanol content (ranging from gasoline E-27 to Ethanol E-100, commonly referred to as flexfuel) are commonplace in the passenger car space, while biodiesel and renewable diesels are quickly gaining ground. This is largely due to Brazil's significant production capabilities for biofuels, making them an ideal and attainable method for decarbonization. But alternative fuels are not limited to Latin America. Renewable diesel fuels are also seeing heavy investment in North America.

Elsewhere, people are consistently holding onto their vehicles for longer periods of time. The average age of passenger vehicles the United States, for example, has risen from 11.1 years in 2012 to 12.6 as of January 1, 2024. The trend here is that end users are seeking to gain greater value from their investments over the long term. But the only way this will happen is when high-performance lubricants become suited to the needs of these vehicles.

Finally, layered on top of these major trends is a continuously evolving specification landscape. New major specifications coming from North America will raise the bar for baseline lubricant performance across the board. The aforementioned ILSAC GF-7 will require certified lubricants to contribute to significant new fuel economy gains in new-model passenger car engine applications. Simultaneously, in the heavy-duty space, the new proposed category (PC-12) will similarly necessitate higher engine oil performance across the board in diesel applications everywhere.

Figure 1. US Average Age by Vehicle Type

Combined average age rises to new record of 12.6 years



Data compiled May 01, 2024. As of January 1. Source: S&P Global Mobility © 2024 S&P Global

These specifications will impact all of the Americas, requiring a higher baseline of performance industrywide. And the road does not end here. GF-7, for example, will issue first licenses on March 31, 2025, as the result of an escalated timeline to meet impending government-mandated fuel economy increases. While ILSAC GF-7 is a significant upgrade, an even more robust GF-8 is being discussed and will begin development in just a few years.

It all points to the escalating need for higher-performance, higher-value lubricants throughout the Americas. And it's up to all of us to deliver.

Looking Forward and Communicating the Value of High-Performance Lubricants

Taken cumulatively, our industry's ability to successfully navigate the trends outlined above while driving greater value for all stakeholders will, in my view, depend on two things.

First, the lubricants industry must work in step with regulators, specification bodies, OEMs and more to drive real value in today's and tomorrow's high-performance engine oil formulations. Enhanced fuel efficiency, the ability to help reduce NOx and CO₂ by enabling aftertreatment devices, and other performance characteristics are becoming simple table stakes—and our industry must advocate for and properly communicate the value of true, top-tier lubricant solutions.

Here it is important to note that while many global regions are embracing higher-quality lubricants—and the fuel efficiency and longer engine life they enable—Latin America has been slower to adapt. For example, many passenger car engine oils in the market meet only the API SM, API SL or even older specifications. This means that, as hybrids gain traction in the Latin American market, consumers may find that few engine oils on the market meet their needs. Most engine oils will not be able to protect their investment and give them the performance they deserve, especially over increasingly longer-term ownership periods.

This is why our industry's advocacy of higher-performing lubricants is so important-not just in Latin America, but in every region around the globe. The truth is that increasingly modern and efficient engine technology-be it hybrid or other ICE technologydepends on the right engine oil formulation to meet its full potential. Crucially, this message must be clear at every level of the value chain. For example, when it comes to major upgrades, required performance increases must be concrete in the value that they will deliver to oil marketers and end-user consumers who purchase their products.



This must happen at the specification development level by ensuring performance criteria upgrades that are both meaningful and achievable for the parties responsible for meeting them; oil marketers must see the value these upgrades will create, incentivizing their ability to achieve them. And it must happen at the end-user level. Consumers everywhere must see a real reason to choose a higher-tier product when lower-tier products are available at a corresponding lower price point, especially when vehicles are beyond their warranty period, which typically mandates the use of OEM-approved fluids.

Second, ongoing collaboration and partnership will be essential to not just communicating the value of higher-performing lubricants, but in achieving next-level performance that tomorrow's hardware requires and



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Working together, additive technology companies and oil marketers can and will deliver high-value products to the marketplace-and it is incumbent upon the additive technology providers to identify the most optimal path forward in doing so. At Lubrizol, we believe not just that top-tier products should provide meaningful value, but that oil marketers' ability to deliver them should be as straightforward as possible. This means anticipation of OEM wants and needs in the coming years. It means optimized technology packages for finished products. It means broad base oil coverage, especially as global supply chains continue to remain uncertain. It means delivering scientific components that aren't at risk for regulatory scrutiny in the near future. And it means delivering the performance you expect, with all of the potential costs, risks and benefits posed by a broad swatch of industry influences fully considered.

Indeed, the ongoing success of the lubricants industry will depend on strong partnerships throughout the value chain to meet the changing needs of transportation applications throughout the Americas. At Lubrizol, we believe in a bright future ahead and it will take our collective effort to get there.



Keith Corkwell is vice president of the Americas business for Lubrizol Additives, where he has spent the past 32 years in various technological and leadership positions. Prior to joining Lubrizol, Corkwell worked for leading oil and gas companies, including BP and Texaco, in research and technical positions.



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Is the Lubricants Industry Working for its Workforce?

Insights from ABN Resource's Lubricants Talent Report 2024

By Ewa Ozga and James Moorhouse





The lifeblood of any successful company is its people. Even amidst advances in artificial intelligence and other useful technologies, companies rely heavily on their qualified employees to make their businesses thrive.

ust as technology is in a constant state of flux, so too is the workforce. It is vital for companies to understand the current employment landscape to attract and retain talented personnel.

Enter the Lubricants Talent Report 2024, which was conducted by global executive search firm ABN Resource to help both employers and employees do just that.

About the Report

A global audience operating in the lubricants, additives and base oils segments were polled via an online survey. The purpose of the report is to provide data to understand how the workforce is feeling about their role in the industry and to help companies and their personnel shape their workplace strategies and careers. Understanding the key trends illuminated by the report is important because companies cannot achieve many key goals without the right people in the right jobs performing at a high level of competence.

We are proud to report that we received the largest volume of responses since the talent report was conceived three years ago.

Job Satisfaction Is on the Rise

The survey revealed a significant increase in job satisfaction among lubricant professionals. The average satisfaction rating has increased to a commendable 3.7 out of 5, with a significant 63% of respondents feeling satisfied or very satisfied in their jobs. This is a major jump compared to last year's survey, in which only 48% expressed satisfaction with their jobs, indicating significant

strides in employee engagement and workplace culture.

The survey highlighted three key factors for why satisfaction ratings have improved:

Competitive Compensation. More than half (51%) of respondents highlighted compensation as crucial in job satisfaction. It seems a good paycheck goes a long way in boosting happiness. With the average executive leader getting a very significant 18% pay increase, senior managers achieving 15%, middle managers 7% and solo contributors in technology and commercial roles achieving 9%, it looks like 2024 has delivered good salary increases across the sector.

Supportive Work Environment. Of the survey respondents, 46% value a positive workplace culture match.

Growth Opportunities. About 42% of respondents reported a desire for career advancement opportunities as a primary factor in workplace satisfaction.

Hiring Is Hard

In addition to increased job satisfaction, the survey revealed only a little over 20% of respondents are actively seeking new jobs. This is an interesting finding, as it suggests a growing sense of stability among employees. While reasons vary from individual to individual, it would appear situations in the global economy and a focus on developing careers within the current organization are significant factors in people staying put. With so few actively seeking new work, employers must adapt new strategies to tap into passive candidate networks to get the

right talent for their vacancies.

The active seeker trend does vary by age group, though. Employees between ages 35 and 44 are significantly more likely to be open to new opportunities, with 30% of them stating that they are actively exploring new job opportunities. This contrasts with the 55+ age group, which accounted for 42% of survey participants. Only 12% of 55+ year-olds reported they were actively seeking work.

Talent Retention and Attraction Difficulties

The Lubricants Talent Report 2024 unveiled some complex issues for the industry's workforce. One notable and stark reality emerged, as the majority of the survey respondents indicated that they are under 10 years from retirement age. Of course, a younger workforce is in place and is growing every day. These younger employees are keen to grow and develop, but they aren't getting many opportunities to do so.

It is commendable that 79% of professionals reported access to some form of training, signalling a growing awareness of skill development by employers. Larger organizations (made up of 500+ employees) are leading the charge with structured training programs, recognizing the pivotal role of employee development. However, a concerning 18% of professionals, particularly in smaller companies (1-50 employees), lack formal training opportunities, hindering talent retention and skill acquisition. Geographical disparities further exacerbate the issue, with regions like Europe outpacing the Middle East in training provision.

Perhaps an answer to the retention dilemma is in the evolution of the lubricants sector. As sector changes take place, new skill sets are going to be in demand. Customer focus,







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technical expertise and problem-solving abilities are emerging as the cornerstones of success. In fact, all three were voted as the most important for future job roles in the lubricants industry. Notably, the report reveals a strong correlation between formal training and the acquisition of these critical skills, emphasizing the importance of structured learning.

The ideal skill set for employees varies across roles and generations. Executives prioritize customer-centricity and adaptability, while technical roles demand expertise and problem-solving prowess. Similarly, younger professionals lean toward communication, collaboration and emerging technologies, while older professionals emphasize customer service and technical knowledge.

The data does suggest that companies need a more effective way of giving advancement to the emerging generations in the sector while also appeasing more mature personnel to retain the experience and knowledge accrued over decades of work.

But the data shows there are blocks in place. People are desperate to develop and grow, but there is generally not enough opportunity for that development to occur. Personnel are retiring at later ages, and the problem is compounded by key duties not being relinquished by more senior staff. This poses a significant risk for the lubricants industry. The data illustrates a frustrated next generation who could decide to leave the industry in search of personal growth, taking the pipeline of successors and next generation talent away with them.

As the lubricants sector reports a key challenge being growth, it also grapples with key issues around changing consumer demands, declining volumes and diversifying product offerings to capture new markets. Navigating these changes could be a solution to workforce retention, as new jobs, responsibilities and skills can be introduced into the sector to deliver the necessary change.

Navigating the Road Ahead

Growth and geopolitical tensions made the list of the top challenges for the lubricants sector in 2024. These were closely followed by workforce attraction and retention as a top concern, according to the survey respondents. But there are some proven strategies to navigate these challenges. These include the following:

Competitive Pay Equals Happy Workers. Salaries increased by an average of 11% in 2024, with 75% of professionals receiving a raise within the past twelve months. This correlation with job satisfaction highlights the importance of competitive compensation.

Career Development and Work-Life Balance. While financial security is important, it is not the only factor when it comes to job satisfaction. Employers should prioritize career development and work-life balance to foster a truly happy and engaged workforce. According to employee feedback, 42% identified career development as important, and another 35% emphasized the significance of work-life balance in contributing to their job satisfaction.

Different Scale, Different Problems. While smaller companies often exhibit stronger talent management capabilities due to their agile nature and personalized work environments, larger organizations grapple with scaling these efforts more effectively. A pervasive lack of career development opportunities, when coupled with inadequate compensation packages, hinders the industry's ability to compete for top talent with other sectors.

More Diversity, More Engagement. With the personnel challenges facing the sector, it was interesting to note that only 5% of respondents identified diversity, equity, and inclusion (DEI) as a top challenge. This indicates a misalignment between industry needs and employee perceptions. If companies made DEI a foundation of their business, it is likely that they would see significant benefits in performance, profitability, talent attraction and retention.

Building a Better Workplace

This year's survey also reveals some areas for improvement, including the following:

Gender Disparity. Job satisfaction is higher for men (64%) than women (51%). Companies need to address this by enhancing workplace culture and support systems for women and non-binary employees. This could involve implementing flexible work arrangements, unconscious bias training and more inclusive mentorship programs.

Mid-Management Squeeze. Mid-management employees face unique pressures that need to be addressed through targeted support and development programs to improve job satisfaction. These professionals are often sandwiched between the demands of upper management and the needs of their teams. Providing them with the tools and resources they need to succeed, such as leadership training and coaching, can make a big difference.

Poor Culture Fit. Organizational culture and work environment is crucial for employee satisfaction and retention. In fact, 50% of the survey respondents declared that this is one of the primary reasons behind their willingness to change jobs. While smaller companies typically cultivate a strong sense of belonging, they may lack formal cultural frameworks. Meanwhile, larger organizations, despite resources, face the challenge of maintaining a consistent culture across diverse teams. Both face the risk of cultural misalignment, highlighting the need for intentional culture-building strategies that adapt to company size and structure.

For those looking to delve deeper into the survey's data and insights, the full Lubricants Talent Report 2024 by ABN Resource is available for download at https://abnresource. com/talentreport/

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By Trevor Gauntlett

hemical regulation may be reducing the flow of new molecules into the market, but it has prompted a variety of new approaches to product R&D and introduction to market, plus a significant review of products that had previously seemed unattractive. This, to many, is a highly desirable form of innovation, reports Trevor Gauntlett.

The 21st Century has seen the introduction or extensive modification of chemical legislation and regulation globally. These include REACH (the Registration, Evaluation and Authorization of Chemicals) in Europe, REACHlike regulations in Turkey and Korea, the so-called TSCA reform in 2016 in the United States (actually, the Frank R. Lautenberg Chemical Safety for the 21st Century Act) and many others covering operational health and safety as well as environmental impact.

Many argue that regulation adds cost and complexity to the research and development of new molecules and their applications, leading to fewer successful developments and reduced choice. This is further complicated by those regulations possibly not being consistent between regions.

On the opposite side of the coin, the European Union's official website states that "REACH ... aims to enhance innovation and the competitiveness of the EU chemicals industry." This is certainly the case based on the many new chemistries that were on offer at industry conferences in the first half of this year.

I'll Show You Mine...

Woodlands, Texas-based SI Group's Tyler Kuchta explained the challenges of developing new additives to *Lubes'n'Greases*. "Lubricants and greases are complex mixtures, formulated to meet specific performance and marketing needs, and OEM specifications. Changing formulations can be technically complex due to additive interactions, as well as gaining OEM approvals for those modifications."

Figure 1. GHS Hazard Labelling: Common Antiwear Additives

• Widely used antiwear additives are classified by GHS as hazardous materials and corrosive

· Regulatory labels can also be present on finished lubricants dependent on additive concentration

ZDDP EC 270-608-0	ZDDP EC 224-235-5	ZDDP EC 947-946-9	ZDDP EC 217-316-1	ETHAFLOW™ 6705
H315	H318	H315	H315	
H318	H411	H317	H319	
H411		H413	H412	
			(!)	No hazard labelling
New Phosphite a	ntiwear additive is ashle	ess and non-GHS hazard	lous, enabling removal	of common GHS

hazardous antiwear additives in many lubricant and grease types

ZDDP = Zinc Dialkyldithiophosphate; MoDTC = Molybdenum Dithicarbamate; DBHP = Dibutyl Hydrogen Phosphite

Source: SI Group



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The development and registration costs of long-established additives were recouped many years ago. Up front R&D, manufacturing and registration costs to develop and produce new additives are therefore a significant barrier, and new chemistries typically require global registration, which can take several years and cost millions of U.S. dollars.

SI Group was taken over in 2018 by private equity company SK Capital Partners, which had acquired Addivant from Chemtura in 2013. Addivant's additives business was focused on the plastics and rubber industries. (Chemtura had retained the lubricant additives and polyalphaolefins businesses and was subsequently acquired by Lanxess in 2017.)

Upon acquisition, the new SI Group sought to generate synergies between the two legacy businesses, some of which it hoped would be from the cross-selling of existing products. "We took a journey to look at products in adjacent markets from elsewhere in SI Group," Kuchta said.

One likely candidate was a phosphite-based antioxidant for polymer production with its development history firmly in Addivant that was non-hazardous and approved for incidental food contact (HX-1). This product was to become ETHAFLOW 6705. Could the phosphorus content lead to beneficial antiwear or friction-modifying properties?

The legacy SI Group had the abilities and knowledge to test film forming tendency in rolling and sliding tests. "We found pretty quickly that the technology provided some wear protection and some friction modification, similar to traditional friction modifier chemistries," Kuchta said. "And it continued to shine in gear and transmission rig tests and grease bearing wear tests."

"Despite having a heritage very close to the lubricants industry, there

are some unique characteristics of the new product that allow differentiation. The product is now in the market and being used in lubricant formulations," added Tim Chipuk, senior market development manager at SI Group. "We estimate this saved 5-plus years and many millions of USD in R&D, registration and commercialization costs."

Filling a Gap

While new regulation can present obstacles to new product introduction, it can also open up possibilities as formulators consider moving away from previous chemistries. One area of interest is the substituted diphenylamines (SDPAs) that are used as antioxidants in many mainstream lubricants.

SDPAs containing mixed butyl/octyl (C4/C8) groups have been classified as Reprotoxic Category 2 under GHS (Globally Harmonized System). But they and their C9 substituted analogs could face more severe classification. (See the August 2024 issue of *Lubes'n'Greases*—volume 30, issue 8, page 26—for more information about the proposed regulation of SDPA.)

Depending on the treat rate, this classification could carry through to the finished oil, requiring the lubricants manufacturer to place "the exploding human" pictogram on their product label (see Figure 2). Several companies in the lubricants market are exploring alternatives to these workhorse molecules to find label-free formulations.

SI Group recognized that they had an SDPA in their portfolio, with recent data showing that it was not reprotoxic and also was non-bioaccumulative. "As the additive has a relatively high melting point, there had previously been no driver for the lubricants market to adopt this additive," said Stuart McTavish, market development director for SI Group. However, it has been taken on by grease and industri-

Figure 2: GHS pictogram to illustrate Carcinogenic, Mutagenic or Reprotoxic hazards



Source: Regulation (EC) No 1272/2008

al lubricant manufacturers, who can handle solids.

Nyco, based in Paris, France, also saw a low HSE profile antioxidant as having a high potential. Siegfried Lucazeau, marketing and project manager, industry & automotive, explained that Nyco was looking for a non-toxic product for industrial applications. "We built on previous work for aviation, where we had developed a non-toxic aviation turbine oil" based on non-toxic phosphorus-containing products and label-free antioxidants, he said.

With tightening regulation for some common SDPAs on the horizon, Nyco deployed Quantitative Structure-Activity Relationships, or QSARs, to screen antioxidants. QSARs were one of the methods to screen candidate components for the aviation development and "are used by the European Chemicals Agency and many regulatory authorities," Lucazeau explained. "They use potentially hundreds of molecular descriptors of shape and size and compare them with the available data on biological activity."

Such a computational study is often called in silico and is also used in the early stages of drug design or in predicting environmental impact. "The biggest challenge is to use the correct descriptors," Lucazeau said.

Nyco wanted to consider neurotoxicity, carcinogenicity, mutagenicity and reprotoxicity. Their team took available structural and activity data on antioxidants and similar chemicals and used the data on 90% of the molecules to build a learning dataset. The other 10% of molecules of the most interest was kept for testing the newly developed QSAR, which compares the parameters with the known end points. Once the model is validated, it can be used to model new and existing molecules where toxicity data is not published.

The in silico study generated some positive results. "Some specific oligomeric antioxidants appear to have a non-toxic profile using our model," Lucazeau reported.

Nyco has now reverted to a more conventional approach, investigating their effectiveness as antioxidants and cost-effective manufacturing routes. "It's imperative that we also consider ease of manufacture and effectiveness in service," Lucazeau said.

In some cases, the model could not predict no toxicity. "There's often a grey area where you can't be adamant about the results you obtain. It's not a perfect science," Lucazeau said. "We need to refine our models further." Sometimes the issue is impurities, so modelling the majority molecule does not necessarily correlate with experimental data.

Playing the Long Game

Oleon, based in Evergem, Belgium, is, like Nyco, looking several years ahead in its market-testing activities. Pieter Struelens, R&D manager industrial applications, and his colleagues noted the interest in ionic liquids in modulating electrical discharges in electric vehicles and wind turbines.

"We asked, 'What can oleochemistry offer to this challenge?'" Struelens said.



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They were sure that they could make ionic liquids that might work in those applications but with a much-improved HSE profile. They appear to have succeeded in this action with performance data on ionic liquid/base oil blends generating market interest. At the STLE Annual Meeting in Minneapolis in May, Struelens presented data showing that their most promising candidate could both reduce the wear scar size in a four-ball wear test and reduce the electrical resistivity when top-treated into a commercially available polyurea grease. He added, "We have readacross data from similar chemicals that support the improved HSE profile we sought."

But what's next?

"Here, a step-by-step approach is preferred, because you don't want to engage in very expensive testing on the regulatory side without knowing the molecule's performance in its application and vice versa," Struelens explained. But taking steps consecutively adds time, and the process requires a lot of resources. Struelens is sure Oleon's approach has done much to de-risk the HSE aspects. "Safe and Sustainable by Design could have been a phrase to describe Oleon's practice for many years," he said. This phrase now describes a voluntary approach recommended by the European Commission to guide the innovation process for chemicals and materials.

Open Innovation

Yann Cramer, professor of entrepreneurship & innovation at the ESSEC Business School in Paris, France, oversaw a significant change in the way Shell Lubricants exploited new approaches to formulation in the 1990s and 2010s. One of the approaches Shell adopted, in common with several large players in the lubricants field, was open innovation.

"Open innovation has emerged over the past two decades as a mainstream strategy for large corporations; reaching out to more non-traditional sources of potential solutions helps corporations come up with new products faster," Cramer told *Lubes'n'Greases*. "Going forward, as open innovation evolves into broader corporate venturing strategies, tighter

Figure 3. Novel Secondary Polyol Ester Technology



Source: VBASE Oil Company

regulations will increasingly serve as a filter, distinguishing truly innovative corporations from the rest."

Recognizing an Opportunity

Scientists at Pendleton, South Carolina-based Tetramer Technologies were developing a molecule for another market segment and recognized its potential for utility in high-performance sustainable lubricants. Minor changes to its chemistry led to the development of a family of Secondary Polyol Ester (SPE) Base Oils and the formation of a spin off company, VBASE Oil Company.

Martin Greaves, chief technology officer of VBASE Oil Company explained that "SPEs are oxygen-rich synthetic esters, unlike other esters that are well-known across the industry. This leads to improved thermal management and energy efficiency—key needs across the automotive and industrial lubricants markets."

The SPE technology also offers detergency and high levels of both biodegradability and bio-carbon content.

Having developed novel chemistry, the next steps for the company are more incremental than revolutionary. "The SPE platform can be extended beyond base oils to include the development of performance additives and extended to other adjacent markets," Greaves said.

Regulation as a Stimulus

With new molecules still appearing, and new approaches to market introduction, regulation has not killed off new product development.

According to Cramer, "Constraints, such as tighter regulations, actually tend to spur innovation rather than stifle it, as they call for greater creativity both in terms of number and variety of ideas." Those who succeed, he said, "will leverage constraints as catalysts for breakthrough solutions, driving industry advancement and sustainability."

Struelens had similar thoughts. "You could say that the regulatory environment slows down innovation, but at the end, it is for a just cause. If there is inherent novelty, you will succeed."



TREVOR GAUNTLETT

has more than 25 years' experience in blue chip chemicals and oil companies, including 18 years as the technical expert on Shell's Lubricants Additives procurement team. He can be contacted at **trevor**@ **gauntlettconsulting.co.uk**

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January 6, 2021	240	1.007	12/10/20	3.44	1,099	12/19/29	3.69	1,139	12/10/20	240	1,000	12/10/20	3.49	1.001	120
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Eable any 17, 2021	4.13	1.054	00/19/21	4.14	1 260	02/19/21	4.00	1 256	61/26/21	4.13	1.264	02/19/21	4.10	1 274	0.07
Fabrican Dd. 2001	4.83	1.785.4	0000001	4.14	4 355	03.00/14	4.30	1.340	anna/ki	4.13	1 344	03/08/21	4.10	1.274	100
March 3 2321	413	1.1014	00/10/21	414	1 100	02/19/21	4.10	1.340	88/94/21	413	1 264	02/19/21	4.10	1 274	0.24
March 10, 2021	4 13	1 384	00119/21	414	1 202	02/19/21	4.19	1.148	82/04/21	4.13	1.264	02/19/21	4.10	1 274	0.00
March 17 2021	4.12	1 104	001001	4.94	1 221	03/19/21	4.10	1140	01/14/21	413	1,264	02/19/21	4.30	1,336	100
March 24, 2021	4.73	1.047	00/74/21	4.34	1 331	03/19/21	4.50	1400	01/04/21	4 33	1 325	03/04/21	4.30	1 335	0.0
March 21, 2021	4.99	1.347	030401	4.94	1 931	03/78/21	4.50	1.400	03/34/31	4.33	1 335	010401	4.30	1 114	100
And 7 2021	4.33	1.347	030401	4.34	1.331	03/19/21	4.50	1.409	03/34/21	4.33	1 325	03/24/21	4.70	1330	122
And 14, 2021	4.33	1.342	0324/21	4.34	1.331	03/19/21	4.50	1.409	03/04/21	4.33	1.325	03/24/21	4.39	1,326	03
Aud 21 2021	4.73	1.347	03/24/21	4.34	1 331	03/19/21	4.50	1.409	03/34/21	4.33	1 325	03/24/21	4.30	1 3 3 5	0.1
And 28, 2021	4.43	1.393	0583/21	4.45	1 377	04/00/21	4.50	1.409	03/24/21	4.48	1.371	05/03/21	4.54	1,380	04
May 5 1011	1.00	1 101	0503/21	4.49	1 177	040021	474	1 455	0505/21	448	1 371	050321	4.54	1 360	166
May 12 2024	4.48	1 391	0503/21	449	1 377	04/00/21	4.74	1.455	05/05/21	4.48	1 371	0503/21	4.54	1.380	06
May 15 2021	4.45	1.593	0503/21	4.49	1 377	0400/21	4.74	1.455	05/05/21	4.48	1.371	0503/21	4.54	1,300	0.6
May 26, 2021	1.10	1.009	9593.91	6.10	5,877	91.96/91	671	1,166	96/95/21	4.48	1.371	0503/21	4.54	1,380	104
June 2, 2021	4.48	1,292	05/03/21	4.49	1,377	04/00/21	4.74	1,455	05/08/21	4.48	1,371	0503/21	4.54	1,380	04
June 9, 2021	4.48	1,393	05/03/21	4.49	1.377	0400/21	4.74	1.455	05/05/21	4.48	1.371	0503/21	4.54	1.360	104
June 16, 2021	4.48	1.393	05/03/21	4.64	1,423	06/18/21	4.74	1,455	05/Q5/21	4.48	1.371	05/03/21	4.69	1.426	1 Off
June 23, 2021	4.63	1,440	99/23/21	4.64	1,423	05/18/21	4.89	1,501	96/20/21	4.63	1,417	06/23/21	4.09	1.426	00
June 30, 2021	4.63	1,440	06/23/21	4.64	1,423	05/15/21	4.89	1,501	96/25/21	4.63	1,417	06/23/21	4.60	1.426	06
July 7, 2021	4.63	1,440	06/23/21	4.64	1,423	06/18/21	4.89	1,501	06/25/21	4.63	1,417	06/23/21	4.60	1.426	06
July 14, 2021	4.63	1,440	06/23/21	4.64	1,423	05/15/21	4.89	1,501	06/23/21	4.63	1,417	06/23/21	4.69	1.420	06
July 21, 2021	4.63	1,440	06/23/21	4.64	1,423	05/15/21	4.89	1,501	05/29/21	4.63	1,417	06/23/21	4.69	1.426	06
July 28, 2021	4.63	1,440	06/23/21	4.64	1,423	06/18/21	4.89	1,501	06/20/21	4.62	1,417	06/23/21	4.09	1.420	06
August 4, 2021	4.63	1,440	06/23/21	4.64	1,423	05/15/21	4.89	1,501	06/23/21	4.63	1,417	06/23/21	4.69	1,426	06
Nagust 11, 2021	4.63	1,440	06/23/21	4.64	1,423	05/18/21	4.89	1,501	05/23/21	4.63	1,417	06/23/21	4.60	1,428	06
August 18, 2021	4.63	1,440	06/23/21	4.64	1,423	05/15/21	4.89	1,501	06/2/721	4.63	1,417	06/23/21	4.00	1.426	05
August 25, 2021	4.63	1,440	06/23/21	4.64	1,423	05/15/21	4.89	1,501	05/20/21	4.63	1,417	06/23/21	4.60	1,426	06
September 1, 2021	4.63	1,440	05/23/21	4.64	1,423	05/15/21	4.89	1,501	05/20/21	4.63	1,417	06/23/21	4.69	1,426	05
September 8, 2021	4.63	1,440	06/23/21	4.64	1,423	05/15/21	4.80	1,501	06/(3/21	4.63	1,417	06/23/21	4.69	1,426	OE.
September 15, 2021	4.63	1.440	06/23/21	4.64	1,423	05/15/21	4.89	1,501	06/(3/21	4.63	1,417	05/23/21	4.00	1,426	06
September 22, 2021	4.63	1,440	06/23/21	4.64	1,423	05/15/21	4.89	1,501	06/23/21	4.63	1,417	06/23/21	4.69	1,426	05
September 29, 2021	4.63	1,440	0523/21	4.64	1,423	05/15/21	4.89	1,501	06/23/21	4.63	1,417	06/23/21	4.60	1,426	06
October 6, 2021	4.63	1,440	09/23/21	4.04	1,423	05/15/21	4.89	1,501	06/23/21	4.65	1,417	06/23/21	4.09	1,420	06
October 13, 2021	4.63	1,440	06/23/21	4.64	1,423	05/18/21	4.89	1,501	06/2/21	4.63	1,417	06/23/21	4.69	1,426	CK.

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BOP

COMPREHENSIVE CONDITION MONITORING

OCTOBER 2024

Oil analysis is the core but not the limit of condition monitoring

By Mary Messuti, Al Yates and Camron Cunningham



il analysis has always been an integral part of predictive maintenance programs. Advances in complementary technologies such as vibration analysis and thermography have enhanced the ability to detect and diagnose issues before unplanned downtime or damage occurs. While condition monitoring is most effective when the technologies are targeted for the specific application, the combination of technologies needs to be based on sound strategy.

Factors for Deciding on a Test Package

Selecting the right condition monitoring test package involves several key considerations on the part of both the customer and the lab in order to ensure the package aligns with the equipment's requirements and operating conditions. Some of these considerations include the following: equipment criticality, equipment type and application, the operating environment and operating parameters (i.e., continuous hours of operation), oil type and original equipment manufacturer recommendations, known



contaminants and failure modes, and trend analysis.

Oil Analysis: 10 Core Tests

While there are dozens of basic fluid analysis tests and many advanced tests, the following are the 10 core fluid analysis tests.

- Viscosity: This measures a lubricant's resistance to flow at a specific temperature. An oil's viscosity is considered its most important property and is the best indicator for measuring oil serviceability.
- Elemental Spectroscopy: This determines the concentration of wear metals, contaminant metals and additive metals in a lubricant. However, spectroscopy cannot measure particles larger than roughly 7 microns; there are other tests for that.
- Karl Fischer Water Test: This method analyzes water in the microgram or part-per-million range. This test is very accurate to 0.001%. Low levels of water (less than 2%) are typically the result of condensation. Higher levels can indicate a source of water ingress.
- Fourier Transform Infrared Spectrometry (FTIR): Molecular analysis of lubricants and hydraulic fluids by FTIR spectroscopy produces direct information on molecular species of interest, including additives, fluid breakdown products and external contamination.
- Acid Number: This is useful in monitoring acid buildup in oils due to depletion of antioxidants. High acid levels can indicate excessive oil oxidation or depletion of the oil additives and can lead to corrosion of the internal components.
- Base Number: Base number testing is very similar to acid number testing, except that the proper-

ties are reversed. The sample is titrated with an acidic solution to measure the oil's alkaline reserve. Measuring the base number (BN) can help ensure that the oil is able to protect the component from corrosion due to acid. As with viscosity, both acid number and base number are serviceability measures.

- Particle Count: This measures the size and quantity of particles in the oil sample. It is a way to monitor the level of solid contamination in an oil. Particulate contamination is an indication of the effectiveness of filtration and can indicate excessive external contamination.
- Ferrous Wear Concentration: In components such as gearboxes, ferrous wear may be more important than overall particle count and is therefore a good substitute. It measures ferrous wear debris in all types of oil—from gearbox lubricants to hydraulic oil. It also measures ferrous wear debris in grease.
- Analytical Ferrography: This gives analysts the ability to visually examine wear particles present in a sample by separating solid contamination and wear debris for microscopic evaluation. It can identify wear particles, their composition and their origin.
- Fuel Dilution: This test takes a portion of used engine oil and uses a gas chromatograph to measure the amount of fuel contained in the sample by comparing carbon chain length. A high amount of fuel in the oil causes degradation and a loss of viscosity.

The latest breakthroughs in oil analysis involve the integration of artificial intelligence and machine learning to interpret data more effectively.

Complements to Oil Analysis

Oil analysis is a valuable condition monitoring tool, particularly for machinery and engines, but it is not always sufficient on its own. It primarily detects issues related to lubrication and wear particles, but it may not identify problems related to other factors such as electrical malfunctions. Three excellent complements to oil analysis that create a system of checks and balances are thermography, vibration analysis and acoustic monitoring.

Thermography, vibration analysis and acoustic monitoring are reactive and, more importantly, are useful predictive maintenance tools. Because of the predictive nature of these tests, unplanned downtime for heavily used equipment can be reduced or eliminated, allowing repairs to be sched-

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uled during planned downtime.

Thermography. Thermography pairs well with oil analysis. In medical terms, oil analysis is comparable to the bloodwork of the asset, while thermography is comparable to checking the temperature. An asset can look fine, but the thermal camera can see the "fever" that may be affecting the oil. This high temperature can cause the oil to burn off. High oil burn-off can then lead to internal destruction and may cause the asset's power source to fail. Key industries where vibration analysis is most beneficial include the following:

- Manufacturing: To monitor and maintain machinery, electrical systems and production lines.
- Power generation and utilities: For inspecting electrical switchgear, transformers and other critical components.
- Oil and gas: To ensure the proper functioning of machinery and equipment in harsh environments.
- Facilities management: To maintain HVAC equipment, electrical panels and other building infrastructure.
- Mining: For monitoring heavy machinery, conveyor systems and electrical systems.

The main objective of thermography is to confirm that the machinery is running at a healthy temperature and to detect abnormal heat patterns that would indicate inefficiency and/ or defects.

Vibration Analysis. Vibration analysis can be used on many types of rotating components including bearings, gears, shafts, rotors, electric motors, turbines, fans, drivetrains, gearboxes, pumps, piston engines and compressors.

Vibration analysis supplies important information for most industrial or manufacturing facilities anywhere machinery and equipment play a critical role in operations. Primary sectors include the following:

 Manufacturing: Factories with heavy machinery such





Analytical ferrography (left) and ferrous wear concentration testing (right)

as motors, pumps, compressors and conveyors.

- Energy: Power plants, wind turbines and other energy-producing facilities.
- Automotive: Companies involved in the production and maintenance of vehicles.
- Aerospace: Aircraft manufacturing and maintenance facilities.
- Oil and gas: Refineries, drilling rigs and pipelines.
- Mining: Equipment such as crushers, mills and conveyors.
- Marine: Ships and offshore platforms.
- Building maintenance: HVAC systems and other mechanical infrastructure in large buildings.

In addition to determining critical speed and flagging imbalances and bearing failures, vibration analysis is capable of identifying such issues as misalignments and mechanical looseness, electrical motor faults, bent shafts, gearbox failures, and empty space or cavitation in pumps. For example, vibration analysis can help to detect misalignment in a pump or determine if a bearing is beginning to wear.

Acoustic Monitoring. The benefits of acoustic monitoring extend across many industries including aviation, manufacturing and energy production—anywhere air and gas systems play a critical role. Acoustic imaging is particularly beneficial for railway and mining applications. In the railway industry, acoustic monitoring can be used to detect leaks in brake systems by analyzing the sounds produced by faulty brakes. With mining, acoustic monitoring can be used to detect malfunctions and pending failures in critical equipment.

While these systems are designed to operate reliably and safely, they can be prone to leaks and malfunctions that lead to costly downtime, loss in equipment efficiency, increased costs, decreased reliability and increased safety hazards. Early detection of air and gas leaks saves on energy costs, improving equipment performance and preventing potentially hazardous safety risks.

Other Complementary Condition Monitoring Technologies

Depending on the application, other condition monitoring tests to consider may be ultrasonic analysis, which detects high-frequency noise from friction, impact or electrical discharges; and acoustic emission analysis, which detects stress waves produced by crack formation and other critical structural changes.

Together with oil analysis, these technologies refine predictive models, resulting in more accurate and efficient condition monitoring. Ultimately, maintenance teams get a holistic view of equipment condition, leading to better maintenance decisions and improved reliability.



MARY MESSUTI is the president of Eurofins TestOil, Inc. located in Strongsville, Ohio. Her lab offers a full line of lubrication testing as well as fuel, coolant, grease and associated tribology services. Mary enjoys over 25 years of experience in both laboratory management as well as heavy industrial and aerospace manufacturing environments.



AL YATES is the vice president of sales and marketing for Eurofins TestOil. He is responsible for leading the industrial and transportation sales team. With valuable experience in robotics and automation, he creates workflow automations that lead to company-wide efficiency.



CAMRON CUNNINGHAM

is the field service business unit supervisor for Eurofins TestOil and is Thermographer CAT Certified. He is responsible for all reliability services rendered in the field, and for all field service personnel. Camron has worked in the reliability field and reliability-related field for more than 16 years.

Product News



Forestry and Agriculture Lubes

Zeller+Gmelin has presented its complete range of high-performance lubricants for agriculture and forestry. Highlighted in the portfolio is Divinol SynthoHyd Eco 46, a fully synthetic (PAO-based) and biodegradable multi-grade hydraulic oil for use in environmentally sensitive areas. The product is particularly suitable for highly loaded hydraulic units, for large mobile machines or for stationary applications. Its high-quality zinc and ash-free additives enable it to offer excellent corrosion and wear protection. The product range also includes other Divinol organic hydraulic oils and AquaChainFluid, which is an organic chain oil. www.zeller-gmelin.de

Long-Range Lubrication System

Perma introduced its new STAR VARIO Long Range lubrication system. This cutting-edge lubrication solution features LoRa Wireless Technology, allowing for the management of up to 2,000 lubrication systems per Gateway deployed over distances of up to 1.2 miles. The STAR VARIO Long Range system operates autonomously, delivering precise lubricant amounts regardless of temperature and pressure variations. With the launch of the perma CONNECT App, manufacturers can gain access to remote monitoring and management capabilities, simplifying maintenance processes in hard-to-reach work areas and danger zones. The new system provides increased efficiency, time savings and enhanced productivity, Perma says. www.permausa.com

GF-7 Additive Package

Lubrizol announced that it has developed new passenger car engine oil additive technology Lubrizol PV1710. Lubrizol PV1710 is formulated to meet upcoming ILSAC GF-7 credentials and has the capability to reach the dexos 1 specification. The package is designed for coverage in a broad range of base stocks and viscosity grades. Core technology testing is complete and additional testing is underway to cover extensive industry requirements, the company says. The additive package will be available well in advance of the first-license timeline, enabling oil marketers to fully prepare to go to market. www.lubrizol.com

Internally Lubricated Compounds

Americhem, Inc. has launched the EcoLube line of PFAS-free internally lubricated compounds. EcoLube delivers advanced tribological and mechanical properties in moving plastic parts. EcoLube pre-lubricated engineered compounds and alloys are designed to help manufacturers reduce the wear and friction of moving plastic parts, reduce noise during use, and decrease the coefficient of friction for plastic-on-plastic and plastic-on-metal applications. The line features solid state, non-migrating lubricants that stand up to extreme pressures, reducing frictional wear and "slip-stick" behavior in nylon bearings. www.americhem.com

Continued on Page 40

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Sample of 2024 Speakers Include:

Thomas Norrby

Nynas AB

Base Stocks for EV Fluids

Emery Oleochemicals rolled out a new ester base stocks and components portfolio for the formulation of finished electric vehicle fluids. The DEHYLUB monoesters and diesters offer superior lubricity in all viscosity grades, high oxidative stability for prolonged fluid life, excellent low-temperature performance and high flash points for broad temperature regimes, improved thermal management through outstanding dielectric and cooling properties, high breakdown voltage to protect against discharges and arcing, and extended miscibility with most other base stock technologies. The esters also employ renewable raw materials and high product biodegradability. www.emeryoleo.com

Automatic Lubrication

SDT Ultrasound Solutions launched their latest product, the LUBExpert ON-GUARD, an automated precision lubrication system designed to ensure critical production equipment is greased correctly. The company says that it differs from other similar automated lubricators because it continuously monitors the friction levels of critical rotating machinery. Then, using the SDT LUBrain algorithm, ON-GUARD injects the exact quantity of grease needed to restore a perfect lubricant film. Using LUBExpert ON-GUARD, operators can view critical lubrication information from the convenience of their web browser from anywhere in the world. www.sdtultrasound.com

Better Motor Oils

Shell Lubricants launched three new products under its Shell Helix Ultra passenger car motor oil brand to meet upgraded industry specifications and OEM requirements. Test results show that new Shell Helix Ultra products enable customers to increase engine power by up to 1.8%, increase the responsiveness of their engine by up to 3.4% and achieve better fuel efficiency of up to 4%. Field trials also demonstrate that the new products enable customers to keep their engine strong and powerful, for up to 200,000 km. Shell Helix Ultra ECT C6 0W-20 and Shell Helix Ultra ECT C3/SP 0W-40 were launched in China and Europe in the second and third quarter of 2024, respectively. Shell Helix Ultra ECT C3/SP 0W-30 is now available in China and will be launched in Europe this year. www.shell.com

More MWF

Master Fluid Solutions has debuted three of its latest products: TRIM MicroSol 465, TRIM MicroSol 685XT and TRIM C290. TRIM MicroSol 465 is a low-foam semi-synthetic microemulsion coolant optimized for high-volume cast iron, ferrous metalworking operations, and select aluminum and nonferrous operations. It prevents leaching of elemental iron, eliminates clinkering, and offers excellent corrosion inhibition. TRIM MicroSol 685XT is a high-lubricity, low-foaming semisynthetic microemulsion coolant, and TRIM C290 is a synthetic metalworking fluid optimized for general aluminum parts that provides outstanding corrosion resistance on nonferrous materials, including aerospace-grade aluminums. www.masterfluids.com

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Places'n'Faces

NNPC Denies Malta Connection

Officials from the Nigeria National Petroleum Corp. have illicit operations in Malta, from where they import substandard petroleum products, including lubricants and fuel, the owner of a Nigerian refinery alleged before the Nigerian House of Representatives joint committee on petroleum resources.

"Some of the terminals, some of the NNPC people and some traders have opened a blending plant somewhere off Malta," Africa's richest man and CEO of Dangote Refinery Aliko Dangote said to the committee. It's a claim those who are said to be involved categorically deny.

Dangote was in turn accused by Farouk Ahmed, the CEO of the Nigerian Midstream and Downstream Petroleum Regulatory Authority, that diesel from his refinery is inferior quality compared to imported fuel.

The Dangote refinery has capacity to process 650,000 barrels per day and when fully operational will be Africa's biggest oil refinery and the world's biggest single-train facility. It also has the potential to shrink petroleum product imports to Nigeria by 60% to 160,000 barrels per day by 2025, from 400,000 bpd in 2023, according to Nigerian media. Those invested in product importation will take a substantial hit.

Until the refinery was built, there was no refining capacity in Nigeria, despite it being the continent's biggest oil producer. According to the government, the country imports products to the value of more than U.S.\$25 billion per year, and NNPC is the sole licenser of imported petroleum products.

Imports of petroleum products from Malta to Nigeria were \$47.5 million in 2013, rose to \$177 million in 2015 and then dwindled to zero between 2016 and 2022. Suddenly in 2023, they skyrocketed to \$2.24 billion, accounting for almost 10% of Nigeria's total, according to data compiled in the United Nations Comtrade database and discovered by Nigerian media. Malta is a relatively small island with a small petroleum industry.

In a message posted on social media on July 23, Mele Kyari, group managing director of NNPC, refuted Dangote's claim and said he was unaware of anyone from the stateowned energy company who owns a blending plant in Malta.

Marsaxlokk harbor with the traditional Luzzu boats. Malta would be a sleepy

backwater were it not for its handling of Russian oil.

"I do not own or operate any business directly or by proxy anywhere in the world with the exception of a local mini-agricultural venture," Kyari stated in the post. "Neither am I aware of any employee of the NNPC that owns or operates a blending plant in Malta or anywhere else in the world."

Emeka Obidike, executive secretary of the Lubricant Producers Association of Nigeria, agreed that Dangote's allegation was fanciful. He added that even if there is such a blending plant in Malta, it would have no bearing on the Nigerian lubricant market.

"Don't forget that the Nigerian lubricant market is big, and some multinationals have blending plants outside the country from which they import lubricant products into the country, but that has not affected the local lubricant market," Obidike said.

"The fact that people import lubricant products from outside Nigeria does not make such products superior to local lubricant products. The allegation that some officials of the state-owned petroleum corporation *Continued on Page 44*

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CONFERENCE CALENDAR

OCTOBER

8th – 9th 19th ICIS Middle Eastern Base Oils and Lubricants Conference

Riyadh, Saudi Arabia https://events.icis.com/ website/8329/

9th – 11th Argus Base Oils Conference, Asia, Middle East & Africa

Dubai, United Arab Emirates https://www.argusmedia.com/en/ events/conferences/base-oilsconference-amea

16th – 18th 2024 UEIL Annual Congress Porto, Portugal https://www.ueil.org/?post_ type=events&p=7347

DECEMBER

5th - 6th 18th ICIS Pan American Base Oils and Lubricants Conference Jersey City, New Jersey https://events.icis.com/ website/8891/

FEBRUARY

12th - 14th 29th ICIS World Base Oils and Lubricants Conference London, United Kingdom https://events.icis.com/ website/9160/

Continued from Page 42

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own and operate a blending plant in Malta won't have any effect on the local lubricant market in Nigeria."

However, leaked documents seen by local media implicate a Nigerian company Matrix Energy in the importation of off-spec fuel and other products from Russia via Malta. Maltese waters are now the number-one destination for ship-to-ship transfers at sea of sanctioned Russian oil and petroleum products.

Matrix Energy's managing director is Abdulkabir Aliu is also a member of the Presidential Economic Coordination Council. Aliu has opened lawsuit to clear his name of wrong doing.

Ingevity Merges Oleo, Tall Oil Units

Performance chemicals company Ingevity Corp. will close its Crossett, Arkansas, facility and shift oleo production to North Charleston, South Carolina, a move the company hopes will make its performance chemicals segment more profitable.

The closure of Crossett is expected to generate annual savings of U.S.\$20 million to \$25 million starting in 2025. The company blames underperformance of its oleochemicals business on slow industrial recovery. Ingevity will also implement a number of corporate cost cutting measures that it says will generate \$10 million in annual savings by 2025.

However, the restructuring will cost Ingevity \$100 million, of which \$65 million is non-cash asset-related charges, \$10 million in severance pay and other employee-related costs, and \$25 million for decommissioning, dismantling and removal charges and contract termination costs, the company said in a press statement.

"Transitioning oleo chemical refining to our North Charleston facility rationalizes our manufacturing footprint, creates significant cost savings with no anticipated impact on commercial operations and maintains future growth optionality as the oleochemicals market evolves," said John Fortson, president and CEO of Ingevity.

The company saw second-quarter net sales fall 19% to \$390.6 million year-on-year, as well as a net loss of \$283.7 million in the same period.

Potential Citgo Buyer Emerges

New York investment firm Elliott Investment Management emerged as a likely buyer of Petroleos de Venezuela Holding Inc., the 100% owner of Citgo Petroleum Corp. The convoluted auction process and legal entanglements with the U.S. Treasury could still scupper its chances.

Based in Houston, Texas, Citgo processes up to 807,000 barrels of oil per day at refineries in Louisiana, Illinois and Texas. The company also owns stakes in terminals, pipelines and lubricant manufacturing plants. It was valued at U.S.\$11 billion-\$13 billion and is the asset target for creditors from the auction.

Citgo unmoored from Venezuela's state oil company Petroleos de Venezuela S.A. after sanctions were imposed in 2019. Since then, PDV Holding and Citgo have been controlled by Venezuela's National Assembly, which is in opposition to President Nicolas Maduro. Maduro blames them for losing the parent company to pay PD-VSA's debts. The National Assembly counters that it didn't approve of Citgo being used as collateral.

The seizure of Citgo was triggered by a lengthy legal battle by a Canadian mining company Crystallex, which wanted to recoup unpaid damages from the expropriation of its Venezuelan assets during the administration of former President Hugo Chavez.

A group of 18 creditors wants \$21.3 billion in arbitration rewards for past expropriations and debt defaults in Venezuela, some of which accrued during the Chavez era. To recoup these debts, the U.S. seized PDV

Continued on Page 46

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Continued from Page 44 Holding and put it up for sale.

Police Swoop on Fake Oil Factory

Law enforcement seized drums of counterfeit Castrol engine oil and packaging during a raid in the city of Bhadohi, Uttar Predesh province, India.

Counterfeit lubricant is a worldwide problem, especially in the developing world where authentic products can be prohibitively expensive. The damage to equipment caused by fake oil can be catastrophic, as well as to the makers of authentic products.

Sunil Kumar of Castrol India Ltd filed a complaint with the authorities and took part in the raid, which netted 700 packed cans and 360 liters of oil labelled Castrol. Kumar said the counterfeit products were worth hundreds of thousands of rupees.

The police also found 25 employees and the owners of the factory, who were taken into custody.

The innocuously named Petrolube Private Ltd is one of many similar operations around the country. In July, police raided an outfit in Tirtol, Jagatsinghpur province, where cheap oil was being mixed with various chemicals and sold at inflated prices, Indian news reports said.

At the start of the year, Honda Motorcycle & Scooter India joined police to crack down on a fake oil network in Kolkata that seized 8,000 fake products. In Delhi at the same time, police raided a fake oil factory after complaints from drivers of malfunctions and accidents caused by counterfeit products. Among the fake packaging were "unknown chemicals" as well as 50 kilograms of urea, typically used in fertilizer.

Exxon Opens U.K. Base Oil Terminal

ExxonMobil is opening a base oil supply terminal in Dagenham, United Kingdom, providing an extension in the supply chain for its API Group II base oil plant in Rotterdam.

The site is 15 miles east of London in an area known for its industrial past. The facility brings the number of distribution points in Europe to eight and is the company's second facility in the U.K., after its Group I base oil plant in Fawley.

The American energy giant said it has signed a long-term contract to rent the terminal from Stolthaven, a terminal owner and operator and unit of London shipping and logistics company Stolt-Nielsen.

The base oil plant at ExxonMobil's Rotterdam refinery was the first large Group II plant in the European Union, with capacity of 1 million metric tons per year. Officials did not say that all of the base oil offered in Dagenham will come from Rotterdam but suggested that much of it will.

"Coupled with our Rotterdam refinery, the new Dagenham distribution center will cover the majority of our customers' lubricant manufacturing needs in the U.K.," said Nick Harris, ExxonMobil Basestocks EAME sales manager and project manager for the new terminal. "The facility will enable a more direct supply chain, reduced lead time and simplified customs clearance for imported molecules, ultimately reducing complexity across the entire import process for lubricant formulators."

The Fawley base oil plant has capacity of 407,000 t/y and is the only virgin base oil plant in the country.

Briefly Noted

U.K.-based lubricant company **Morris Lubricants** upgraded its production plant in Shrewsbury, the first step in a long-term investment plan, with more improvements to follow, the company said. The upgrades cost the company U.S.\$3.9 million and included advance blending capabilities, a new tank farm of 30 storage vessels, relocation and reconfiguration of production lines, automated control and recovery systems, and energy-efficient LED lighting in the production facility.

TotalEnergies will sell its 50% stake in Total Parco Pakistan to a

commodities trading company. Parco has a retail network of more than 800 service stations across Pakistan, as well as fuel logistics and lubricants operations.

ENOC Group announced a partnership with **Flow Petroleum Private Limited**, an oil marketing company headquartered in Lahore, Pakistan. The agreement grants Flow Petroleum the exclusive rights to distribute ENOC's premium lubricants across Pakistan.

Faces in the News

German rerefiner Puraglobe appointed a new CEO, **Alois Virag**. He replaces the long-serving **Andreas Schueppel**.

Gulf Oil Lubricants India Ltd. appointed **Sandeep Bangia** as the new head of strategy, transformation and e-mobility.





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