

OPTIMISING EFFICIENCY

With the construction, mining and infrastructure projects are growing faster, there is a growing demand for productive and efficient equipment in various projects. This will boost the demand for technologically superior lubricants to meet the industry needs.

Lubricants play a vital role in the overall efficiency and productivity of an equipment. Over the years, with the changing equipment design and compliance to the latest emission norms, leading lubricant manufacturers are constantly upgrading and updating the lubricants in accordance with various operating parameters and conditions. Major role lubricants play in improving fuel economy and reducing cost of ownership is through providing better protection for equipment.

Current technology trends

OEMs in off-highway segments are

constantly focusing on new technologies aimed at improving fuel economy, minimising emissions and optimising the work environment. Lubricant manufacturers complement these need of the OEMs. The combination of performance and avoiding downtime has a major effect on increasing yield and return for the customer.

Construction and mining equipment are working in severe operating conditions. Increased drain intervals without compromising durability is the major technology advantage customers in this sector are looking for.

“With the changing dimension and requirements of these equipments, customers are now keen to know various properties of lubricants and oils such as air release properties, demulsifying properties, TOST life, etc. In transmission oil category such as backhoe loaders, people are looking for universal oils for gear, transmission and clutch. This concept is going to gain traction in the coming years,” says **Satyendra Debdas, General Manager-Industrial Oil Sales and Marketing, Apar Industries:**

According to **Pulkit Khemka, Vice President, Pensol Industries**, the current trends in the lubricant industry



Photo courtesy: Apar Industries

Increased drain intervals without compromising durability is the major technology advantage customers are looking for in construction and mining projects.

are directly linked to the requirements and demands from OEMs. "Mining, construction and material handling equipment OEMs are now in the process of designing their equipment to get more performance output at the lowest energy consumption. This is where lubricants can play a vital role," he says.

In the current scenario, the size of the equipment is reduced, but with the same output as given earlier. OEMs have also focused on designing compact equipment, giving better performance output and handling capacity. Hence, the lubrication system has also changed with equipment design. This results in more pressure on the lubricant in terms of oil thickness maintained at elevated temperature, reduced residence time, increased speed, load and temperature. Khemka adds, "Oil has to perform well under the high speed, high temperature with load, sometime shock load. The lubricant has to give better oil film to reduce wear, protect equipment from corrosion and rusting, dissipate the heat and keep the system clean in harsh conditions."

J Ramesh, Executive Director, Tide Water Oil Company (India) Limited, is of the view, that the single most important trend is to have a longer drain interval of the lubricant and a short downtime of the equipment. He adds, "OEM recommendations are assuming greater importance in lubricant acceptance and use across a wide range of applications and most organised companies follow OEM specs while adding new equipment and/or to replace old ones."

According to **S Venkatesan, Chief Manager (Technical Services), Indian Oil Corporation,** lubricant technology trends are driven by the three major factors: Fuel efficiency, equipment durability and environmental impact. "Although the equivalents of BS-VI for the off-highway equipment have not yet been announced in India, it can be expected soon. In the case of on-

highway sectors, the industry is going towards HVI and VHVI hydraulic oils, like IOCL's Servo HyVis EE 46 which has the capability of giving 10-12 per cent fuel economy benefits," explains Venkatesan.

K Madhu Mohan, General Manager - Marketing, GS Caltex India, states, "One of the key technology trend in lubricants is towards bringing down the machine downtime and improve the overall efficiency. We are focusing on developing a robust value proposition to the customers which can enhance the efficiency of their operations. We have products which offer long drain intervals which immensely help the customers in bringing down the machine down time."

Products and solutions

Any lube oil consists of three main components: base oil, viscosity modifiers, and an additive package containing friction modifiers, detergents, inhibitors to protect copper parts, and emulsifiers to keep water droplets in suspension. Viscosity modifiers improve the flow at low temperatures and provide increased viscosity at higher temperatures. "A well designed formulation with balance of all components is the key to provide the right performance as all these components compete against each other and too much of one will affect the others," says **Jayanta Ray, General Manager - Industrial and OEM, GS Caltex India**

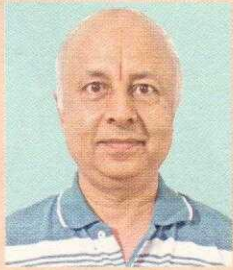
All the major oil and lubricant companies offer vast range of products for various applications like

engine oils, transmission oils, UTTO, hydraulic oils, ATF, axles, and multipurpose and specialty greases.

"Our entire ranges of HDDEO are API certified till CJ4 category. Our engine oils are also certified by Volvo under VDS3 and VDS4 specifications. We blend our entire range of engine oils with group II+ and group III base stocks. Few advantages of our engine oils include: Extended drain interval, enhanced equipment life, lower piston deposits, better fuel economy, excellent friction characteristics, better soot handling capability, excellent shear stability (we use better base oils with higher inherent VI), and lower traction coefficient," claims Debdas.

He further adds, "Our transmission fluid range is approved by Allison and meets the requirements of CAT TO4. We have unique technology driven UTTO products which meet the latest OEM requirements. Our hydraulic fluids are approved by major companies such as Bosch Rexroth, Cincinnati Milacron, Bull Machines, Action Construction Equipment, HYVA, BEML etc."

Khemka explains, "Pensol industrial lubricants are specially formulated to protect equipment in the harshest conditions. You can depend on our proven products and lubrication expertise to keep your stationary and mobile equipment working at maximum efficiency. We offer a broad line of high-performance mineral oil-based lubricants for the



"LUBRICANT TECHNOLOGY TRENDS ARE DRIVEN BY FUEL EFFICIENCY, EQUIPMENT DURABILITY AND ENVIRONMENTAL IMPACT."

- S Venkatesan,
Chief Manager (Technical Services),
Indian Oil Corporation

many specialised needs of the mining and construction industry."

Tide Water Oil Company (India) offers Veedol range of lubricants including engine oils, power transmission oils, gear oils, hydraulic oils, radiator coolants, extreme pressure greases and heat resistant greases. "Veedol has a long history of providing the correct lubrication solution for every possible application; also, the first to provide Super Clean and Genuine OEM oil to leading OEMs in India," says Ramesh.

IOC has a vast range of oils and lubricants (as Servo range and OEM-specific) for various applications including engines, transmission, axles, hydraulics, and engine coolants.

GS Caltex has a complete portfolio of brands for mining and construction sector such as Kixx range of oils (Engine Oil), GS Geartec range of oils (Gear Oils), GS Hydro range of oils (Hydraulic Oils), and GS grease range (Grease).

Says Mohan, "Within engine oils we have the complete range of products meeting API standards of CF4 to CJ4, which is poly alpha olefin-based fully synthetic products. Apart from meeting API standards our products exceeds several industry specifications of ACEA, JASO, Cummins, VDS, CAT and MB standards. Apart from engine oils, we also have high-performance gear oils (API GL4/ GL5, TO4 and UTTO), greases (Li-Complex, Moly, EP etc) and hydraulic oils (meeting DIN 51524 Part III and super clean range)."

Rajesh Nagar, Managing Director and CEO, GS Caltex India comments, "GS Caltex, the leader in Base Oil Technology, has developed superior world class products to address the needs of the challenging operations. These specially designed lubricants supports: improve components' performance, extend the service life of the machine, and reduce fuel and oil consumption."

He further adds, "GS Caltex construction sector lubricants meet the

high standards required during extreme operation so that the construction and mining equipment's maintains its performance, productivity and low owning and operating costs during its entire service life. Most importantly many of these savings can be measured tangibly through our expert advice available free of cost to our esteemed customers."

Lubricants & emission norms

According to Ray, to meet stricter emission norms in future, OEMs would require the use of EGR and/or SCR technologies, and possibly a DPF, depending on the approach. On the fuel economy side, OEMs may need to review all engine systems to reduce consumption. This could include higher pressure fuel injectors, the addition of boosting systems, high-efficiency SCR and combustion technology, as well as downsizing the engine itself. A good quality lubricants could satisfy and support these testing conditions required to be met by the OEMs.

Says Khemka, "Pensol has wide range of lubricants solutions to cater to the emerging needs of the OEMs in India. Higher grade lubricants are required to meet the current emission norms and we have already launched BS-IV specification lubricants products well in advance. Government of India has targeted year 2020 for BS-VI implementations, and Pensol is well equipped to launch lubricant product as per OEM requirement."

According to Ramesh, most OEMs have API CI-4 /CI-4 Plus as their recommendation. He adds, "Veedol Max-Pro Long Drain 15W-40 CI-4 Plus, our premium engine oil launched more than three years ago for varied automotive and industrial applications, is future-ready and is the most suitable oil for a BS-IV engine. This grade has shown exemplary performance in construction equipment applications, supported by our condition monitoring lab results. Similarly our full product range is continually upgraded to meet emerging emission norms. These



"ALL OUR PRODUCTS ARE DEVELOPED TO MEET STRINGENT REQUIREMENTS OF THE OEMS."

- Rajesh Nagar,
Managing Director and CEO, GS Caltex India

include PTF series, Atransol series, high performance long life greases, anti-freeze coolants and so on.”

Venkatesan elaborates on his company's role, “Ever since BS-IV introduction in select cities in 2010, IOCL's range of engine oils meeting API CH4/CI4 and CI4 plus have been in application for various engines employing EGR technology. These oils are extremely robust in handling the additional soot generated due to EGR and yet keep the engine parts clean. IOCL has also developed the Diesel Exhaust Fluid (DEF) or alternately called AUS 32 (Aqueous Urea Solution 32) for use in vehicles built with SCR technology.”

To bring down reductions on greenhouse gas emissions and improvements on fuel economy averages use of ultra low sulphur diesel (ULSD) will become a norm soon. The combination of these mandates led to market changes to use API CJ4 category of lubricants. Says Ray, “GS Caltex has already launched a super premium quality diesel engine oil called Kixx DX Euro 15W-40 for off-highway and construction applications, which require an API CJ-4 service category. Product categories meeting API CK4 and API FA4 standards are also ready for launch and will be in market as India moves to stricter emission norms.”

Nagar says that his company is always working in association with global OEMs to comply with the emerging emission norms effectively. He adds, “Our R&D team continuously works with OEMs on a global basis. All our products are developed to meet stringent requirements of the OEMs. Our products are designed to meet the latest emission norms and we are well set to offer products to meet the future emission norms.”

Low sulphur and wear & tear

All crude oils contain sulphur so that products of refined crude oil like diesel fuel, gasoline and conventional



“THE ENGINE OILS IN DEMAND WILL BE OF CJ4 EQUIVALENT, WHICH WILL ADDRESS THE EMISSION COMPLIANCE AND FUEL EFFICIENCY.”

- Satyendra Debdas,
General Manager-Industrial Oil Sales and
Marketing, Apar Industries



“THE MARKET IS MOVING TOWARDS FULLY SYNTHETIC LUBRICANTS DUE TO ADVANTAGES OVER CONVENTIONAL LUBRICANTS.”

- Jayanta Ray,
General Manager - Industrial and OEM,
GS Caltex India

motor oils also contain sulphur. Latest emission regulations limit the amount of sulphur in all of these products. While this is a benefit for emissions, it does have some consequences in terms of wear and tear. Sulphur is a natural anti-lubricant, so reductions in sulphur reduces the natural lubricity of refined products. According to Khemka, the reduction of sulphur in diesel fuel, gasoline and motor oil has had measurable effects on fuel injectors and other vital engine parts. Hence, lubricant manufacturers need to upgrade their quality that can increase the lubricity of fuel to save wear and tear of parts.

Says Venkatesan, “Although the sulphur levels in fuel is decreasing, in order to keep the lubricity levels of the fuel intact, certain additives are incorporated in the fuel at the manufacturing level itself so that there is no detrimental effect on FIPs. The HFRR test value specified in the BIS Standard for diesel ensures the same.”

According to Mohan, India has a long way to go before it can offer low sulphur diesel as it needs massive upgradation of all the refineries. “However, on the lubricant technology front we have products which are designed to meet the requirements these engines. We have low SAPS (sulphated ash, phosphorous and sulphur) products to meet those requirements,” he adds.

Technology gap

Is there a technology gap prevailing in the market as far as the emerging emission norms and the availability of fuel and additives are concerned? Debdas reacts, “It is not a technology gap. But because the changes in regulations are coming into effect so immediately that the industry gets hardly any time to prepare for the new designs and changes. Various factors such as finance and time driven technology are involved in the process of changing compliance from the current level of norms to the next level.” He further adds, “The BS-IV



“WE HAVE LOW SAPS (SULPHATED ASH, PHOSPHOROUS AND SULPHUR) PRODUCTS TO MEET THE LATEST EMISSION NORMS.”

*- K Madhu Mohan,
General Manager - Marketing, GS Caltex India*

norms have been already in force for on-road vehicles now, while the implementation of BS-VI (skipping the BS-V level) has been planned by 2020. So within a short span of three years, the technology being developed and introduced is getting obsolete, which involves a lot of efforts and money. This is a difficult situation for heavy machinery and vehicle manufacturers because there are a lot of manpower, technology, software development, model designing, etc involved. This is the gap we see as far as meeting the new norms is concerned.”

Ramesh also doesn't see any technology gap as far as lube oils are concerned. He comments, “Government policy may determine the need for and timing of migration to BS-IV alignment from the currently existing BS-III for the construction equipment segment. All our products are geared to meet new norms as and when they come into effect.”

According to Venkatesan, the BS-VI emission norms recently announced by Govt of India has already been prevalent in Europe at least for the last 10 years. So, essentially, all technologies needed for lubricants to be compatible with BS-VI emission compliant fuels, engines and after treatment devices (ATDs) are pretty much available in India. He adds, “In fact, IOCL is

already ready with its latest API CK4 engine oil compatible with the latest treatment devices. So, I don't see any technology gaps in meeting the new emission norms.”

Off-highway OEMs have been under considerable pressure to offer engines that are more durable, more fuel efficient and produce less emissions than before. New legislative mandates along with exhaust after-treatment system and engine hardware changes are working together to create harsher conditions in which lubricant is operating and has its effects on overall performance of the oil. As Ray explains, “Part of the solution can be address through lubricants technology. Thus, new service categories like API CK4 and API FA4 are born to meet the goals of emission norms and also to accomplish overall performance. In India, API CK4 and API FA4 product categories will arrive by 2020 when India moves to BS-IV fuel quality standards. CK4 Fluids have HTHS of 3.5cP or higher and are backwards compatible. But FA4 will have reduced HTHS of 2.9-3.2cP and will have better fuel economy potential but are not backward compatible.”

Selecting right lubricant

To maximise lubrication effectiveness, minimise cost and reduce the risk of application-induced failure, the appropriate choice of lubricant is essential and needs to be determined by the nature of the environment in which it will be used. Different types of lubricants excel at various uses, depending on their precise combination of ingredients and formulation. Therefore, when selecting lubricants, a number of factors need to be considered. It is essential to select the right lubricating solution with correct viscosity and adequate performance level so as to enhance engine durability, provide fuel economy and maintain environmental pollution norms. There are specifications laid down for each application. Beyond this, All

OEM service manuals recommend oil specifications (viscosity as well as performance level) for their equipment. Service and oil analysis play a major role in selecting the lubricants and oils for the right application.

Ramesh elaborates, “While in service, a lubricant is exposed to a variety of different and unrelated field conditions (extreme temperature, contamination, etc), each of which may have a decided effect on performance. Therefore, a proper lubricant selection is the cornerstone of any excellent lubrication programme. A good understanding of this allows the lubrication engineer to study and recommend the right lubricant for each equipment, including the optimum drain interval. This ultimately extends the life of the equipment and reduces its total operation and maintenance cost, resulting in less time of the equipment in the shop floor and more time in the mining field.”

According to Khemka, using the right lubricants can significantly reduce costs by cutting unplanned equipment downtime, thereby lowering maintenance costs and increasing equipment life and availability. The selection of the right lubricant will always depend on the equipment which is going to use it and the environmental conditions.

Venkatesan is of the view that the importance of choosing the right lubricant for the right application cannot be overemphasised. He adds, “This is especially true in the case of construction and mining industry where the demand on the machinery is virtually 24x7 and the profitability or viability of any project depends on continuous operation of the equipment. Therefore, it makes business sense to select a reliable and technically sound lubricant supplier, who can not only provide on-time supplies in competitive prices, but also support with oil condition monitoring, selection of lubricants for the



"PROPER LUBRICANT SELECTION IS THE CORNERSTONE OF ANY EXCELLENT LUBRICATION PROGRAMME."

- J Ramesh,
Executive Director,
Tide Water Oil Company (India) Limited



Photo courtesy: Tide Water Oil Company (India)

Customer are looking for long drain lubricants.

application and be technically capable of troubleshooting any lubricant related complaints. IOCL with its vast supply network backed up by technical services engineers in every part of the country, comes as a natural choice fulfilling all these conditions."

Emerging scenario

OEMs are introducing the latest machines which are technologically much superior and have complex designs requiring superior lubricants. Khemka elaborates, "Across the mining, material handling and construction segments, the innovation and sophistication required in the equipment is immense, which demands more advanced lubricants. Lubricant technology is driven by these changing needs of customers and OEMs. As the industry faces the challenges of improving the lube for fuel ratio and lowering the cost of production, a key requirement is to lower the operating costs and total maintenance costs. Hence, we see a more rapid adoption of leading edge lubricants that provide energy efficiency, productivity benefits and lower the total cost of ownership."

Says Debdas, "Considering the implementation of BS-IV emission norms from April 1, the engine oils

in demand will be of CJ4 equivalent, which will definitely address the emission compliance and fuel efficiency."

According to Ramesh, requirement for construction and mining equipment is increasingly driven by more power output, smaller sump capacities, clean technology and longer drain oils. Different models require different types of advance technology lubricants as stress factor varies from model to model. The demand from OEMs and end customers for better quality lubricants with longer life, leads to technology developments in the lubricant industry.

"At a basic level, there is a clear shift towards multigrade oils (of lower viscometrics) replacing monograde oils, thereby positively impacting longer lubricant drain interval and extended equipment life," comments Ramesh.

He further elaborates on the other emerging trends, "In engine oils selection, the industry is moving from API CF4, CH-4 to CI-4, CI-4 Plus. However, viscosity remains SAE 15W-40. To increase fuel economy, some users contemplate using lower viscometrics like SAE 5W-30, 10W-30 etc, but many OEMs have their reservation with respect to engine durability at this level."



LUBRICANT MANUFACTURERS NEED TO UPGRADE THEIR QUALITY THAT CAN INCREASE THE LUBRICITY OF FUEL TO SAVE WEAR AND TEAR OF PARTS."

- Pulkit Khemka,
Vice President, Pensol Industries

According to Ramesh, power transmission fluids (in SAE 10W, 30 and 50) are becoming popular. These are specially designed heavy-duty transmission fluids for off-highway power shift and certain non-synchronised manual transmissions, wet brakes, final drives and hydraulic systems meeting rigorous performance requirements.

Venkatesan elaborates on the emerging trends, "In engine oils, the trends shall be towards lower viscometrics like 10W-30/10W-40 away from the regular 15W-40 grades which are still very popular. Although the shift is very gradual, once the fuel economy benefits derived from such oils are experienced and the misgivings about component durability are laid to rest, we can expect a much faster growth in these segments. The major change however, we can see in the increasing usage of High VI and VHVI hydraulic oils where the twin benefits of fuel economy and extended drain intervals can be had."

Ray highlights on a new global trend, "Many countries are putting several stringent regulatory sanctions on mineral lubricants owing to their environmental impact. This is compelling oil marketing companies to focus on synthetic lubricants (PAO-based) and also towards bio-based lubricants. A suitable example here would be GS Caltex developed PAO (Polyalphaolefin)-based synthetic fluids. Kixx PAO is a synthetic engine oil based on the Tri-Synthetic formula including PAO. Satisfying the American Petroleum Institute (API) performance standards and European standards, Kixx PAO 5W-40 boasts superior oxidation stability, delivers a smooth and comfortable ride, and provides complete engine protection."

Outlook

According to Ramesh, the size of the Indian industrial lubricant market is estimated at \$3.1 billion with mining, road infrastructure and construction

segments together contributing to 15-18 per cent. "We predict that there will be a growing demand for engine oils and other variety of lubricants from the Indian construction equipment sector, accelerated by growing mechanisation of construction activities. Investment in infrastructure is the main growth driver of the construction equipment industry."

He further adds "Mechanisation of mining operations, a key ingredient behind rising production, has led to increased demand for mining equipment. The burgeoning real estate industry in India gives a fillip to the demand for concrete and building construction equipment. Real estate market is expected to grow at a CAGR of 17.2 per cent and is expected to reach \$180 billion by 2020."

Almost all global technology leaders in the construction and mining equipment sector have a presence in India, either as joint ventures or with their own manufacturing or marketing companies. All these factors suggest that there is undoubtedly going to be a lot of action in this industry in the years to come, Ramesh observes.

According to Debdas, the market for lubricants has to grow as the user industry is growing. He adds, "Last year we have seen commercial vehicle segment growing. Construction projects, especially road projects, are picking up with the speed of construction is growing year after year. More road projects are in the pipeline and various other infrastructure projects are coming up. Government is giving equal importance to the rural as well as urban development activities. In the next five years, the market growth will be robust."

He further elaborates, "In the mining also, there are increased activities, not only government companies, but private players also have come up with more mining activities. We see that a lot of high-end equipment have been imported by the private mine operators. There are ample orders in the pipeline for more

equipment in the coming years. OEMs should be ready with the required investment during this period to meet the growing demand for equipment. Another advantage is that after demonetisation drive, there is enough cash reserve with the banks as the fiscal deficit has decreased drastically from Rs 1,40,000 crore to Rs 15,000 crore. So, the government wants to invest the surplus money in a wise manner. Though this trend is not visible now, in the next one year, we think the flow of funds will take off."

According to Ray, "India is the third largest lubricant market, accounting for 6 per cent of global demand. Due to focus and investments towards environmentally sustainable lubricant solutions, market is moving towards fully synthetic products (Group III and PAO-based base oils). The increasing popularity of the synthetic lubricants due to the various advantages over conventional lubricants such as excellent thermal stability, wear and tear protection coupled with other properties such as good load carrying capacity and low friction are anticipated to propel industry growth in construction and mining segment over the next five years."

Mohan also sees a big opportunity for industrial lubricants in India as the per capita lubricant consumption is still very low here. He adds, "In the next five years, the market will grow because of the economic growth. However, in the long run, the lubricant market will saturate, stagnate and then shrink due to the longer drain oils, lower sump sizes and negligible top ups. Overall, as a growing economy, global lubricant players will be looking at India and more players will enter the market in the coming years.

Lubricant manufacturers are gearing up for the emerging emission norms, which will see technologically superior grade lubricants to cater to the stringent application requirements in future.



- SUDHEER VATHIYATH