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Focusing on Africa's lubrication needs

VOL.13 • JUNE 2015

MAIN FEATURE

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EDITORIAL

Effective lubrication saves energy, increases production output

We are pleased to welcome you to this 13th edition of Lubezine, which is part of our continuing coverage devoted to highlighting developments within Africa's lubricants industry, including notable international technological and market dynamics.

Our cover article this quarter highlights the instructive role lubricants can play in reducing energy wastage, and bolstering machinery performance. At length, our guest contributor John Sander explores the ways by which proper lubrication can result in immense energy savings, reduced production costs, and increased output. Mr. Sander outlines comprehensive case study findings with facts and figures that corroborate the fact that effective lubrication is an indispensable energy saver.

In another technical article we have published this quarter, John Evans of Wearcheck(SA) demonstrates the mechanisms through which lubricants additives are depleted, providing a detailed summary of the processes involved in oil degradation, and the importance of regular oil analysis to establish lubricants' efficiency while in operation.

This edition's market report includes Total-Egypt's renewed five-year contract to continue to be the sole authorised dealer for Nissan, and the reported plans by Gulf Oil Middle East to launch a series of joint ventures in Africa as part of its expansion programme in the continent. We have also covered various other distributorship deals that have been signed between and among firms.

Of particular note is the KenolKobil–BP (SA) deal that will not only see the former being the sole distributor of Castrol lubricants in the Kenya but culminating in setting up of a blending plant in the country.

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proper lubrication can result in immense energy savings, reduced production costs, and increased output

Joseph Ndung'u

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See also Frequently Asked Questions P.7

Vivo Energy (Uganda) sponsors national motocross championships with 50 million shillings

Vivo Energy Uganda, the company that distributes and markets Shell branded fuels and lubricants sponsored the 2015 Uganda's 2015 National Motocross Championships.

The oil company provided a USH50 million sponsorship package under its Shell Advance lubricant in support of the 15th February 2015 event. The sporting occasion was the first round of the motocross out of the eight that are scheduled for this year.

At least 60 riders participated in the championship and there was a special participation by guest rider Daniel Sedlak from the USA who was competing in the MX 1 class.

Speaking at the cheque handover ceremony, at Shell Kawempe, Vivo Energy's Lubricants Brand Manager, Joy Mwine expressed great satisfaction in bringing their customers and motocross fans the exciting riding experience that only Shell Advance can provide.

She said: "Shell Advance, which is specifically designed for motorbikes, actively cleans and protects vital parts of the engine for better performance, giving riders a smoother and more exciting ride".

Mwine assured customers of the company's commitment to continuous innovation to improve product offering, giving customers the quality products that they deserve. She urged motocross participants, fans and the general public to rigorously observe all the safety measures in place to ensure their health and safety during the championships.

"Vivo Energy's Goal Zero target means the company aims for zero harm to people, environment and assets. For people this includes zero fatalities, to lose zero time from injuries and to have zero road accidents", Mwine concluded.

The first round of the championships, organized by Speedway Motorsports Club, will take place on February 15th 2015 at the Uganda Motorsports Arena in Busiika. ■

Motech Africa distributors ink deal to distribute Motul products in Zimbabwe

Motech Africa has announced that it has signed a distributorship deal of Motul products in Zimbabwe.

Announcing the development, Motech Africa's representative in Zimbabwe Francois Molife said the agreement will include the Motul 300V Motorsport line as well as maintenance products, including brake fluid, coolant, and transmission and differential fluids.

"As part of our ongoing growth in Africa, especially southern and East Africa, we are very pleased to now have Motech Africa as our distributor in Zimbabwe. We are sure that Zimbabwe will find the quality of our products and service to be among the best they have experienced. Motech Africa has a great team in place with a very aggressive strategy for the Zimbabwean market, and we are looking forward to them making great strides here', said Steven Lurie, Motul's business development manager for Southern Africa.

French firm Motul specializes in the formulation, production and distribution of high-tech engine lubricants for a range of private and commercial uses, and was among the first companies to market 100 per cent synthetic lubricant for automotive engines. ■

Turn to P.15

Global Two-wheeler Market

KenolKobil, BP sign distribution agreement for Castrol

L-R David Ohana Group MD KenolKobil and Stanley Dewing - BPSA- Africa Sales Manager

KenolKobil and BP Southern Africa have signed an agreement that will see KenolKobil hold exclusive distribution rights in Kenya for the globally acclaimed Castrol lubricants.

The May agreement sets the stage for superior lubricants technology in the market through introduction of a wide, superior range of products covering among others, automotive, industrial, mining, and marine lubricants as well as grease and other specialty products.

The long-term agreement signed at the ceremony presided by the KenolKobil board Chairman Mr. James Mathenge and Group Managing Director Mr. David Ohana, covers the Kenyan market and looks towards local blending of Castrol products, upon which Kenya will become one of the countries in Africa to blend the products.

In a statement, KenolKobil's Managing Director David Ohana said that the company plans to build a lube blending plant with a capacity of 1,000 metric tones per month in Mombasa, a joint venture with BP Southern Africa (BPSA).

"We will build a new blending plant in Mombasa in the next one or two years at a cost of between USD 10 million and USD 15 million," Ohana said during the signing ceremony.

"This Partnership with BPSA is of great benefit to the Kenyan market as it givers consumers access to a brand that has built a formidable track record based on quality and innovation, with string partnerships with global and continental Original Equipment Manufacturers in automotive, commercial and Industrial sectors such a Toyota, VW, Ford, Nissan and Volvo. It also brings home advanced customer support and knowledge transfer through user training and engagement in the field if lubricants technology" said the Group MD Mr. David Ohana.

"furthermore, this move is in line with the KenolKobil core objective of being a market leader in innovation and a supplier of the highest quality products as well as offering diverse solutions for existing market needs as well as setting the pace for future developments" he added.

KenolKobil will distribute the full range of Castrol products, the world's No.1 specialty lubricants brand, including Edge and Magnatec which are based on pioneering and advanced technologies. ■

Total renews lubricants supply deal with Auto Egypt

Total Egypt has renewed its five-year contract with Auto Egypt, a member of El Kasrawy Group, to remain the leading Nissan authorised dealers sole supplier of lubricants. According to the agreement extension, Total Egypt will provide Auto Egypt with all required performance engine oils including Quartz Family, Rubia Family, Cooling and Transmissions Oils and other fluids, delivered on-site, said a statement.

In return Auto Egypt will acquire all products needed for its Auto Egypt outlets and workshops from Total Egypt, it said. In addition, Total Egypt and Auto Egypt will carry out joint marketing activities to enhance and strengthen both brands' partnership.

Thomas Rebeyrol, managing director of Total Egypt, said: "There is no better sign of success, stability and even greater future potential than renewing an existing agreement with a long-standing company as reputable as Auto Egypt. It's our great pleasure at Total Egypt to look forward to another five years - at least - of collaboration with Auto Egypt.

"With our solid track record, joint experience and well-established understanding, the future looks bright for both companies," he added.Mohamed El Kasrawy, chief executive officer of Kasrawy Group, said: "We have come to rely on Total Egypt's expertise in supplying Auto Egypt, Nissan's authorized dealer with cutting edge products, perfectly aligned with our needs and expectations for nothing less than the best for our own leading brands.

"Finding the right partners is one of the greatest business challenges, and once the fit is right, it provides unparalleled opportunity for long-term successful collaboration and joint growth."

Meanwhile, Total Egypt is also committed to providing Auto Egypt with the technical support, information and training necessary to ensure that all the company's staff is fully trained to implement international standards, thereby guaranteeing exceptional customer experience. ■

Gulf Oil Middle East plans to expand in Africa

The Gulf News, a Dubai-based newspaper, is reporting that Gulf Oil Middle East Limited, a wholly owned subsidiary of Gulf Oil International, is in talks to acquire at least one blending plant and launch a series of joint ventures in Africa, according to a senior company executive.

Camille Nehme, group vice-president operations and business development at Gulf Oil International, told Gulf News in Dubai the company wants to launch its own African operations. It currently operates in the continent through a series of licensee and franchise agreements. It's time to enter Africa, he said, "we are very bullish."

Nehme estimates Gulf Oil Middle East will spend around US$20 to $35 million establishing its own operations in Africa, which includes acquiring a number of blending plants and a heavy marketing campaign. He said the "source of funds [is] not an issue" with Gulf Oil Middle East and Gulf Oil International both likely to tap banks and group funding. Nehme did not mention which banks.

Egypt, Morocco, Tanzania, South Africa and Nigeria were identified by Nehme as major growth markets, however, he declined to state in which countries the talks for joint ventures and acquisitions are taking place.

The African expansion will allow Gulf Oil to conduct its "own sales" with its "own team," Nehme said.

Gulf Oil Middle East has its own operations in the UAE, "sponsored operations" in Oman, Bahrain, Qatar and Kuwait and distributors in other Middle Eastern countries, according to its website. In Africa, it exports to Tanzania, Uganda, Congo, Kenya, Ivory Coast (Côte d'Ivoire), Benin, Sierra Leone, South Africa and Morocco.

Gulf Oil Middle East is also looking

favourably to re-establishing its business in Iran with plans to launch a joint-venture if sanctions are lifted later this year.

Gulf Oil Middle East, a Gulf Oil International Group company, is part of the $18 billion Hinduja Group. Today, Gulf Oil International markets lubricants under the Gulf brand in more than 100 countries across five continents. ■

See also P.12
The mechanisms of additive depletion and degradation

Frequently Asked Questions FAQS

Q Is it okay to mix brakefluid of different DOT ratings

DOT has become a common name for brake fluid. The abbreviation itself means the US Department of Transportation (DOT). Brake fluid exists in different forms meeting the US Department of Transportation specifications. These specifications are DOT 3, DOT 4 and DOT 5.1

In general DOT 3 can be mixed with DOT 4, while DOT 3 and DOT 4 can also be mixed with brake fluids of the DOT 5.1 rating. DOT 5(silicone based) is incompatible with the other DOT brakefluids therefore can not be mixed.

Q How can one store lubricant drums outside?

It is discouraged to store lubricants outside, but if one must store outside, a temporary shelter can be placed. The drums should be placed on top of pallets or blocks so that they do not touch the ground to prevent ingression of moisture. The lubricant drums should be placed on their sides with bungs (holes) horizontal to each other. This ensures the lubricant covers the bungs and protects the drum from breathing in and out on differential temperatures.

If the lubricant drums are stored on end with bungs on top, water may seep into drums through the bungs and destroy contents, or form rust on the drum's interior.

Q What's the difference between synthetic and mineral oil?

Synthetic lubricants are made up of molecules that have been modified under complex chemical processes and allow for enhanced performance under extreme conditions of temperature, pressure and mechanical forces. Mineral lubricants are composed of molecules present in crude oil that are separated in the distillation process at a refinery.

Q Does the colour of the oil mean anything?

The colour of an oil has no special meaning, but depends on a number of factors, such as the refining process (Hydro treated and hydrocracked base oil are lighter in colour) and the types of base oils(Group II and II tend to be lighter than group I), additives and crude oil used. ■

Uganda grapples with fake oil as marketers shun local blending

By Samuel Sanya

In order to understand the Ugandan lubricants market, we spoke to Andrew Mugisha Oryx Lubricants Engineer, Edward Walugembe Vivo Energy/ Shell Uganda Commercial Manager and Peter Muinde of Hass petroleum. They shared their observations on the market. The following are excerpts of those interviews:

Oryx Lubricants Engineer Mr. Andrew Mugisha

Qn: What major lubricant brands are in the market?

Mugisha: It is hard to say exactly which the major brands in the market are as there are several brands in the market. The brands vary by the manufacturers who include: Shell, Total, Oryx, Castro, Dello, National, Enoc, Oil Libya, and Mogas.

Walugembe: We have Remula for diesel engines. It's the most popular by sales. We also have Helix oils for petrol engines. Regarding lubricants, we have oil for gear boxes, aviation and hydraulic systems. We have greases such as Gadus and Spirax for gear oils.

Qn: Where are they blended)? (Uganda does not blend locally)

Mugisha: Oryx is Swiss; we operate in Europe and Africa. We have two blending plants in Togo and in Dar-es-Salaam, Tanzania. Our Dar-es-Salaam plant also blends products for other companies in East and South Africa. The Oryx plant in Dar-es-Salaam produces over 100,000 tones of lubricants annually.

Walugembe: We do not blend locally. 95 per cent of the product we sell on the Ugandan market is blended at our plant in Mombasa. The other 5 per cent is blended at other worldwide Shell blending plants like in South Africa, Morocco, Germany and the US. We also import some lubricants from Turkey and the Far East. The Vivo energy/Shell plant in Mombasa produces 25,000 tones of lubricants every year, the product is distributed within East Africa and as far as Zambia in Southern Africa.

Qn: What are the major reasons why the country has not invested in a blending plant?

Mugisha: The raw materials for lubricants are base oil-80 per cent and additives, which determine which type of lubricant is being blended. The base oil is either Diesel oil or Petrol oil. Due to the logistical cost of transporting base oil, it is cheaper to have a blending plant along the coast line.

Walugembe: Blending locally depends on the level of local demand. At the moment, it is not economically viable to blend locally. Our plant in Mombasa blends sufficient product for our market in the entire region at the moment. Also, proximity to the coastline makes financial sense to blend from Mombasa; it makes financial sense due to the bulky raw material used in the manufacture of lubricants.

Qn: Will production of oil in Uganda lead to local blending of lubricants?

Mugisha: Yes and no. I believe the production of oil in Uganda will create opportunities for locally blended lubricants, however, in order for us to blend lubricants locally, there have to be economies of scale, the larger the level of production, the higher the level of profitability. At the moment Uganda has a smaller market for lubricants when compared to the rest of East Africa. We suffer a lot of low quality, recycled lubricants on the market.

When it comes to vehicle lubricants, a large number of the cars on the roads are old, and are not regularly lubricated. There are a lot of recycled lubricants in the market from Dubai which is very cheap. This means that virgin oil is competing in a price sensitive environment. However, as the middle class grows, there is a rise in the segment of clients are quality sensitive and willing to pay premium prices.

Right now, this quality sensitive market is still too small to justify the establishment of a blending plant in Uganda. We need government to introduce policy against the import of recycled lubricants as this will increase demand for higher quality virgin oil. Subsequently, when demand for virgin oil reaches a critical point, where we have economies of scale, then a blending plant can be set up.

Walugembe: the oil that Uganda will produce might not have what it takes to create lubricants. Lubricants require a certain, specific type of crude before additives can be added.

Qn: Who has the largest market share? What is the proportion of market share of these companies?

Mugisha: There is intense competition in the market. Most times when you get a client, it is very likely that they have just moved from a competitor, so customer care and service is very essential. Market share keeps changing from time to time, depending on the magnitude of deals that various market players have signed.

Generally, I would say, total has the largest market share when it comes to motor lubricants and Shell, which trades as Vivo energy, has the largest market share for industrial lubricants.


Mr. Edward Walugembe - Vivo

Walugembe: it is hard to determine who has the largest market share since there is no requirement to submit sales reports. It is hard to compare sales of Gap co, Shell (Vivo), Total and so on. What I can say is that positions change frequently according to which company has closed which deal. The lubricants industry is not as clear cut as the fuel industry. However, I tend to agree with those who place Vivo and Total as the market leaders.

Qn: What are the main sales channels in the country?

Mugisha: The sales channel depends on the nature of the client. For industrial clients, Oryx directly approaches the company. However, most motor vehicle lubricants are sold through our retail network. All distributors generally follow the same trend – industrial clients are approached directly while motor vehicle lubricants are sold through retail outlets.

Walugembe: We use our retail outlets for motor lubricants. We use direct business to business for big clients. We also have an indirect channel through third party shops and garages, spare parts shops and auto shops.

Qn: What product ranges are available (automotive, industrial, specialty products)?

Mugisha: There is an abundance of lubricants on the market. There are hydraulic, gear, aviation, transmission, transformer lubricants, brake fluids, compressor oils, whatever you can think of.

There are very few clients that require specialized lubricants. If there is unique equipment with unique requirements then most likely the machine manufacturers will recommend a particular lubricant. The actual lubricant names and brands vary by manufacturer; there are very many brands of automotive and industrial lubricants on the market.

Most times vehicles will consume as much as four different lubricant types during the year; this makes it hard to pinpoint which lubricant was fake and which was the right one

Walugembe: We offer all lubricants you can think of. We also have specialty lubricants. We even have lubricants for door hinges; we have lubricants for all appliances.

Qn: What product specifications are there (monograde, multigrade and synthetic lubes)?

Mugisha: All three types are available in Uganda. Monogrades are the cheapest and majority of vehicles on the market go for these since they are old vehicles. Synthetic lubricants are fairly more expensive and are majorly used by drivers of new vehicles. Users of synthetic lubricants are few but the number is steadily growing as the middle class expands and the number of new vehicles increases.

Multigrades are majorly used in heavy duty diesel engines. Multigrades and synthetics are being consumed majorly by quality sensitive consumers and industrial users who do not care much for price.

Walugembe: We have all classes of lubricants. We supply lubricants according to the Original Equipment Manufacturer (OEM) directions. There are many cheap imports of recycled monograde oil from Dubai which are competing with our virgin lubricants. However, the market for high grade synthetic lubricants is steadily growing because of the growth in the industrial sector and the use of high value equipment. Most cars in Uganda are between 10 – 15 years and they tend to go for cheap monograde lubricants.

Qn: What regulations are in place in the industry?

Mugisha: Yes, there are regulations for lubricants which are enforced by the Uganda National Bureau of Standards (UNBS). However, there is a lot of recycled and duplicated product on the market.

Walugembe: I would like to see more enforcement of regulations by UNBS. There is a lot of low spec oil and recycled oils that are being sold on the cheap, this should be stopped. They should crack down on people selling adulterated lubricants. Another major problem is consumer awareness about the right type of lubricants and the effect of using the wrong lubricants.

Our market is fully deregulated so more effort is required to empower the consumers with the right information. Clients leave mechanics to play 'god' over their cars but they need to be more involved when their vehicles are being serviced.

Muinde: Adulterated and recycled product is a big problem. Most times vehicles will consume as much as four different lubricant types during the year; this makes it hard to pinpoint which lubricant was fake and which was the right one. Some product is adulterated and repackaged within the region; the regulator needs to do more spontaneous checks

Qn: Which international brands are available (not blended in East Africa)?

Mugisha: Almost all products that are sold in Uganda are not blended in East Africa. There are few players that blend in East Africa like Oryx who blend in Tanzania. I believe Vivo energy (Shell) blends in Kenya as well. The Oryx plant also blends for four other players in the Ugandan market. For petrol engines, we recommend our Axcella oils which enable the engines work longer before their next service by absorbing fumes and preventing buildup of sludge.

Qn: What is the main market segment? (Diesel engine, petrol engine, 2 wheeler segment, agriculture, gear lubes, greases, brake fluids etc)?

Mugisha: The industrial sector which is quality sensitive is the most lucrative because clients in this segment are willing to pay more. On the other hand, the motor vehicle segment is saturated with recycled lubricants which are hard to compete with. Greases are specialty and are mostly used by industrial clients.

Qn: What strategy does a new entrant use in the industry?

Mugisha: The market is not yet saturated; however, clients have multiple alternatives. The Ugandan market is so competitive that most times when you get a client, they have most likely moved from a competitor. It is vital that a new entrant differentiates themselves on service, quality product and after sales service support. ■

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Prevention of sludge

By James Wakiru
James has been working in the lubricants industry in the areas of sales, marketing and technical support.

Oil sludge or black sludge is a solid or gel in motor oil caused by the oil gelling or solidifying, usually at temperatures lower than 100°C.

Sludge appears in difference ways ranging from light brown to opaque black, they range from semi-liquid to solid, and they can be formed by different chemical reactions. Sludge is typically soft, but can polymerize to very hard substance. It plugs oil lines and screens, and accelerates wear of engine parts.

Sludge infested engine

In the current times, new and reconditioned engine and equipment durability is directly related to the recognition, control and elimination of all factors that support engine sludge formation. In the previous edition we looked at the various causes of sludge formation in the engines and other lubricated equipment especially in the industrial set up. There are a number of ways one can mitigate, prevent or deal with sludge formation to attain the above objective.

Regular maintenance

Regular maintenance and service of the engines and equipment is imperative to ensuring they operate under required conditions. The normal checks and actions during regular scheduled maintenance would easily point problems that would lead to sludge formation. One should ensure that the service interval reflects operating conditions of the vehicle. For severe and heavy duty requirement, service should be done more frequently.

Use of high performance lubricants

High performance lubricants often have fewer impurities. High specification mineral lubricants like API SM, SL for petrol engines and API CJ-4, CI-4 for diesel engines will help in preventing the sludge formation due to the additive design to resist formation of sludge. Use of full synthetic motor oils contain fewer impurities than conventional oils. That means they're designed to better resist the formation of sludge, maintain their viscosity and ability to flow, and prevent deposits from forming.

Filtration system

The Filtration system of the engine is vital in ensuring the integrity of the lubricant and fuel in the engine. Poor or faulty air filtration system would cause ingression of dust and other particles which are catalysts to sludge formation. The air filters need to be genuine and or approved to be able to seat well and seal dust and other contaminants from ingression into the engine. Oil filters being used in the engine and other equipment require to also be genuine and approved. Failure to change the oil filters can cause partial blocking of the filter and oil starvation can easily occur causing opening of the bypass valve allowing unfiltered oil to flow through the engine. This will increase engine wear and oil consumption.

Cooling system

The engine or equipment cooling system is a vital part in mitigating sludge formation. Primarily this is because overheating leads to oxidation of the lubricant which is a major cause of sludge formation. The cooling system of the equipment requires to be in good working condition. Overheating can cause your engine oil to oxidize, which can lead to the accumulation of oil sludge. One needs to pay keen attention to the gauges and repair any cooling-system issues that can lead to high operating temperatures. A coolant is recommended to be used to ensure the boiling point of the water used for cooling is raised beyond the peak operating temperature of the equipment.

Draining of oil regularly

Despite the urge to lengthen the oil drain intervals, it is recommended that an oil should not be overused. Whilst carrying out regular maintenance and service, the oil requires to be changed during the same scheduled services. When oil is left for long in an operating equipment, sludge formation is prone to occur. The rule of thumb is using the OEM(Original Equipment Manufacturer) recommended drain interval or experience to gain the right drain interval. Regular draining of the oil will ensure the equipment and engine cleanliness and avoid accumulation of contaminants that catalyse sludge formation.

Operational discipline

Another cause of sludge formation is the start-stop operation that causes the engines not operate efficiently. It depends how hard one drives the engine and it's intended purposes. Hard driving along with frequent start-stop driving causes the oils to get hotter and breakdown, causing sludge formation. The same principle applies to industrial applications where frequent start-stop operations occurs. One should reduce the hard operations and cases of start-stop operations to avoid sludge formation. In an engine, one can prevent sludge formation by avoiding making exclusively very short trips. If one is restricted to short distances of driving, ensure you go for a longer drive once in a week. ■

Total lubmarine opens new lab facilities for marine lubricants research

Total Lubmarine has opened new laboratory facilities at its main research centre in Solaize, near Lyon, in France. The new facilities are dedicated to the research and formulation of new marine lubricants and equipped with state of the art equipment to support the research team's quest to develop the next generation of lubes for the shipping sector.

The new facility comes against a backdrop of stricter emission limits in Emission Control Areas (ECAs) which would require the use of dual fuels and new lubricant formulations.

The company said that stricter sulfur regulations, which came into effect at the beginning of this year, had prompted the need for a "next generation" of lubes.

Since January 1, 2015, sulfur content in marine fuel has been limited to 0.10 percent, leading many companies to switch to low-sulfur fuel or alternatives such as liquefied natural gas (LNG).

Inaugurating the new facilities, Norbert Schieren, General Manager of Total Lubmarine said "Total Lubmarine's success to date has been due in large part to our commitment to long-term research programmes. These programmes, run by scientists at the top of their field, enable us to scope out and evaluate all the options. We are re-imagining the lubes of today and developing lubes suitable for the stresses and strains of the marine environment: whatever the fuel and whatever the engine. Our investment in these new facilities demonstrates our on-going commitment to this vital research".

"The next generation of lubricants must be born out of innovative chemistry if they are to be simple for operators to use and at the same time match tough and variable operating conditions," he said. ■

Source : OEM/Lube News

GM increases Dexos1 trade name licensees

The number of General Motor's Dexos1 approved oils has gone up to now over one hundred licensees, approximately 10 per cent more than the number of licensees at the start of 2014.

In early 2014, the total number of Dexos1 oils on the approved oils list was 224 and the total number of dexos2 oils was 96. But there are now 359 Dexos1 oils and 119 Dexos2 oils presently listed. In March 2013, the total number of approved Dexos1 oils on the list was only 105 and the total number of Dexos2™ oils was only 75.

Dexos is an engine oil specification that enhances fuel efficiency and the same initiative is being carried out by API and ACEA. Currently, there is a rush by oil marketers and additive manufacturers to get licenced to market lubricants with the trade mark of Dexos. However, many motorists have not moved to fuel efficient lubricants.

It is common practice for OEMs to come with customized specifications and request that oil marketing companies that can meet the specifications get licensed to use the trade mark.

For instance, GM has been encouraging oil dealers to formulate automatic transmission fluid and requiring seek authorization from GM to use the brand name Dexron11 to Dexron V1 as the brand was recommended by many manufacturers, including Japanese.

Jo Lynne Parsons, dexos™ Project Manager at the Center for Quality Assurance, which administers the program for GM, observed that the number of Dexos™ products offered continues to increase because 2014 saw an increase in the number of licensed 0W-20 and 5W-20 dexos™ products.

"As vehicle and fuel efficiency requirements become more demanding, more GM vehicles are specifying lower viscosity engine oils. The efforts of both licensed blenders and additive companies in responding to these shifts and meeting the challenges through the development of new formulations is a key factor in successfully meeting the needs of GM vehicle owners,» he said.

"Another trend seen throughout 2014, was a large increase in the number of private label lines licensed under the dexos™ program, further expanding availability so that dexos™ licensed oils are readily available for GM vehicle owners around the world,' he added.

The global supply of dexos™ continues to expand also on account of more marketers joining the program. With the first license term ending and the second dexos™ license term having started on January 1, 2015, the majority of lubricant suppliers exercised an early extension of their dexos™ licenses.

The firm says in year 2015 there will introduce dexos1™ specification, even as additive companies are engaged in communication sessions regarding the new specification to develop the additive packages for the new specification.

Also, blenders will start to see the new formulations later in 2015 and will be able to register products before GM vehicles requiring the new dexos1™ specification need to be serviced.

Midland, MI-based Center for Quality Assurance develops, implements, and administers licensing programs for OEM-specified fluids such as engine oils and transmission fluids.

With over 25 years of experience working with industry partners, CQA's licensing programs provide OEMs with a convenient process to qualify fluid suppliers, expand global availability of approved fluids, and monitor ongoing fluid quality in the marketplace. OEMs can then focus on developing their next generation of equipment and fluid specifications, while CQA manages the programs that support those developments.

The official GM lists include dexos1™ oils, specifically designed to meet the needs of GM gasoline engines, and dexos2™ oils, specifically designed to meet the needs of GM's light-duty diesel engines. dexos2™ is also the recommended service fill oil for European gasoline engines. ■

By OEM/Lube News

The mechanisms of additive depletion and degradation

By John Evans B.Sc.

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Lubrication oils have a finite lifetime – they eventually degrade, becoming contaminated and will need to be changed. Lubricants consist of a base stock that can either be mineral or synthetic.

In the case of synthetic base stocks, these are a family of compounds that are manufactured in a laboratory to have precisely the properties that the chemists and engineers want. On the other hand, mineral base stocks are derived from crude oil that comes out of the ground and is refined to produce a base stock that can do the desired job. Synthetic bases are superior to mineral ones but are much more expensive.

The other component of a lubricant is the additive package. This is a range of twenty or more chemicals that the refinery blends with the base stock so that it can do its job. Most additives are sacrificial in nature, meaning that they get used up during the lifetime of the oil. As the oil is used to lubricate a piece of machinery, the additives become depleted and deactivated and eventually the oil will wear out and will need to be replaced.

Why oils degrade has been covered in numerous technical bulletins, but I will dwell on how lubricants degrade – in other words, what are the mechanisms for additive depletion and degradation? The following are some of the means by which oil degrades:

Neutralisation

Although the sulphur levels of fossil fuels have been reduced dramatically, especially over the past ten years, many fuels still contain small amounts of sulphur, and some parts of the world still use fuels with sulphur in excess of 0.5 per cent. Residual fuels used in marine applications can have sulphur contents much higher than this.

A technician testing oil samples for neutralisation additives

During combustion, the sulphur is oxidised to form sulphur oxides which in turn react with water vapour (also a combustion by-product) to form sulphur acids. These acids are neither good for the machinery (engine) nor the oil. Engine oils are blended with additives that neutralise these acids. They are typically over-based sulphonates of calcium or magnesium and this is where these results come from on an oil analysis report.

As has already been noted, these additives are sacrificial and once they have neutralised the acids they cannot be regenerated to do the job again. Once all the additive has been used up, acid build up will proceed very quickly.

Nitrogen fixation from the atmosphere can generate nitrogen-based acids through a similar mechanism and these also need to be neutralised in the same manner to avoid damage to both the oil and the equipment. This becomes more of an issue with high combustion temperatures found in gas engines.

Shear down

It is vitally important that the temperature at which viscosity is measured be noted, as viscosity changes with temperature. As temperature increases, the viscosity decreases. To further complicate matters, different oils thin out at different rates as the temperature increases. This introduces the concept of a viscosity index or VI. The VI of an oil is a unitless number that gives a measure of how quickly the viscosity will change with temperature. Oils with a low VI will thin out more rapidly than oils with a higher VI as temperature increases.

The VI of an oil can be increased in a number of ways. Typical mineral multigrade oils have an additive, VII or viscosity index improver, which is a long chain organic polymer that remains tightly curled up when it is cold. As the temperature increases the polymers uncoil and retard the thinning action of the increase in temperature. Very highly refined mineral oils have a naturally high VI as the refining process removes the components of the crude oil that have poor VI properties.

Unfortunately these long organic polymers that uncoil when the oil heats up are not completely shear stable. This means that when the compounds are subjected to high shearing forces, such as may be encountered in an automatic transmission, they start to break up, resulting in a permanent viscosity loss. Oils that achieve a high VI through the refining process or by virtue of their synthetic base stock are not subject to this phenomenon.

Hydrolysis

Hydrolysis quite literally means 'water cutting' and is the reaction of water with certain additives that cause them to break down. This is a chemical reaction of water that alters the chemical make-up of the additive or base stock. As an example, esters are formed by the chemical reaction of an acid with an alcohol and the subsequent loss of a water molecule. This reaction is reversible and water can be added to an ester to break it back down into its constituent alcohol/acid parts. The process would be known as hydrolysis.

Water can be responsible for the breakdown of ester-based synthetic base stocks but can also react with additives such as zinc dithio diphosphate, which make up the anti-wear and anti-oxidant chemicals found in almost all engine oils. This is why engine oils are prone to emulsification – that mayonnaise-like deposit that is sometimes found in engines that have been contaminated with water.

Oxidation

Oxidation can cause a fundamental change in the base stock of the oil and is the reason that even very clean and well maintained oils eventually wear out and need to be changed. Oxidation is the reaction between the oil's base stock (and its additives) and the oxygen that is found in the atmosphere. »

Always sample from running machines, avoid sampling cold systems and remember that the idea behind taking an oil sample is to obtain a snapshot of the system under normal working load and conditions

The air that we breathe is about 20% oxygen. It is this gaseous element that permits us to live on planet earth and is also responsible for the combustion of fuels that takes place in the cars we drive and the buses, trucks and bulldozers that we operate. The rate at which the oil reacts with oxygen is critically dependent on the temperature at which that reaction takes place; the higher the temperature, the faster the oil will oxidise.

For every 10˚C increase in oil operating temperature, the rate at which the oil oxidises is doubled and, by logical extension, the life time of the oil is halved. This situation is not quite as dire as it sounds as oils naturally have quite a long life time. Temperature really only becomes a significant issue over 65˚C and oils that are subjected to high temperatures for extended periods of time are blended with additives that retard the reaction of the oil with oxygen.

So what happens to the oil when it reacts with oxygen and why does it do so much damage? When crude oil is taken from the ground it contains many, many different chemical compounds yet a lot of these chemicals are closely related. The crude oil is taken to a refinery where these chemicals are separated according to various chemical and physical properties.

What follows is a very brief chemistry lesson. When an oil is subjected to elevated temperatures in the presence of oxygen, the base stock reacts and forms compounds that are known as peroxides which, in turn, form another class of compounds called free radicals. Both peroxides and free radicals are highly reactive species and cause the formation of acids and sludge and make the viscosity of the oil increase. This increase in viscosity of the oil is due to another chemical process known as polymerisation which simply means the sticking together of the smaller fractions of the base stock to form fractions of larger chemicals which have higher boiling points and higher viscosities.

A question that is often asked is 'What is the maximum temperature that this oil can withstand?' Unfortunately there is no answer as the lifetime of the oil is not only dependent on operating temperature but time as well. So, what we need to know is, how hot and for how long? An engine oil might happily deal with 150ºC for an hour or so but degrade severely at 100ºC over a longer period of time.

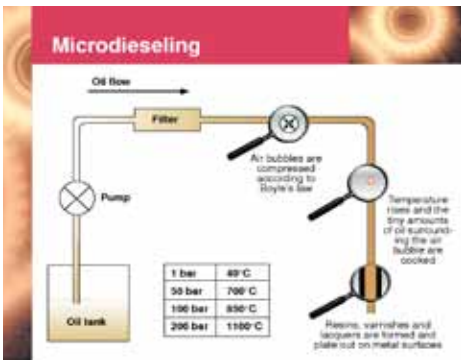
Thermal degradation

The main effect of both oxidation and the loss of the thermal stability (sometimes called the loss of light ends) is an increase in viscosity. Increased viscosity can result in oil pump cavitation, poor fluidity on start-up, increased energy consumption

An engine oil sample with a very high viscosity due to overheating

and the reduction of the oil's ability to shed water and release air. Poor fluidity, due to increased viscosity and cold starts, is when the majority of engine wear takes place.

Another phenomenon that is related to overheating and can result in oil degradation is micro-dieseling. Air can exist in oil in four forms, dissolved, entrained, foam and free. It is the microscopic bubbles of entrained air that cause the problem. These bubbles can be compressed, according to Boyle's law, to very high pressures which, in turn, can create very high temperatures on a microscopic scale. These high temperatures can actually burn the tiny amounts of oil that surround the air bubbles and this leads to the formation of resins, varnishes and lacquers.



Microdieseling

Water washing

Whereas hydrolysis involves the chemical breakdown of the oil by the action of water, water washing is the physical removal of additives from the oil. Almost all additives are formulated to be soluble in the oil's base stock so will have limited solubility in aqueous (water) solutions. However, some additives are selectively soluble in water; this means that some of the additives can become dissolved in the water which will cause them to be removed from the oil. As water is not generally soluble in oil in high concentrations, this process results in the water washing of additives from the oil. Hydrolysis is the chemical degradation of additives; water washing is the physical depletion.

Particle scrubbing

This is also sometimes known as additive stripping. Some additives such as EP additives, metal deactivators, rust inhibitors, tackiness agents and friction modifiers work by attaching themselves to the metal surfaces that they are protecting. However, these additives are not selective as to what metal surfaces they bind to. If there is a lot of very finely powdered wear metal sitting in the bottom of the sump then this is where the additives will go. Also note that the more finely divided a mass is, the greater its surface area. Wear debris has the effect of stripping the additives out of the oil where they do not do any good.

Surface adsorption

This is quite similar to particle scrubbing in that surface active additives bind to metal surfaces. This can happen selectively so that additives are taken out of circulation or certain additives are selectively adsorbed at the expense of others. Particle scrubbing occurs when surface active additives attach themselves to the wear debris lying in the bottom of the sump. Surface adsorption is the same phenomenon applied to intact metal surfaces.

Rubbing contact

Certain gear and extreme pressure (EP) additives work by chemically reacting with the metal surfaces of the gear teeth. Borate gear oils work by forming boron-based crystalline structures on the gear surfaces which results in greatly improved frictional properties. With time it is possible for these compounds to break down during rubbing contact, resulting in the loss of the effectiveness of the oil additive. Other EP additives that contain sulphur and phosphorus react by forming metal sulphides and phosphides on the gear surface under the high contact temperatures and pressures encountered. These compounds have good frictional properties too, but can also be lost during rubbing and sliding contact.

Condensation settling

Some additives such as dispersants work by keeping contaminants like soot in suspension, however, when the additives get used up, the soot will start to agglomerate and will eventually settle out of the oil, forming deposits on metal surfaces and collecting at the bottom of the sump. Other additives that have interfacial properties, such as defoamants and demulsifiers, can also be prone to

Additives can often compete with each other for active sites in an attempt to do the jobs that are required of them

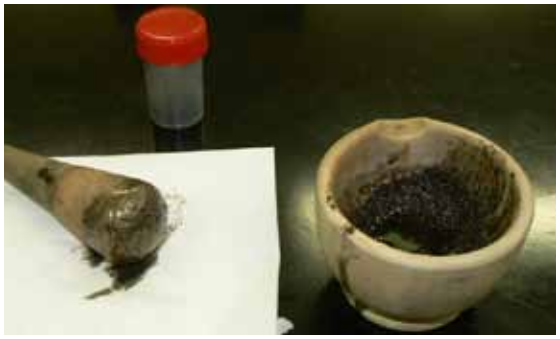
condensation settling too.

Filtration

A commonly-asked question is: can an oil filter remove the additives from the oil? This is most often asked when ultra-filtration or centrifugal filters are being used on engines. Can this super-fine filtration damage the oil additive package? Essentially, no, the filter will not remove additives. It is possible for a filter to remove the anti-foamant additive as the molecules are quite big and can form micelles, however, the other additives will all be well less than one tenth of a micron in size. But, the additives that work by attaching themselves to contaminants such as soot and water can be removed by filtration but these are essentially 'dead' additives that are being removed.

Aggregate adsorption

Often the laboratory will be presented with a bank bag full of sludge that looks incredibly like grease and has a very similar feel and texture. The customer wants to know what is contaminating the lubrication system. Invariably the sludge is a combination of very fine (less than 5 micron in size) wear debris (usually iron), coarse dirt, a trace of water and some oil residues. This mixture is held together by the oil itself, much the same way that milk might hold flour together in a batter. The bottom of most sumps will have varying concentrations of this sludge and surface active additives will be attracted to these aggregates and be removed or stripped from the oil. The oil residues will also be part of the lubricant's additive package.



Sludge like this is often found at the bottom of many sumps

Evaporation

Some additives like ZDDP are quite volatile and it is possible for evaporation to take place, particularly where high temperatures are being experienced; this usually occurs in engine applications. In the case of thermal degradation of oil, the loss of light ends may result in the apparent increase in additives. This is due to the loss of the more volatile components of the base stock, resulting in the apparent concentration of additives. This is particularly noted in engines that are overheating. However, not all additives will appear to increase at the same rate, as the more volatile additives will evaporate as well.

Centrifugation

Components that are fitted with centrifugal filters, usually engines, may be prone to additive loss by filtration. Once again, these will tend to be additives that have interfacial properties and it is 'dead' additives that are being removed from the system. Analysis of filter cake from these types of filters reveals very high levels of oil additives along with wear metals and contaminants.

This explains the most common mechanisms that cause lubricant additive depletion and degradation. As can be seen, the process is quite complex and there are many competing mechanisms that are taking place at the same time. Lubrication technology is very intricate and each can of oil is a very delicate and sophisticated blend of many chemicals that all have very specific jobs to do.

The base stock is also an elaborate mix of compounds. Additives can often compete with each other for active sites in an attempt to do the jobs that are required of them. Likewise, the degradation of the oil is also a complex web with many competing processes taking place at the same. Even the best oil, in the best equipment, operating in an ideal environment with perfect maintenance practices will eventually degrade, wear out and need to be changed. ■

Global two-wheeler market expected to increase at a rate of 8% per year

According to research and consulting firm Kline & Company, the global two-wheeler market, which includes motorcycles, scooters, and mopeds, is expected to reach over 700 million units by 2021. This is a high-growth market segment, increasing at a rate of 8% per annum. Rising economic conditions, lack of public transportation, poor road infrastructure, high fuel efficiency/mileage, lower emissions, and growth in the young population are the leading drivers for this significant uptick in demand. As a result of these trends, countries like Brazil, India, and Vietnam are at the forefront of driving demand for two-wheelers. However, as electric two-wheelers gain prominence in Southeast Asian countries, lubricant demand growth may be subdued.

Despite the penetration of electric two wheelers, the current situation shows tremendous growth potential in this market since conventional four-stroke two-wheelers remain the vehicle of choice for a majority of the market, according to Kline.

Motorcycles represent a major market in Brazil. The fleet of motorcycles posted an impressive growth in the last decade increasing from 15% of total vehicles fleet in 2003, to over 32% of all vehicles in the country in 2013. This expansion occurred mainly due to three factors: the entrance of new consumers in the motorized market; the need for more agile transportation to escape from increasing traffic jams in urban areas; and the replacement of animal transportation in rural areas. Additionally, positive points, such as saving money on fuel, easy parking, and speed of locomotion are driving the growth of the motorcycle culture across the country, particularly in large urban centers where 40% of new consumers are former users of public transport.

In Vietnam, the total number of motorcycles registered in the country is approximately 35 million in 2012, an increase of 9.7% from 2011. Presently, the motorcycle population continues to grow by roughly 7% and reaches over 37 million individuals despite government regulations and the desire to shift towards automobiles. This market represents a CAGR of approximately 12.5% from 2005. The high penetration of motorcycles is the leading cause of traffic jams in the major cities of Vietnam. In addition, motorcycles play a major role in a large number of road accidents. This phenomenon has prompted the government to impose certain policies that limit the registration of motorcycles in the major cities, as well as seven additional provinces, in recent years.

In other developing economies similar internal factors have led to the growth in demand for two-wheelers. These vehicles are capable of filling the need for consumers seeking to have a vehicle that efficiently serves as a basic means of transportation. Mopeds are pervasive in developing markets because infrastructure is best suited for the use of compact two-wheeled vehicles. Economically, these vehicles provide a sufficient means of travel.

According to Kline, two-wheeler usage and consumer behavior towards maintenance and lubricant brand choice and type varies considerably and can be analyzed across four distinct groups.

- Recreational owners who take pride in maintaining their vehicles appearance and condition and will only choose the best lubricant brand regardless of price. These owners are likely to strictly follow OEM recommendations, ride their vehicles in only the best weather conditions, and exhibit a high degree of supplier loyalty. Annual mileage accumulation would be low.

- Commuter owners rely on their vehicles as a primary means of transportation with reliability the most important factor driving their choices. These owners will typically follow OEM recommendations for maintenance and lubricants to ensure the vehicle gets them to work or school with the goal of reducing or eliminating any unscheduled maintenance stops and downtime. Commuter owners may compromise and use a mid tier brand to save money. Annual mileage accumulation would be medium to high for this group.

- Business owners/users rely on their vehicles for a variety of commercial activities from taxi and pay for transport to intra-city delivery services. These owners expose their vehicles to daily or 24 hour operating conditions such as stop and go driving, start/stop operation, high mileage, and multiple operators with minimal regard for the vehicle as they may not be the primary owner. Vehicles may be a mix of newly purchased and second or third hand ownership. Given the operating conditions and frequent oil drain intervals; lubricant brands and quality levels may be compromised and loyalty the weakest among these groups. Annual mileage accumulation would be high for this group.

- Sport/competition owners that use their vehicles for organized and un-organized on and off road racing activities. Lubricant product quality is extremely important and this group is the most likely to use synthetic products meeting the latest OEM and industry recommendations. ■

Proper lubrication cuts industrial energy consumption, increasing output

It is a simple fact: better lubrication can lead to dramatic energy savings, and an improved bottom line. This ought to interest any plant manager who is looking for ways to reduce operating costs, and is especially significant at this time, when stricter government regulations are in direct contradiction to reducing costs.

Lubrication reliability is the solution. How can manufacturing plants use lubrication reliability best practices to reduce their energy consumption, emissions and operating costs – all at the same time?

Energy usage is one of the cornerstones of today's society. Economic development and improved standards of living both rely upon the availability of energy. According to Outlook for Energy: a View to 2030 by Exxon Mobil, energy usage per person varies dramatically, translating, according to the study, to an average of 200,000 Btu a day – which is 15 billion Btu per second.

The same study points out that each person has direct and indirect energy demands. Direct demand of energy is the energy that drives their personal vehicles and operates their homes, while indirect demand is the energy that heats and cools buildings, generates power, produces goods and services, and provides mass transportation of goods and people.

As the lesser developed parts of the world modernize, their needs for energy are projected grow, resulting in increased costs for fuel worldwide. Along with this development, many of the world's governments are passing stricter laws regulating clean air and water, toxic waste, pesticides, endangered species and more. These factors – combined with a struggling economy – will undoubtedly result in a challenge for plant operations managers, with the need to reduce operating costs. Often, this means doing more with less.

One way to reduce operating costs is to reduce energy consumption. Upgrading plant equipment to take advantage of newer, more energy-efficient technologies can reduce energy costs.

Unfortunately, in a challenging economic environment, capital may not be available for plant upgrades. Simple changes in habits can also create considerable savings. One such change is improving the lubrication reliability program. According to Peter Thorpe, the Product Application Specialist at Shell - South Africa, "from a cost point of view alone, lubricant costs are negligible when compared to energy costs, even before the production efficiencies of high-performance lubricants are factored in."

Electric utility bills generally dwarf maintenance and lubricant costs. These are part of any manufacturing operation. So, while controlling or reducing maintenance and lubricant costs is important, reducing electric utility usage is also critical. Tremendous opportunities exist to use an improved lubrication reliability program to decrease plant energy costs, thereby increasing profitability.

Sources of energy

There are various forms of energy, as illustrated in Table 1. Note: Mechanical energy is further broken down into two types – kinetic energy, which is the energy of motion, and potential energy, which is associated with an object's position.

Table 1: Forms of Energy
Chemical
Nuclear
Radiant (light)
Thermal
Sound
Electrical
Mechanical (kinetic/potential)

Table 1: Forms of Energy

Energy often transforms from one form to another for an end-use purpose. For example, oil when combusted contains chemical energy that converts to thermal energy, then to electrical energy or mechanical energy.

Energy for work

During conversions from one form of energy to another, some useable energy is lost. These energy losses can be extremely costly. The science of physics reveals that lubrication can play a role in reducing energy these losses by reducing friction. Many automated tools can be used to perform everyday activities. These tools frequently include many moving parts to accomplish the chore they are designed to perform. It turns out that work and kinetic energy – also called the energy of motion – are directly related.

In 1687, Isaac Newton published his laws of motion in Principia Mathematica and determined that the mathematical expression for kinetic energy (K) is:

a) **K = ½ mv2** (where m is a mass and v is a velocity that the mass is moved)

So, it can be stated that it takes energy to move an object.

The laws of physics also state that work is the force required to move an object a certain distance as shown in equation (b). Work is also equal to the change in kinetic energy, indicated in equation (c).

b) **W = FΔx** (where F is a force and Δx is the change in position)

c) **W = ΔK**

Friction is a force that exists in two forms, static friction (Fs) and kinetic friction (Fk). Friction is represented mathematically by the following two equations:

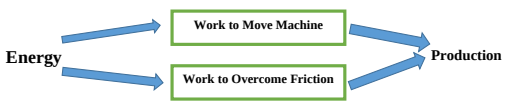
d) **Fs = μsN & Fk = μkN** (where μs and μk are the static and kinetic coefficients of friction, respectively, and N is a force normal to the moving surfaces)

The coefficient of friction is a unit-less number that varies depending upon the composition of materials, which the moving surfaces are made. Obviously, the higher the coefficient of friction is, the higher the friction force.

Finally, the equation that describes the total change of kinetic energy (**ET**) required in a moving system is the following:

e) **ET = Wm + WF** (where Wm is the work to move the machine and WF is the work required to overcome friction)

So, physics shows that reduced friction would result in less energy needed to complete the desired work. Placed between two moving surfaces, a lubricant decreases the coefficient of friction. Naturally, this would also mean the more a lubricant decreases friction, the less energy the lubricated machine consumes.



When searching for the best lubricant to minimize energy loss due to friction, it is often a case of "you get what you pay for.

Lubricant formulation basics

It has been said that "oil is oil, just pour it in," but this statement is far from the truth. Simply described, a lubricant is composed of a base fluid and additives. However, many lubricant suppliers formulate their lubricants according to unique recipes intended for specific purposes. The following is a primer on the basic types of lubricants and the specific ingredient-driven categories.

Table 2: Lubricant Types	
Automotive (Transportation)	Industrial (Factories)
Heavy-duty diesel engine oils	Compressors
Passenger car engine oils	Bearings
Automatic transmission fluids	Gear boxes
Aviation engine oils	Hydraulics
Mobile hydraulic	Turbines
Differential fluids	Chains/wire ropes
Torque fluids	Slideways
Chassis lubricants (grease)	Grease

Each of the above lubricant types are usually broken down into narrower descriptions based upon the product formulation chemistry. Table 3 lists the categories and the additive types that dictate the categorical description. These descriptions are extremely simplified, as there are various base fluid types and even more additive types. Each formula category has its strengths and weaknesses and should be chosen based upon the needs of the application type. (See Table 2 above).

It thus becomes obvious that lubricant formulations can be rather complex. When searching for the best lubricant to minimize energy loss due to friction, it is often a case of "you get what you pay for." In other words, an inexpensively priced lubricant does not necessarily provide maximum lubrication performance. As such, they may require a higher amount of energy consumption, sometimes at higher costs than with a more expensive, better-performing lubricant. However, just buying an expensive lubricant does not ensure maximum lubricant performance and energy savings.

The lubricant must be the right one for the application and must be properly maintained in order to provide maximum performance. This means proper storage and handling, filtration, oil analysis, training and more.

Table 3: Lubricant category by Ingredient	
Category	Ingredients described
Mineral oil	Base fluid derived from refined crude oil
Synthetic	Synthesized base fluids such as: PAO, esters, PIB, PAG and more
R&O (rust & oxidation)	Contains rust and oxidation inhibition additives
AW (anti-wear)	Contains wear-reducing additives
EP (extreme pressure)	Contains extreme pressure wear reducing additives
Multigrade	Contains viscosity index improving additives
DI (detergent inhibitor)	Contains detergent, dispersant, oxidation, wear, anti-corrosion additives
Others	Defoamants, emulsifiers, demulsifiers, pour point depressants, thickeners

All electro-mechanical equipment requires periodic maintenance to operate at peak efficiency and minimize unscheduled downtime. Inadequate maintenance can increase energy consumption. It also can lead to high operating temperatures, poor moisture control, excessive contamination and unsafe working environments. Depending on the equipment, maintenance may include the addition or replacement of filters and fluids, inspections, adjustments and repairs.

So, how does the end-user know what to do? The answer is to find a lubrication partner that can help develop a comprehensive lubrication reliability program that includes lubricant selection, protection and maintenance. This partner could be a consultant, but it could also be a lubricant manufacturer that offers customized, comprehensive solutions, including lubricants and all of the related lubrication reliability products.

Lubricants and energy savings

It is possible to measure energy savings in a variety of ways, including production output, temperature changes or electrical reduction. Another measurement is fuel consumption.

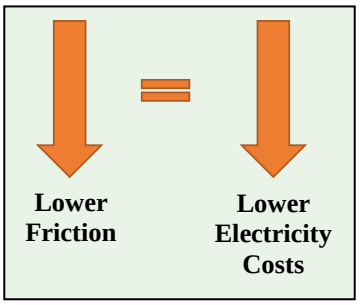
Production output

When we use equipment to perform work, it is possible to evaluate the equipment's energy efficiency by recording its production output. For example, if a machine is capable of producing a certain number of parts in a given amount of time and the lubricant is changed, resulting in a higher volume of parts being produced in the same amount of time, then the machine has become more energy efficient. However, one must be careful when using this technique to ensure that nothing is changed in the process except the lubricant. This can be overcome by using a larger number of test units or evaluating productivity over a longer amount of time.

Temperature changes

Monitoring temperature changes is another way to optimize lubrication program performance. Increased friction in a piece of moving equipment results in higher operating temperatures. Friction is a result of metal-to - metal contact that occurs between two opposing surfaces moving relative to one another. Even between highly machined surfaces, under microscopic view, asperity contact occurs.

The greater the amount of contact, the greater the amount of friction. As a result, more energy is required to move the surfaces relative to one another. This friction results in higher electrical power costs. Lubricants can reduce that friction. Therefore, when friction is reduced, less electricity is required to drive a gearbox, compressor, pump or other piece of equipment.



Sometimes, the bulk oil temperature is monitored in a piece of operating equipment. Another technique for evaluating lubrication performance is thermography, which involves using infrared detection equipment to look for "hot spots" on a piece of equipment that could result from insufficient lubrication, improper lubricant selection or faulty operating parts. In any of these cases, higher temperatures result in wasted energy. It is important, however, to account for ambient environmental temperatures when performing this type of energy efficiency study.

Obviously, a piece of equipment will run hotter on hot days than on cold days.

Case study

A knitting plant in Hendersonville, N.C., was experiencing overheating problems in its Champion TWT-07 reciprocating compressor while using the recommended commercial grade lubricant. Even after changing to several synthetic products, it still experienced lubricant foaming and overheating. After changing to ashless AW mineral compressor oil, the plant experienced an immediate drop in temperature of 15°F (8°C). Even after three months of continued service, the plant maintained this temperature drop. This study illustrates that certain equipment can have its own lubricant appetite. Just because a fluid is synthetic does not necessarily mean that it is always the best recommendation for every piece of equipment.

Electrical reduction

When most think about energy consumption, they immediately think about electrical consumption. Tracking electrical consumption is a highly reliable way to evaluate improvements in plant energy use. In fact, various companies have been able to document improvements »

in electrical energy efficiency related to their lubrication programs. Typically, companies that upgrade their lubricants and reliability practices have been able to document a 5 to 15 percent reduction in power requirements, more than enough to pay for a better-performing lubricant. Average documented savings were 15 percent in gearboxes, 12 percent in air compressors, and 4 percent in electric motors.

Electric motors power most plant machinery, including gearboxes, compressors, refrigeration systems, pumps, hydraulic systems, and ball mills. Kilowatts (kW) are the common unit for measuring electricity. The following equation can determine the amount of electricity used by an electric motor:

f) **kW = V/1000 x A x 1.73** (where V is volts and A is amperes)

Both are common metric measurements of electrical current measured using a voltmeter or ammeter. For a three phase motor, 1.73 is a standard factor. Data logging equipment is available that allows one to measure and collect data for either amperes, volts or both. Yet, most electrical consumers pay for electricity by kilowatt-hour (kWh) per month. The following formula is commonly used to determine the electrical charge per month (ECM):

g) **ECM = kW x h x EC** (where h is hours of service and EC is the electrical charge)

Air compressors are an excellent source for energy savings. Compressed air is one of the most expensive uses of energy in a manufacturing plant, and approximately 70 percent of all manufacturers have a compressed air system. These systems power a variety of equipment, including machine tools, material handling and separation equipment, and spray painting equipment. According to the U.S. Department of Energy (DOE), compressed air systems in the U.S. account for 10 percent of all electricity and roughly 16 percent of U.S. industrial motor system energy use. This adds up to $1.5 billion per year in energy costs and 5 percent in emissions. Energy audits conducted by the DOE suggest that more than 50 percent of compressed air systems at industrial facilities have significant energy conservation opportunities.

Following are manufacturing case studies in which lubricant changes in air compressors and other plant equipment helped manufacturers reduce their electrical consumption.

Typical savings with 5% Amperage Reduction		
Electric Motor	Type of Operation	
(hp rating)	40 hrs/week	Continuous
10	$74	$297
50	$372	$1,487
100	$746	$2,986
200	$1,493	$5,472
*$0.10 kWh electricity Rate		

Case study

A western New York glass and ceramics manufacturer had instituted a program to reduce electricity consumption. The manufacturer targeted its Ingersoll-Rand ESH reciprocating compressor, driven by a 440-volt, 75-hp motor, because this piece of equipment operated at peak capacity 24 hours per day, seven days a week. At the start of the experiment, when the compressor contained the OEM-specified synthetic oil, the average baseline reading was 89 amps.

A week after draining the oil, cleaning the compressor and refilling with a high-performance branded synthetic oil, the manufacturer again collected data and found that the average reading had dropped to 82 amps. Knowing that it was using six fewer amps, applying equations (f) and (g), and knowing that the energy charge was $0.10/kWh, the manufacturer was able to calculate annual monetary savings due lubricant-related electrical efficiency improvements.

kW = 6 amps x 440 volts/1,000 x 1.73 = 4.57

ECM = 4.57 kW x 8,760 h/yr x $0.10 = $4,003/yr

Data collection continued for an entire year, and the new, lower amperage remained unchanged. Valve maintenance was performed at the same intervals as with the previous oil, and this revealed the source of the energy savings. The valves were no longer covered with sticky carbon-varnish build-up, as they had been with the OEM oil, and the new oil appeared to deteriorate less. The manufacturer learned that not all synthetic lubricants are equal.

Case study

A South Dakota wastewater treatment plant was interested in reducing operating expenses by using higher quality lubricants to achieve extended drain service and possible energy savings in three Spencer 50-hp rotary blowers, which were part of a biological contactor system. The average electrical reading was 50 amps on each of the blowers while using the current lubricant. After changing to a high-performance lubricant, the average dropped to 38 amps. Based upon electrical rates at that time, the estimated yearly savings was $2,968 per blower, or $8,904 total for all three.

Today, there are various reasons to reduce energy consumption, such as conserving natural resources, reducing emissions and improving profitability. Governments and corporate management alike are looking for ways to reduce energy consumption. Indirect energy use, more commonly called industrial use, is greater in all regions of the world than direct or personal use. This makes industry the largest consumer of energy and, therefore, the greatest source of potential reductions.

Energy use can be measured through production output, temperature changes and electrical consumption. It is possible to make dramatic gains in energy efficiency by reducing friction, and one of the best ways to do that is to employ good lubrication practices, including the use of high-performance lubricants and the adoption of lubrication reliability best practices. The key to success is finding a lubricant company that not only can provide the right high-performance lubricants for the applications but also can recommend reliability solutions that will further reduce friction and maximize the efficiency of equipment. ■

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Bright stock: Casualty of the Shift From Group I?

By Dr. H. Ernest and Kathleen A. Henderson
K&E Petroleum Consulting, LLC

Over the past century, the primary means by which lubricant base stocks have been produced is to take a crude oil and through the use of physical and chemical steps separate out a series of base stocks referred by the American Petroleum Institute (API) as Group I. A typical family or slate of Group I base stocks is provided in Figure 1. This includes low viscosity, or light, base stocks that can be used in the formulation of multi-grade engine oils through to very viscous or heavy base stocks that can be used to formulate mono-grade engine oils and heavy industrial oils. This very heavy base stock is referred to as Bright Stock.

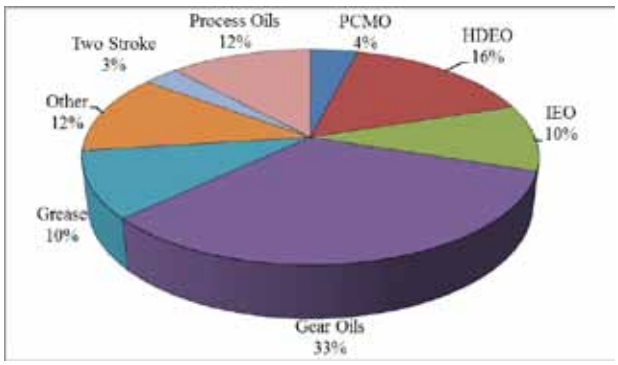
Figure 1
Solvent Refined Group I Base Stock Slate
Photograph provided by KEPC

According to statistics provided by Lubes'n'Greases there are 144 base oil refineries globally of which 105 are classified as Group I using solvent refining technologies. Twenty of these Group I refineries are located in Africa and the Middle East regions. Total global capacity for Group I is 483.7 kbd or 23.7 Million MT and represents 47.5% of global virgin base oil capacity (i.e. includes naphthenics but excludes re-refined). Within the Group I network, only a select number of plants have the feedstock and processing capability to produce Bright Stock. Specifically, the heavy vacuum distillate from the vacuum tower that in many instances would be used to produce asphalt or heavy fuel oil can be further processed through a separate propane deasphalter to produce a DAO or deasphalted oil that becomes the feedstock for Bright Stock production.

Bright Stock itself has the consistency and color of maple syrup to honey and is only produced in a selected number of Group I refineries. This is because not all refineries have the equipment or the vacuum bottoms quality to produce Bright Stock. IHS Inc. (former Purvin and Gertz), a global research and consulting firm, has estimated that global Bright Stock capacity is approximately 92 kbd (4.5 Million MT), or approximately 19% of Group I capacity.

Demand for Bright Stock is estimated by IHS at 80 kbd (3.9 Million MT), providing a slight imbalance. This is the preferred situation in a supply-demand balance as it allows one to accommodate variability in supply due to turnarounds, reduced throughput, unexpected events, etc. In terms of applications, the primary use for Bright Stock is in the formulation of automotive and industrial gear oils at 33% of total usage, with automotive engine oils (i.e. passenger car and heavy-duty) consuming another 20% of Bright Stock production. The current outlets for Bright Stock are provided in Figure 2.

Figure 2
Product Applications for Bright Stock



The demand for Bright Stock is expected to decline at a rate of approximately 1.7% per year through 2020 as the automotive industry in particular continues to shift from mono-grade to multi-grade engine oils. This has been nearly completed in many regions of the world like North America, however, regions like the Middle East and Africa continue to have a higher than normal demand for Bright Stock due to the high percentage of mono-grade engine oils at reduced performance levels and the hotter climate that suggests to many consumers that "thicker is better".

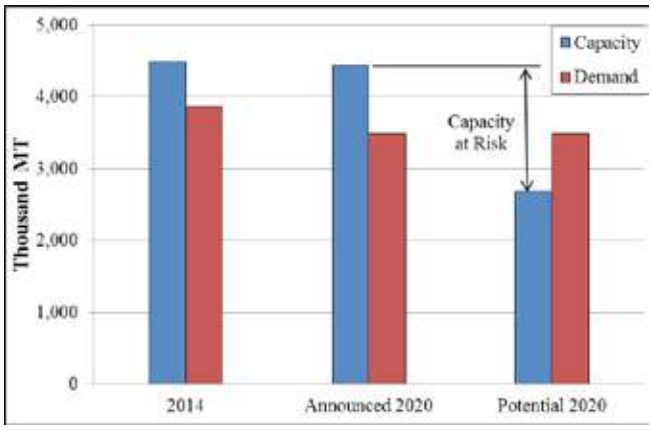
With no new Group I capacity forecasted for the foreseeable future, this would suggest that there would be ample availability of Bright Stock to supply the global market. However, the lubricants industry has seen major changes over the past two decades towards the use of higher quality base stocks that are produced using hydroprocessing technology. These Group II and Group III base stocks, as defined by API, represent approximately 444.7 kbd (21.8 Million MT) of global capacity that is slightly below that for Group I. They also do not produce Bright Stock.

Unfortunately, global demand for lubricants is only 775 kbd (37.9 Million MT) based on 2013 estimates by KEPC reflecting a base oil demand of approximately 735 kbd (36.0 Million MT). This includes marine oil demand, and reflects slightly less than 70% of total global base stock capacity. With several announced Group II and Group III projects underway and/or in the planning stages, refinery capacity over the next 5 years will increase at a much greater rate than base stock demand. The resultant over-capacity combined with reduced margins due to lower crude prices is expected to cause considerable rationalization of Group I capacity. This has already been observed in Europe where Colas (Dunkerque, France), Shell (Pernis, The Netherlands), Total (Gonfreville, France) and most recently Lukoil (Nizhni Novgorod, Russia) have all announced pending closures. This will reduce Group I capacity in Western Europe by roughly 17% and Bright Stock production by 20%.

Another area of improved Bright Stock utilization is in the automotive gear oil area, particularly the SAE 80W-90 multi-grade that is the largest SAE grade globally

Figure 3 below provides an overview of the global Bright Stock supply/demand situation with the assumed rationalization of Group I facilities over the next 5 years. According to estimates from IHS, demand for Bright Stock will be approximately 130% of capacity, representing a shortage of supply of 0.8 Million MT. This shortage could reach as high as 1.3 Million MT is one assumes that refinery utilization for a Group I plant is 80% and that the industry will not be able to sustain continuous production at its designed rated capacity.

Figure 3
Bright Stock Demand Versus Potential Supply – 2014 to 2020
(Source – IHS)



The challenge then becomes how the industry will need to adjust to address the projected shortage. Fortunately there are several options available to the industry to address the shortage. First, there are some products that are moving away from the use of Bright Stock. As stated earlier, mono-grade engine oils are continuing to shift to multi-grades as these provide better fuel economy, controlled emissions and extended durability. Multi-grade engine oils do not require Bright Stock and since this segment represents 20% of current Bright Stock use, the elimination of this application could reduce Bright Stock demand by as much as 0.8 Million MT. This almost represents the preliminary shortage in Bright Stock forecasted by 2020 from Figure 3. It must be recognized that change takes time and the complete conversion of engine oils to multi-grades by 2020 will likely not occur, particularly in regions like Africa and the Middle East where the demand for mono-grades is still noticeably high. Nevertheless, it is a step in the right direction and one of the events that will contribute to a more balanced supply-demand position for Bright Stock.

Another area of improved Bright Stock utilization is in the automotive gear oil area, particularly the SAE 80W-90 multi-grade that is the largest SAE grade globally. This viscosity grade can be formulated either using a high concentration of Bright Stock or a lighter Group I (or Group II) base stock like a 600N in combination with a Viscosity Modifier or thickener. The latter is a very effective option to Bright Stock management and with the continued increase in Bright Stock pricing (e.g. in many regions of the world Bright Stock have the same, or similar, value as Group III) can be a very cost effective option for consideration.

In addition to managing the utilization of Bright Stock in existing products, there are also initiatives to increase production. An example is with Luberef in Yanbu Saudi Arabia where construction is underway to introduce Group II in mid-2016. Despite this change, Luberef will not close down its Group I plant but in fact will retrofit the facility to produce only Bright Stock while maximizing production. The result will be an increase in production by as much as 110% that will support the continued needs in the Middle East and Africa.

With proper pre-planning and good product stewardship, Bright Stock utilization should remain in check and in-line with available demand. When shortages exist, there are still several considerations that are available. The options will depend on the product, the required performance and whether the target market is a commodity, mid-tier or top tier based. For commodity markets, one of the potential alternatives is naphthenic Bright Stocks. They have a lower Viscosity Index than paraffinic Bright Stocks and may suffer in terms of oxidation stability. However, there are many applications where the only consideration is viscosity and this would be a natural fit for naphthenic Bright Stocks. Potential applications include grease manufacture, rolling oils, forming fluids and general process oils. They can also be blended with lighter Group II or Group III base stocks to provide solvency characteristics that are equivalent to Group I. There have been recent investments to increase naphthenic Bright Stock production, perhaps in preparation to the pending Group I Bright Stock shortage. When naphthenic Bright Stocks are not available, rationalization of the product may be the best option.

Several other options exist for Bright Stock including the use of higher performing and higher cost blending stocks like polyisobutylenes (PIB), polyalphaolefins (PAO), alkylated naphthalenes (AN) and polyalkyleneglycols (PAG). Thickeners can also be considered as discussed in the automotive gear oil example. Each of these materials can elevate the overall performance of the finished oil in several areas including but not limited to thermal and oxidative stability, energy efficiency and extended operating ranges. Since many of these Bright Stock alternatives are higher cost, it is expected that the elevated performance will provide a marketing opportunity where improved margins can be achieved. This is also consistent with the continuing growth of full and partial synthetic products in both the automotive and industrial oil areas.

The lubricants industry will continue to require high viscosity blending components in the industrial, driveline, process and automotive areas. Bright Stock produced from solvent refining will continue to meet a significant percentage of this overall demand. However, as supplies decline, alternative measures and blending components will be required. This includes an initial assessment of the product areas where Bright Stock is used and a rationalization of low margin or "commodity" applications. Where cost effective options are available, these should be considered to maintain an adequate availability of Bright Stock for those products where there is a "must" versus "want" demand. When higher cost options are to be considered, it will be important to match the correct option to the resultant product both in terms of performance requirements and the ability to capture a premium in the market.

Overall, there would appear to be sufficient options available to the lubricants industry to properly manage the demand for heavy blending components, including Bright Stock.

Bio: Dr. H. Ernest Henderson is President of K&E Petroleum Consulting LLC and an international expert and instructor in base stocks from solvent refined Group I through Group IV, GTL and re-refined. His knowledge base includes base stock manufacturing, application and value to Supply Chain. Kathleen Henderson is the CFO of KEPC and has multiple advanced degrees including education. Kathleen and Ernie will be celebrating 40 years of marriage June 28. ■

New age for lubricants marketing

By: Geeta S. Agashe
President, Geeta Agashe & Associates, LLC
Geeta is the President of Geeta Agashe & Associates, LLC. Prior to forming her own company earlier this year, Geeta spent close to 20 years with Kline & Company, Inc., as a Senior Vice President in their Energy Practice.

I was invited to speak at the recently concluded 4th Annual Baseoils and Lubes Middle East Conference in Abu Dhabi. I was requested to speak on the Global Baseoils and Lubricants Industry by the organizing committee.

As I reflected upon the past year, I concluded that not a whole lot had changed in the global baseoils industry. Group I was in a somewhat balanced situation, though there was tightness in the heavier viscosity grades including brightstocks. This was further validated as ExxonMobil increased the price of brightstocks in April 2015 after which other suppliers promptly followed. Group II and III were in an oversupply situation which was more pronounced for the lighter viscosity grades. This was validated by the fact that Group II baseoils could be purchased at the same price as Group I baseoils in many markets. Group IV baseoils (polyalphaoelfins) were balanced with tightness in the heavier viscosity grades, particularly as Group III baseoils are not available in the heavy viscosities demanded by some industrial applications such as in wind turbine gear oils. Group V (naphthenics) were also in a balanced position globally. Hence, from a supply-demand stand point there was not much change from a global perspective.

However, what had changed was the price of crude oil that went from a high of close to $140/bbl in 2008 down to $49.60/bbl in December 2014! In May 2015 it is up to $66/bbl. What is the impact of this decline in crude oil prices? This downward spiral has had a significant negative impact on crude exporting countries such as Nigeria, Venezuela, Russia, Brazil and others. The KSA has been an only exception. On the other hand, if the country is an energy importer, such as say India, then the country has enjoyed the benefits of lower crude prices, making them even more competitive on the global arena. Interestingly enough, the impact on baseoil and lubricant refiners has been largely positive. Declining crude prices have translated to declining VGO prices but not at the same speed and rate of decline.

The new and different though is in lubricants marketing! The rest of this article will focus on these three key themes:

1. The lubricants industry is not growing on a volume basis but profits are growing
2. Backward integration is no longer a winning differentiator
3. The winning lubricant marketers will be those who keep close to their customers (including OEMs) and understand their changing needs

The global lubricants industry is estimated to be around 40 million tonnes in 2015. From a volumetric basis we are back where we were in 2007. Looking towards the future, we estimate that the global lubricants demand will remain stagnant to maybe even decline a percent point over the next decade. This might seem surprising given the rapid industrialization and mechanization in the emerging economies, robust forecast for new vehicle sales, jump in new construction and housing starts and other positive indicators. However, the industry is also practicing better housekeeping and maintenance practices and using higher performance lubricants (synthetic and synthetic blends) that are helping to extend oil change drain intervals. In addition, certain countries, primarily in Europe, such as Spain, Portugal, Ireland, Greece, Italy, Russia and others are still reeling from the economic recession. Growth economies like China and Brazil are not growing at the same accelerated pace as they were earlier.

However, there do exist many regional and country specific opportunities for volumetric growth. BRIC countries were the fad yesterday; today there is lot of interest in the MINT countries (Mexico, Indonesia, Nigeria, and Turkey). Astute lubricant marketers are also seeking growth opportunities in growing economies of Myanmar, Kazakhstan, Vietnam, Thailand and others. Africa, considered to be the last frontier, is now coming up more and more on the maps and plans of leading global lubricant marketers!

There are a lot many more opportunities to up-sell the customer to synthetic blends and synthetics. This is possible due to a combination of supply push and demand pull factors. On the supply side, lubricant marketers today have access to sophisticated API Group II, III and IV baseoils pretty much in all parts of the world, well assisted by the leading additive marketers. This is allowing even the smaller independent marketers to formulate and market high performance synthetic blend and synthetic lubricants. Synthetic lubricants on an average are typically sold 4 times more than the price of a conventional lubricant (though not 4 times more costlier to formulate), thus allowing for a higher profit margin for the lubricant marketer. On the other hand, the OEMs too are recommending greater usage of synthetics and now it's not just the luxury OEMs but even such mass market OEMs like the Honda's and Toyota's are recommending a 0W viscosity oil as their first fill oil from 2011 year make models. This has certainly resulted in double digit

Due to growing trends of distributor consolidation, it is very important to create partnerships with strong distributors who engage in "value" based selling

growth for the synthetic category on a global basis! Lubricant marketers are working hard to distinguish and differentiate their synthetics – some even having a tiered good, better, best synthetic offering!

Another change we have witnessed is that it is not imperative for lubricant marketers to be backwardly integrated to be successful. In the past, leading lubricant marketers such as Shell, ExxonMobil, Chevron and others were backwardly integrated and owned baseoil refinery assets. They pretty much produced Group III baseoils to meet their internal demand. As such, they had access to high performance baseoil molecules which were not so easily available to local, independent blenders. But starting from 1990s there was a step change in the industry. We saw the emergence of merchant baseoil refiners such as SK from South Korea who were willing to sell high performance baseoils in the merchant marketplace. As supply started exceeding technical demand, prices for these high performance molecules started falling. The additive companies came up with additive packages that worked well with these merchant suppliers baseoils and lo and behold, the high performance molecules became available to all. This became the big equalizer and that brings me to my point – owning Group III or IV refineries are no longer a key to winning in the lubricant industry. One need not even invest in blend and packaging plant assets as there is currently an over-supply in the blending capacity as well.

So if this isn't, then what is the key to winning in today's global lubricant market? We feel that the winners of tomorrow will be the ones who can create an emotional connect with their customers. It will be critical to understand even better what our key customer's needs and wants are and fulfill them better than the competition. Companies that own better access to the customers will be the winners of tomorrow.

It has become important to have close relationships with the leading OEMs as well. The first fill business is not necessarily a profitable business but it does create a "halo" effect around the brand. In addition, as these OEMs roll out their internationalization plan, they take their lubricant suppliers with them. Companies such as PETRONAS of Malaysia along with their relationship with Fiat, New Holland and Massey Fergusson; Valvoline and their relationship with Cummins; Idemitsu and their relationship with Toyota are all examples of companies that became successful international marketers by following the OEMs that they serve.

Another important facet to the lubricants industry is the growing importance of distributors. It is very critical to have strong, knowledgeable distributors who can provide access to customers. Due to growing trends of distributor consolidation, it is very important to create partnerships with strong distributors who engage in "value" based selling.

Marketing too has to be at the forefront of lubricant marketers. Today, the ways to reach the customer are a combination of traditional and new ways. Social media such as Face book, Twitter, Instagram and others are playing a much greater role in marketing today. Most lubricant marketers have also invested in creating easy to use web pages as another medium of reaching out to their customers.

Bottom line, there are significant changes impacting the global lubricant industry – astute marketers will convert this quickly into growth opportunities!! ■

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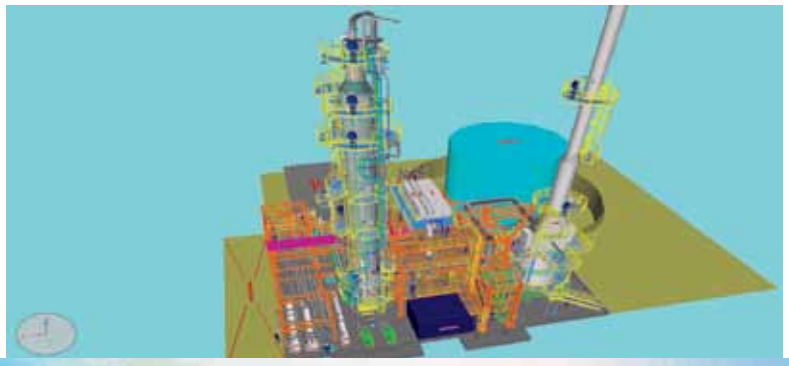

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Motorol Lubricants: meeting market demand by blending locally

Oil Zone East Africa operations manager Mr. Jitesh Barot

From left to right, Martin Kimani, Doreen Kendi, George Rurigi, and Charlse Ndegwa

Introduced in East Africa in 2012, Oil Zone's Motorol has made considerable inroads into the region's market, introducing automotive, industrial, and specialty full range lubricants. Early last year, the company commissioned a blending plant in Nairobi. We spoke to Motorol's Operations Manager Jitesh Barot to get his perspective on the lubricants market, and what it takes to blend in Nairobi.

1. What new product ranges have you launched since you began operations in the region?

The latest brand of products we have introduced is greases (EP2, EP3 and MP3) and synthetic oil (5W40).

2 Could you give us a thumbnail of your brand and its growth since inception?

Motorol is a well-known brand in Kenya. We have been present in Kenya for the past four years, including 36 other countries. Over this period, we have established the brand and earned a good reputation since we do not compromise on quality. This is the reason why the brand continues to grow in Kenya as well as in other markets in the East African region.

3. When was your lubricant blending plant in the region commissioned?

The plant was commissioned in May 2014. It is located in Machakos County along Mombasa road and has a capacity of producing 60,000 liters per day. We blend automotive and industrial lubricants and in future plan to do specialty lubricants. The lubricants are ISO certified and also comply with the Kenya Bureau of Standard's requirements.

4. Why did the company decide to blend locally?

We made a decision to blend oil within the region to meet the market demand on a real time basis. Our decision was also inspired by the "Buy Kenya Build Kenya" slogan as well as desire to have a consistent supply of our products. This model has indeed paid off. For instance, it has influenced the overall growth of the business, because we are now able to produce any product and that gives us an advantage over the importers.

5. Which products are you blending at the new plant

We blend all the Automotive and Industrial lubricants in the new plant. We have a complete range of products in these segments and cannot name all of them in one instance. I would advise the readers of Lubezine to visit our website www.motorollubes.com for more details. We only acquire synthetic, specialty and greases from our head office because we do not have the capability of blending locally yet.

6. Nairobi is 500 km away from the port of Mombasa , how are you overcoming logistical challenges associated with transporting bulky base oils over this distance

We have contracted trusted and efficient transporters who do this on our behalf. Through forming a close relationship with them and proper coordination, our product is transported to our plant in a timely and cost efficient manner.

7. Are you blending exclusively for motorol or you do have toll blending arrangement with other lubricants companies

We exclusively blend Motorol brand but we have co-branded with one of our Executive dealers for three automotive products (Magic 4T, TUK-TUK Special, EXCEL10000). This goes to show the deep trust our client has in our product quality and efficiency in supply.

8. What measures are you taking to ensure quality control at your new plant?

We have a state of the art laboratory with qualified technicians and we only use formulation from the head office. With the formulation, all our products are tested in the laboratory to ensure they meet the set requirements in the Material Data Sheet and international standards like SAE viscosity, and API specifications.

9. Are there enough professionals in the country to run a blending plant of your size?

There may be. We have qualified and experienced professionals in the country who can successfully run a plant of big capacities with enough resources and proper planning. With increased training from technical institutions and field training, we can be able to create professionals who can run blending plants efficiently without the need for importing labor.

10. What types of greases are available, and what are their specific applications?

Our EP2 grease is suitable for chassis lubrication solutions and the EP3 grease is good for bearings. The multipurpose (MP3) grease on the other hand has been specially formulated for general greasing both for automotive and industrial. The greases are made in the United Arab Emirates following the National Lubrication grease Institute (NLGI) standards and exported to Kenya for packaging. The range was formerly introduced into the market in 2012. ■

From left to right, Martin Kimani, Doreen Kendi, George Rurigi, and Charlse Ndegwa

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The good, the bad & the ugly of lubrication practices

By Crispin Mbogo

Chief Executive - Droplex Industrial Systems Ltd. Mr. Mbogo has over 17 years industrial engineering experience both locally in the oil industry and with General Electric in USA. He is an expert in Lubrication Systems & Solutions. To contact him, send questions to:

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In almost every plant, there are machinery with bearings, gear boxes and other moving parts that require frequent, if not continuous, lubrication during the period of operation. However, these important parts of the production systems are generally and always overlooked, and most engineers and even the management never seem to bother to replace them as frequently as they should.

Had due attention been paid to the parts' maintenance requirements, a lot more emphasis would be devoted to observing the lubrication essentials. They can be classified as follows for ease in distinction and understanding:

The ugly

- Not keeping contaminants at bay
- Using the wrong lubricants

The bad

- Not using the right lubrication equipment
- Untrained personnel

The good

- Developing a comprehensive lubrication program
- Contamination Control

Contamination should be considered as the 'ugliest' bungle in lubrication practices. Yet, disturbingly, most plants with the most sources of contaminants such as dust, water and other fluids seem not to consider the importance of lubricants contamination control.

Plants need to understand that by preventing dust or water ingestion into bearings or gearboxes, for instance, a plant can be assured of optimal performance of the oil or grease inside the equipment, achieved by keeping moving surfaces apart. However, when this does not happen, as is often the case, dirt forms a grinding paste or medium that accelerates the rate of wear. This is why it is not uncommon to get such complaints as a bearing designed to last for two years, for example, survives for only three months.

To avoid contaminating grease or oil meant for equipment lubrication, the solutions should be stored in a "hospital" type of environment, if maximum protection and reliability of industrial equipment and machinery is to be achieved. Otherwise, any speck of dirt that gets into equipment becomes the wear element, even with proper lubrication.

Cross contamination is the other factor that should be controlled. Small quantities of particular oil, for example, introduced into another type of oil as a result of using the same oil pump, which may contain small quantities the other oil type, may affect the properties

and performance level of the right oil. Using dedicated lubrication equipment for particular oil prevents cross contamination, ensuring that the properties of the lubricant do not change.

Right lubricant

There is a good reason why there are so many types of oils and greases for different applications. Using the right lubricant is dependent on a lot of factors which may affect the performance of the lubricant being applied.

The following factors are heavily considered:

a) Temperature, both inside and outside the lubricated part. High and low temperatures affect lubricants. That is why lubricant manufacturers come up with lubricants that will withstand temperatures as high as 600 deg.C or as low as -50 deg.C.

b) Working pressure of a bearing or gearbox determines the type of grease or oil to be used. Greases and oils are made to handle different pressures. The pressure inside a cement kiln gearbox and that of a bottling conveyor gear box are different and so is the type of oil.

c) The working environment highly determines the type of lubricant to use. For example, fully synthetic oils can accommodate up to 10% contamination without affecting their performance.

d) The industry determines the type of lubricant to use. Using non-food grade oils and greases in a food or beverage manufacturing equipment where there exists a chance of getting in contact with food is not only dangerous to humans but also "evil" with knowledge that non-food grade oil are carcinogenic - cancer causing. Marine equipment is exposed to water and as such the grease used to lubricate the equipment has to be able to hold onto the equipment without being washed away.

The right equipment

This is not always considered to be a key element in ensuring that lubrication is done properly. In as much as lubrication is the number-one most important item in equipment maintenance, the investment in lubrication equipment is very low. Most plants still use grease guns for all lubrication activities, even where automated or centralized lubrication systems should be used. Use of the correct equipment ensures that proper lubrication is achieved, especially in equipment where frequent re-lubrication is required. Manual lubrication may be sufficient at some level. However, the criticality of lubrication may require elimination of the human element, which means the use of automated lubrication systems has to be employed.

Training, training, training

Lubrication training is critical to achieve the desired results. Adding oil or grease to an equipment is not lubrication; it is just an event which is important, but could also be the source of equipment failure. Without training the lubrication personnel on the importance of lubrication, how it is done and ways to make sure it is effective, is a recipe for failure.

A lot of lubrication personnel are the reason for equipment failure. For example, scooping grease from a bucket with a piece of wood or cardboard box is a common practice, and a frequent source of the contamination that finds its way into bearings. Using any oil or grease available when the right one has run out of stock may not be an issue to a lubrication technician. But the random lubricant may not have the appropriate performance requirements such as the ability to handle high temperatures, and result in failure of bearings or gearboxes. An untrained lubrication technician is like an untrained soldier sent out to a war zone.

Comprehensive lubrication program

A plant will work well in the presence of a comprehensive lubrication program. This does not simply mean ensuring lubrication is done but existence of a program that ensures all forms of lubrication at the plant are documented and followed to the letter. A comprehensive lubrication program should clearly answer the following questions:

a) Does the plant management team believe, and do all it takes to make sure that lubrication is given the highest level of priority?

b) Does the maintenance team have a tracking mechanism, or a process that ensures that all lubrication activities are recorded either manually or electronically?

c) Is there traceability of lubrication activities that would track the lubrication events of a gearbox that fails so that the failure investigation can lead to a solution?

d) Does the plant have a lubrication champion that is responsible of all lubrication activities, including lubricants and equipment management as well as improvements in the plant?

In summary, the good, the bad and the ugly just highlights key elements in lubrication that any serious plant maintenance manager must pay attention to at all time if desires to achieve high equipment reliability and reduced plant operating costs. Plant lubrication only costs 1 – 2 per cent of the overall plant operating budget. However, it leads to over 50 per cent of all operating equipment failures in a plant. No special engineering is involved. Just proper lubrication practices are required.

Remember, poor lubrication practices are costly, very costly. ■

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