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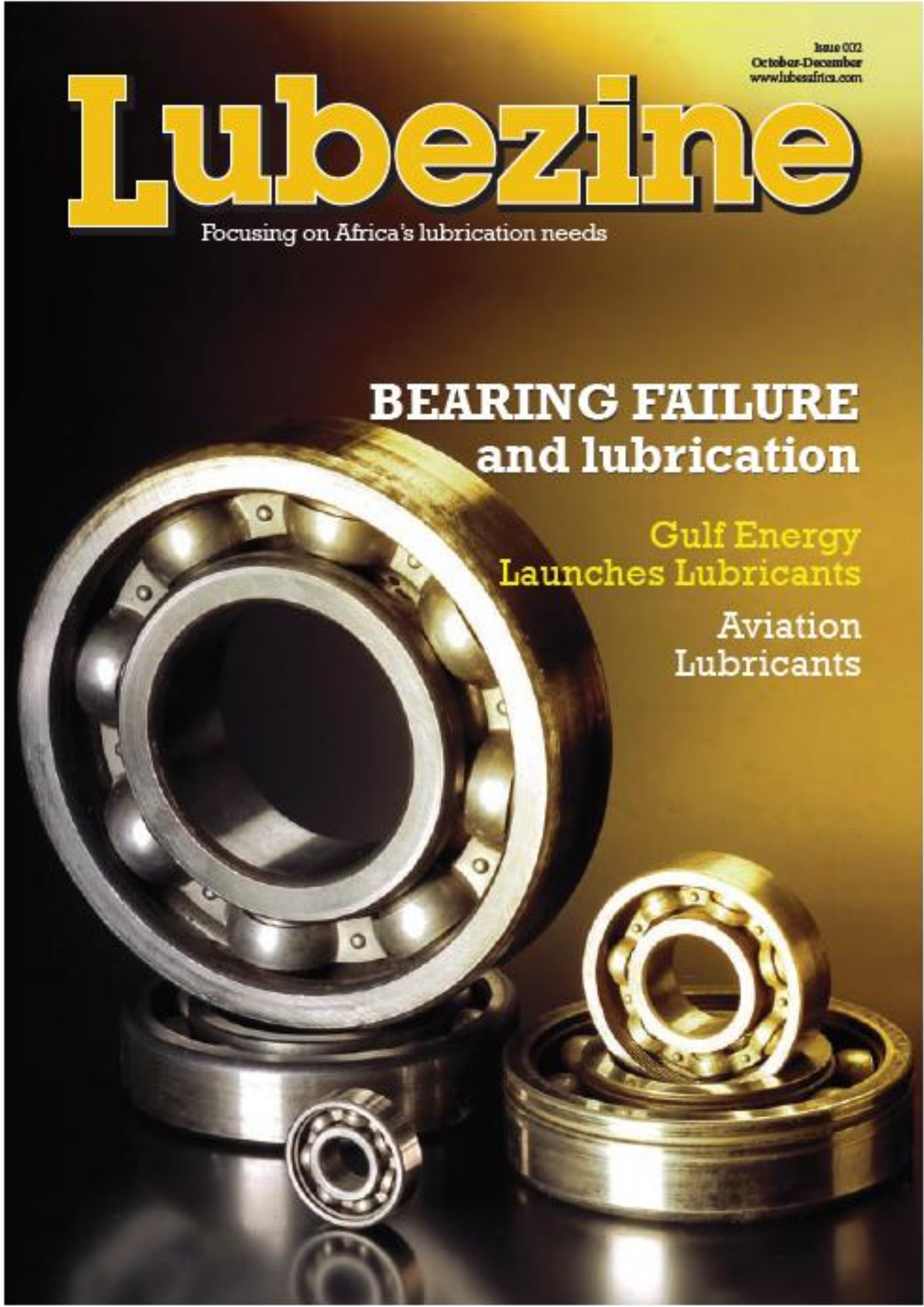
Lubezine

Focusing on Africa's lubrication needs

BEARING FAILURE and lubrication

Gulf Energy Launches Lubricants

Aviation Lubricants



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Contents






In july 2011, Lubezine magazine's first issue rolled off the press premised on an editorial policy that champions the dissemination of technology and market news with an aim of uplifting the standards of the regions lubricants industry. With the partnership and support of our readers and advertisers, this magazine continue to receive accolades and is now viewed as a premium tool in which progressive communication agenda and matters of interest to the lubrication and oil sector are conveyed to a targeted readership.

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Karibu

By Joseph Ndungu

The past three months have seen some of the most exciting moments in the lubricants industry. Gulf Energy, a local oil company launched its own brand of lubricants. In so doing it joined the likes of Hass Petroleum, which has blazed this trail since 2009. The scope of the Gulf Energy Lubricants is breath taking, what with a fully synthetic petrol engine oil-*G3 Syn Tec,* meeting Euro 5 emission standards and a Brake fluid meeting dot 5.1 specifications. With this bold step, the company's slogan, *we are here to change the game,* is in full motion.

Lubezine continues to stay faithful to its core objectives of informing the market and dissemination of technology information to stake holders in the industry. Did you know that you could substantially reduce the annual expenditure on bearings by simply using the right grade of grease and observing best practices of lubrication? In this edition the issue of proper bearing maintenance has been given extensive coverage with practical guidelines on the do's and don'ts.

For illustration, we have covered an incident that took place in 2000, in California, USA, where a plane crashed leading to loss of life as a direct result of not observing the recommended lubrication practices, in this case not using sufficient quantity of grease. Thus the article on aviation lubricants is timely and resourceful for practicing professionals in the aviation industry.

This edition of *Lubezine* magazine will reach key stake holders who make decisions on various aspects of lubricants and lubrication. It constitutes the most direct link between marketers of lubricants and end-users, thus forming the most ideal advertising medium for the industry. We are grateful to past and present advertisers who have ensured that this magazine reaches as many maintenance engineers and other stakeholders every quarter.

Happy reading.

Joseph Ndungu

For feedback or questions
email feedback@lubesafrica.com

Common causes of bearing failures

Bearings are critical machine elements found in both Automotive and industrial machinery. Every maintenance budget comes with a substantial allocation of funds for bearings replacement. Additionally, a bearing failure affects production as machines have to be stopped for maintenance, thus impacting negatively on a company's bottom-line. What causes bearing failure and how can the working life of these machine elements be fully realized?

By Joseph Ndungu

A myriad of reasons are responsible for premature bearing failures. Each of these factors could be singularly responsible, or act in a complex combination with the other factors, to result in failure. Typically the causes of bearing failure can be classified into 5 main groups shown below in figure 1.

Recent advancement in tribology has led to a better understanding of the causes of bearing failures. The most common causes of failure have been identified as those related to lubrication. This is illustrated in the figure 2.

1. Improper lubrication

Improper lubrication is the major cause of bearing failures, contributing close to 80% of such failures. Understanding lubricants and lubrication of bearings is thus of paramount importance if premature failures are to be reduced.

Grease

The most commonly used lubricant for bearing lubrication is grease. Grease is defined as a solid or semi - fluid product of a dispersion of a thickening agent in a liquid lubricant. Thus grease consists of 3 parts; (1) the thickener which makes up 4-20% of the product and whose function is to hold the lubricating oil; (2) the liquid lubricant which makes up 75% - 90%; and (3) additives making up 0%- 5%.In the finished grease, the lubricating liquid and additives are held within the structure of the thickener, just like water is held in a sponge. When the thickener is squeezed, for example when a load is applied to a bearing, it releases the lubricating fluid to do its job. And that is how grease works.

Functions of grease

Grease performs all the normal functions of a liquid lubricant such as prevention of friction and wear, prevention of rust and corrosion and heat dissipation. In addition to the basic functions, grease is expected to;

i. Act as a seal against the intrusion of water , dust and other contaminants
ii. Resist wash- off by water
iii. Stay in place
iv. Resist leakage through seam mechanisms which may be simpler and cheaper to manufacture, than those normally used in oil lubrication applications.

Lubricant and lubrication methods greatly affect the life of a bearing. Bearing failure could be as a result of any one or a combination of the following factors

I. Unsuitable grease

Using unsuitable grease represents 20% of the causes of bearing failures. Bearings are exposed to extreme operating conditions. When selecting a grease, factors to consider include operating load, speed and temperature. The product selected should have the right type of thickener, additives, consistency, and ability to withstand the operating temperature.

Every grease technical data sheet usually gives the following information

• Thickener type

The most common thickeners are lithium and lithium complex. Lithium based greases are suitable for general purpose greasing where the operating temperatures are low, and lithium complex greases are suitable for high temperature applications, especially for wheel bearing.

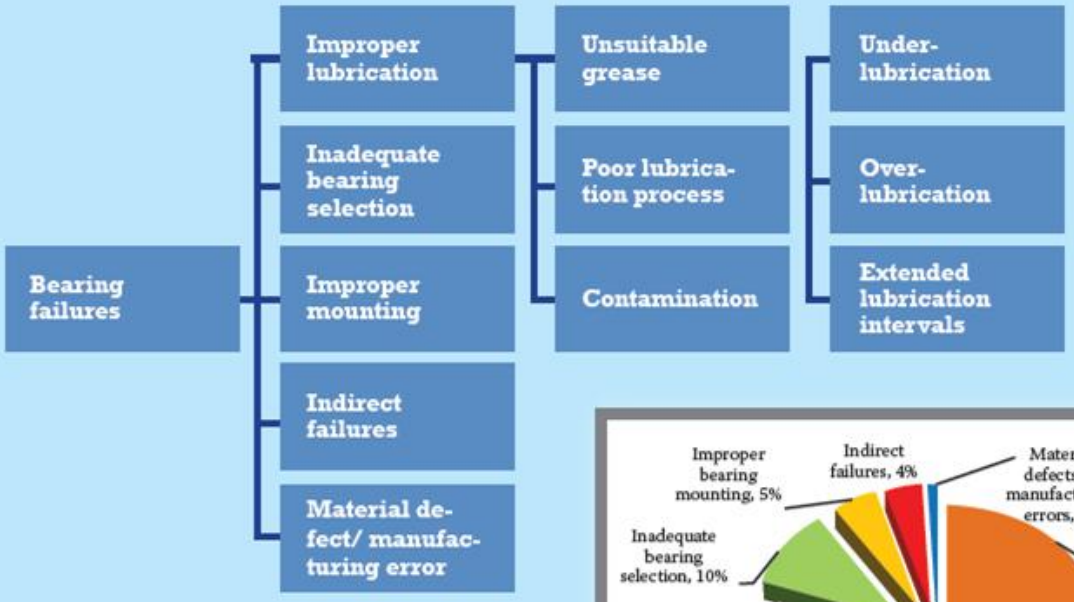

Figure 1: Causes of bearing failures

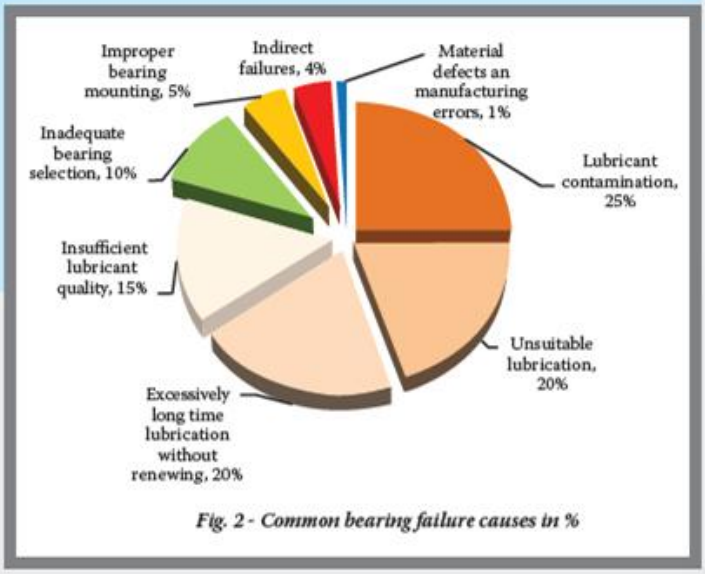

Fig. 2 - Common bearing failure causes in %

• Consistency

This is the relative hardness of grease. This factor contributes to the ability of the grease to stay in place, to seal, to lubricate under high load /slow speed operation and greatly determines which method of dispensing and application should be used for the grease. It is expressed in NLGI numbers, 000,00,0,1,2,3,4,5 and 6. For many automotive and industrial applications, NLGI 2 & 3 greases are generally recommended. Using higher consistency grease, i.e. thicker grease, in applications requiring lower consistency grease will lead to excess heat generation, and subsequent melting of the grease from the bearing housing.

• Operating temperatures

The maximum temperature that grease can withstand depends on the type of thickener used.. The technical data sheet typically gives two temperature ranges; (1) The dropping point defined as the temperature at which the grease thickener breaks down and irreversibly releases the oil held within it; (2) The maximum operating temperature which is lower than the dropping point, and is the recommended maximum temperature at which the grease will function well in operation. When selecting grease the maximum operating temperatures should be considered, and grease able to operate at this temperature should be used. Grease with a lower operating temperature will melt and flow out in operation thus leaving the bearings with no lubrication, leading to their ultimate failure.

Below is an extract of a technical data sheet for Adnoc Grease LX, marketed by Hass Petroleum. The thickener type of lithium complex, and the maximum operating temperature of 1600C, make the grease suitable for high temperature and wheel bearing applications.

Typical Inspection	Adnoc Grease Lx	
NLGI No.	2	3
Thickener type	Lithium complex	Lithium complex
Base fluid type	Mineral	Mineral
Base oil viscosity		
KV 40 ^{o}C, cSt	240	240
KV 100 ^{o}C, cSt	20	20
Viscosity Index	95	95
Penetration, Worked	280	235
Dropping Point ^{o}C	280	285
Temperature Range ^{o}C	-30 to +160	-30 to +160

Technical data: Adhoc grease LX

II. Poor lubrication processes

Poor lubrication is responsible for close to 35% of all bearing failures. This can result from the following processes;

• Under lubrication

If a bearing is not supplied with sufficient quantity of lubricant, abrasive wear will result leading to bearing failure.

- **Over-lubrication**

Over lubrication occurs when a bearing is greased excessively. This causes internal friction between the rolling parts, which generates excessive temperature that can create stress and deformation of the bearing. Additionally, the excess temperature will melt the grease out of the housing leading do bearing failure. As a general rule, rolling bearings and their housings should be filled 30% to 60% of their total capacity. If the working temperature and speed rises, then a reduced amount of grease should be used.

- **Long lubrication intervals**

Over time grease loses its properties and fresh quantities must be supplied at correct intervals. Prolonged runing without renewing lubcrication is one of the most common causes of bearing failure., blamed for 20% of all cases..

III. Contamination

Contamination by water, chemicals and particles is harmful to rolling bearings and is known to be responsible for 25% of premature failures. Water leads to formation of corrosion pits and finally flaking of the bearing surfaces. This is shown in the figure 3 below

not work properly. In some cases the bearing require preloading to facilitate rolling motion and to prevent roller skidding. Replacing the original bearing with a new one may result in frequent failures if it is not properly loaded.

3. Improper mounting

About 5% of bearing failures are caused by poor mounting methods. Failure might occur as a result of misalignment, in which case there will be increased vibration and temperature in the bearing, leading to heavy wear in the ball or roller pockets where they run. If during mounting the inner ring requires to be expanded through heating, uneven or excessive heating can lead to failure. Additionally, if the heating method is through use of induction heaters, it is imperative to demagnetize the roller bearing. Failure to do so will result in the bearing attracting ferrous metal particles that will eventually cause abrasive wear.

4. Indirect causes

Indirect failures such as overloading, excessive speeds, vibrations, high temperatures and electrical discharge account for about 4% of all bearing failures. Overloading of stationary bearings by static loads will

Damaged rolling elements possibly caused by dirt contamination in the grease

When a bearing requires replacement, it is prudent to only use the one recommended by the original equipment manufacturer.

Grease is an excellent catcher of particles, especially dusts. Such particles generate micro cracks on the bearing raceways during operation. The life reduction caused by solid particles in the lubrication film is dependent upon type, size, hardness and quantity of particles. It is also dependent on the lubricant film thickness and bearing size. It is therefore of paramount importance to ensure proper storage of grease in sealed containers to prevent possible contamination.

2. Inadequate bearing selection

In correct bearing selection accounts for 10 % of all bearing failures. When a bearing requires replacement, it is prudent to only use the one recommended by the original equipment manufacturer. For example, replacing a bearing with a larger or stronger one in the hope that it will have the capacity to carry more radial load may lead to problems. The new bearing could have a speed lower than the nominal one and thus may

lead to plastic deformation of the rolling element or raceways. If the typical bearing load and rated speeds are doubled, then the bearing life may be reduced by up to 90% and 50% respectively. Electrical discharges occur when electrical charges are dissipated through the bearings to the ground. This results in surface damage in the form of shallow craters that are closely positioned to one another. Bearing failure due to overloading Higher temperature than normal will lead to degradation of the grease in use. This will result in bearing failure as a result of inadequate lubrication.

5. Material defects and manufacturing errors

Though not common, some bearing do fail due to use of defective materials and/or manufacturing errors. These types of failures are gradually being reduced with advancement in material science and manufacturing processes■

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Gulf Energy REVIEWS STRATEGY to beat competition

By Rita Mutuku

Aside from all the debate and blame game surrounding the ever rising international crude oil prices, translating to high fuel prices, increased competition to attract a larger clientele remains one of the priorities among regional and international marketers.

H.E President Mwai Kibaki, the Minister for Energy Kiraitu Murungi with Mr. Suleiman Shahbal, Chairman Gulf Energy and MD Mr. Francis Njogu, when he toured Gulf Energy Stand during the 2nd annual Energy Conference

Hon Kalonzo Musyoka, the VP joins Gulf Energy team L-R Francis Njogu, Suleiman Shahbal Chairman, Ahmed Bajaber Directorduring the Company's re-branding and lubricants launch event held at Nairobi club.

The New Gulf Energy image unveiled.

Gulf energy sponsored rally team -warembos bila make-up.

In a market where more than 400 new/second hand vehicles are registered daily, oil marketers have a huge task to ensure availability of products and services. The current competitive environment has seen some oil marketers offer pump discounts, while others diversify their product offering to consumers.

Gulf Energy has not been left behind. The company recently launched a line of new lubricants in the market and at the same time unveiled a new corporate identity. "Gulf Energy is making a difference and changing the game," says Francis Njogu, Gulf Energy's CEO during the launch event held recently. He said the new identity expresses the company's beliefs and confidence in all its areas of business. "Our commitment is to be the leading futuristic energy provider, continually meeting our customers' energy requirements in an ecologically safe manner," he added.

"We take immense gratification in the fact that our products stand in a very small class in the world. Products that meet the very stringent Euro 5 specifications," he added. Mr. Njogu says he is confident that Gulf Energy's lubricants meet the emission standards of different models of top-of the range vehicles.. "Not too many products even those marketed by the old-guards, can boast of this," he added. He urged motorists to use the new synthetic lubricant, G3 Syn-Tec oil, in their vehicles and experience long drainage intervals and superior performance.

The gulf energy lubricants cover a wide spectrum of both industrial and automotive applications. These include *G3* range of petrol engine oils, *VX* range of diesel engine oils, *FFWD* range of manual transmission oils, *Kinetix* range of industrial gear oils and *Maganus* range of hydraulic oils. Others include specialty products such as, Brake fluid dot 5.1, *Goofy* EP3 grease, *Kruise* ATF Dexron II and, *K3* long life coolant.

One salient feature of the Gulf Energy lubricants is the ultra modern pack design. As the Lubricants Manager Mr. Kirima explains, the pack design was developed with functionality and aesthetics in mind. The unique cap that incorporates a pouring

sprout is meant to ensure that pouring the lubricants into the engine is trouble free with no spillages. The aesthetic pack is also meant to ensure that Gulf Energy Lubricants stand out and reflect the high quality of the lubricant inside.

Gulf energy lubricants will be distributed through the newly launched Gulf service stations, which currently total 12, and through distributors and direct sales to industrial consumers. Gulf Energy has also expanded its market by establishing Gulf Energy Uganda and Gulf Energy Rwanda. Through these affiliates, the newly launched lubricants will find a foothold in the wider East African region.

The company's long term relationship with global trading firms and equity holders gives it strong trade positions in petroleum products supply to the region. Its range of products includes; Crude oils, Fuel products, Lubricants, Liquid petroleum gas (LPG), Bitumen & bituminous products and Specialty products, solvents & petrochemicals■

Lubricants BASE STOCK

By James Wakiru

Lubrication has always implied the use of lubricating oil, usually formulated by blending appropriate quality lube base stocks(s) and additives. On average lubricating oil consists of about 93% base stock(s) and 7% chemical additives and other components. The basic fluid that constitutes the major part of lubricating oil is almost invariably made from a mixture of two or more components, generally referred to as the base stocks. These can be petroleum-derived lubricating oil, but increasingly, quantities of other chemical fluid are being employed as partial or whole substitutes for mineral oils. Most such chemical fluids are readily miscible with petroleum fractions, and is a requirement for use in lubricants for general sale, to avoid problems from the use of different types and brands of oil in admixture.

A picture of a Base Oil Refinery

A Historical Overview

Base oils date back before the fifties. Although the important requirement for base oils in the fifties was the correct viscosity and the absence of acidic components, base oils in the sixties were down graded to solvents or carriers for additives in the euphoria surrounding chemical additives. In the seventies, there was a realization that some synthetic base oils with uniform basic chemical structure offered performances superior to that of mineral base oils. At that time the high price hindered their market acceptance. In the eighties, however, lower price, quasi—synthetic, hydrocracked oils were introduced in western Europe, which closely matched the properties of synthetic hydrocarbons(Shell, BP, Fuchs) The trend towards greater performance, and better environmental compatibility continues in the first decade of the new millennium. The significantly higher price of the new lubricant, which will be increasingly characterised by their base oil and less so by their chemical additives, will probably be accepted by users all over the world. In the year 2004, approximately 7% of base oils were synthetic. It is forecasted to grow to 10% in 2015

Types of Base Oils

There are three main types of base oils as below:

Mineral Base Oil

Current mineral-based oils are products of an intricate and extensive process of decontaminating and refining. Crude oil is used in the makeup of this base oil and is of an extremely inconsistent quality. This is because thousands of hydrogen and carbon atoms, or hydrocarbons, as they're referred to when they commingle, can be found in all molecules, and bind to other particles. Mineral oil is produced in vast amounts, is relatively inexpensive, and therefore easily accessible and used for many different things. It has no color, taste, or smell, which makes it a perfect ingredient for cosmetic products like creams, ointments, and lotions. Even though it is oil, it has an innate ability to water down thicker oils, making it an excellent component in detergents. Mineral oil does not soak up moisture in the environment, so it is also used to protect and transport certain metal tools and weapons to hinder corrosion.

Synthetic Base Oil

Synthetic base oils are tailor made base oils necessitated by different equipment and operational requirements, like very high or low temperatures, inert requirements etc. Hydrocarbons in synthetic oils are made of a simpler substance, thus allowing chemical engineers to alter the components of this lubricant to their desired state. Synthetic oils move easier in low temperatures and do not stop working at high temperatures as a mineral oil would. These oils can also be certified a couple of grades lighter than that of a mineral oil, which uses a lesser amount of energy and consumes less fuel. Because this is an item of better quality, it has a higher price.

EHVI and VHVI Base Oils

EHVI means "enhanced high viscosity index" oils, and VHVI means "very enhanced high viscosity index" oils. They are also created from crude oil. When unique methods are used, these oils can develop a state of being similar to that of synthetic oil. Because of the ever-increasing demand for low emissions and the improved quality requirements for transportation manufacturers, EHVI and VHVI oils are major elements of motor oil.

Classification of Base Oils

Base stocks differ widely in molecular composition, physical and chemical properties due to the crude source and processing steps used in their manufacture. These differences in base stock composition, even with similar physical properties can impact the end use performance of finished lubricants. As such lube base stocks are considered to be non-fungible products in many end use applications. In 1990 the American Petroleum Institute (API) established a base oil classification system to help marketers to minimize re-testing costs when blending licensed engine oils with base oils from different manufacturing sources. The system uses physical and chemical parameters to classify all base stocks (oils) into five categories as listed in table below :

Group	Saturate wt %	Sulphur wt %	Viscosity Index
I	< 90 and/or	> 0.03	> 80 to < 120
II	≥ 90 and	≤ 0.03	≥ 80 to ≤ 120
III	≥ 90	≤ 0.03	≥ 120
IV	All poly alpha olefins (PAOs)		
V	All base stocks not included in Groups I-IV		

API - Classification of Base Oils

These categories define the type of base stock the oil is formulated from. Note that the base oil group category is followed by the manufacturing method (in bold print) and then a description of the oil characteristics for each category.

Group I - Solvent Freezing: Group 1 base oils are the least refined of all the groups. They are usually a mix of different hydrocarbon chains with little or no uniformity. While some automotive oils on the market use Group I stocks, they are generally used in less demanding applications.

Group II - Hydro processing and Refining: Group II base oils are common in mineral based motor oils currently available on the market. They have fair to good performance in lubricating properties such as volatility, oxidative stability and flash/fire points. They have fair performance in areas such as pour point, cold crank viscosity and extreme pressure wear.

Group III - Hydro processing and Refining: Hydro processing and Refining: Group III base oils are subjected to the highest level of mineral oil refining of the base oil groups. Although they are not chemically engineered, they offer good performance in a wide range of attributes as well as good molecular uniformity and stability. They are commonly mixed with additives and marketed as synthetic or semi-synthetic products.

Group IV -Chemical Reactions: Group IV base oils are chemically engineered synthetic base stocks. Polyalphaolefins (PAO's) are a common example of a synthetic base stock. Synthetics, when combined with additives, offer excellent performance over a wide range of lubricating properties. They have very stable chemical compositions and highly uniform molecular chains. Group IV base oils are becoming more common in synthetic and synthetic-blend products for automotive and industrial applications.

Group V - As Indicated: Group V base oils are used primarily in the creation of oil additives. Esters and polyolesters are both common Group V base oils used in the formulation of oil additives. Group V oils are generally not used as base oils themselves, but add beneficial properties to other base oils.

Note that the additives referred to in the Group V description are not aftermarket type oil additives. The additives referred to are used in the chemical engineering and blending of motor oils and other lubricating oils by the specific oil company that produces the finished product.

Base stocks are called by several names: Neutrals (100N, 150N, 600N, ...), Bright Stocks, Grades (SAE 5, 10...; ISO 22, 32..). The most common names are for group I (SN: Solvent Neutral), for group II (N: Neutrals) and group III grade names refer to the viscosity (4cst, 6cst, 8cst ...). Grade names can also refer to trademarks.

Group	Grades			
I	SN150	SN500	BS150	
II	N150	N325	N600	
III	2cst	4cst	6cst	8cst

Base oil classification by grade

Gas-to-Liquid conversion technology

As a result of efforts to increase the value of natural gas in logically favourable locations, the chemical liquefaction of natural gas(also the chemical reaction route) was developed . The basis was the Fischer-Tropsch process. The process creates high quality liquid products and paraffin wax. High quality UHVI oils can be obtained from natural gas by part oxidation, polymerization and isomerisation.

The base oil market could undergo dramatic changes if the gas-to-liquid technology would become more generally available. It is nevertheless, most likely that major oil companies will be the first to operate large-scale gas-to-liquid(GTL) plants. ExxonMobil, Shell and SasolChevron each announced GTL projects including base oils production units in Qatar. These plants start production between 2009 and 2012. GTL base oils will have premium characteristics including very high viscosity indices, essentially no sulphur and nitrogen, very low evaporative losses, and almost no aromatic content. They will probably be classified as Group III+ base oils.

Besides natural gas, all carbon containing materials can, in principle, be used for production of liquid products and paraffin wax by Fischer-Tropsch technology.

Because of limited availability of crude oil, gasification and liquefaction of carbon, biomass, and even oil sands are of increasing interest■

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Material Safety data sheets (MSDS)

By James Wakiru

A Material Safety Data Sheet (MSDS) (also known as PSDS (Product safety data sheet) is a form with data regarding the properties of a particular substance.

An important component of product stewardship and workplace safety, it is intended to provide workers and emergency personnel with procedures for handling or working with that substance in a safe manner. It includes information such as physical data (melting point, boiling point, flash point, etc.), toxicity, health effects, first aid, reactivity, storage, disposal, protective equipment, and spill-handling procedures. MSDS formats can vary from source to source within a country depending on national requirements.

MSDSs are a widely used system for cataloging information on chemicals, chemical compounds, and chemical mixtures. MSDS information may include instructions for the safe use and potential hazards associated with a particular material or product. These data sheets can be found where chemicals are used.

There is also a duty to properly label substances on the basis of physico-chemical, health and/or environmental risk. Labels can include hazard symbols such as the European Union standard black diagonal cross on an orange background, used to denote a harmful substance.

An MSDS for a substance is not primarily intended for use by the general consumer, focusing instead on the hazards of working with the material in an occupational setting.

In some jurisdictions the MSDS is required to state the chemical's risks, safety, and effect on the environment.

Information found in the Material Safety Data Sheet (MSDS)

MSDSs are often hard to figure out, even for trained safety professionals. MSDS information is required by EPA (US Environmental Protection Authority), OSHA(Occupational Safety and Health Administration), DOT(Department of Transport), and/or DOE(US Department of Energy) regulations, depending upon the type of hazardous substance. The Material Safety Data Sheet includes the following information categorized in sections:

Section 1. Chemical product and company identification
Links the MSDS to the material. Enumerate going down Identifies the supplier of the MSDS. Identifies a source for more information. It includes the manufacturer's name and address.

Section 2. Composition/information on ingredients
Provides the lists of the OSHA hazardous components. May also list significant nonhazardous components. May also include additional information about components (e.g., exposure guidelines). A product can be patented to protect the contents, but disclosure must be made for all hazardous constituents.

Section 3. Hazards identification, including emergency overview
Provides information on the potential adverse human health effects and symptoms that might result from use and misuse of the material. May provide emergency overview.

Section 4. First aid measures
Provides instructions to be taken if accidental exposure requires immediate treatment. May also include instructions to medical professionals. This should include specific instructions to medical professionals; not general platitudes, like "seek medical help" or "apply CPR"

Section 5. Fire fighting measures
Provides basic fire fighting guidance, including appropriate extinguishing media. Describes other fire and explosive properties useful for avoiding and fighting fires involving the material, such as flash points or explosive limits.

Section 6. Accidental release measures
Describes actions to be taken to minimize the adverse effects of an accidental spill, leak or release of the material.

Section 7. Handling and storage
Provides information on appropriate practices for safe handling and storage.

Section 8. Exposure controls/personal protection
Provides information on practices, or equipment, or both, that are useful in minimizing worker exposure. May also include exposure guidelines. Provides guidance on personal protective equipment.

Section 9. Physical and chemical properties
Provides additional data that can be used to help characterize the material and design safe work practices.

Section 10. Stability and reactivity
Describes the conditions to be avoided or other materials that may cause a reaction that would change the intrinsic stability of the material.

Section 11. Toxicological information
May be used to provide background toxicological information on the material, its compounds, or both.

Section 12. Ecological information
May be used to provide information on the effects the material may have on plants or animals and on the material's environmental fate.

Section 13. Disposal considerations
May provide information that is useful in determining appropriate disposal measures.

Section 14. Transport information
May provide basic shipping classification information. (If any specific transportation label is required it is stated. For bulk chemicals UN number is included. Otherwise the labelling simply says "May be shipped

normally as a nonhazardous material")

Section 15. Regulatory information
May be used to provide any additional information on regulations affecting the material.

Section 16. Other information
May be used to provide any additional information. [Comment: If useless denials of responsibility are to be include, they are confined to this section]
Chemical manufacturers may legally withhold the specific chemical identity of a material from the MSDS and label, in the case of bona fide trade secrets. In such cases the following rules apply:

- The MSDS must indicate that trade secret information is being withheld.
- The MSDS must disclose information concerning the properties and effects of the hazardous chemical, even if the actual chemical identity is withheld.
- The trade secret information must be disclosed to a doctor or nurse in a medical emergency.
- In non-emergency cases health professionals can obtain a trade secret chemical identity if they can show they need it for purposes of health protection and if they sign a confidentiality agreement.

To access MSDS on the internet directly from manufacturer's site, one can follow the link below:

http://www.ehso.com/msds.php

Are lubricants a health risk? I've heard reports that lubricants can cause skin cancer, please explain this.

Material safety data sheets (MSDS) should be available in all work areas. Because they provide information relating to both health and environmental hazards, all personnel should have easy access to this important information. Use of appropriate safety protection is a must, including gloves and safety glasses when handling lubricants or greases. If lubricants accidentally contact the skin, wash immediately with an approved hand cleaner followed by normal soap.

With respect to skin cancer, the International Agency for Research on Cancer (IARC) has classified mineral-based lubricants and rated them according to their risk. A summary of this system is given below. Note the groups do not relate to API base oil groups. Note also that additives and synthetic base oils are not included in this listing.

Group 1: These are lubricants with sufficient evidence of carcinogenicity to humans. This group includes base oils that are acid-treated oils, mildly retreated solvent-refined oils, aromatic oils and mildly hydro-treated oils..

Group 2: These are lubricants with no human data, but strong animal data exist that indicate possible or probable carcinogenicity. There are no base oils listed in this group.

Group 3: These are lubricants not classifiable as to be carcinogenic to humans. They include base oils that are severely hydro-treated oils.

Group 4: These are lubricants that are probably not carcinogenic to humans. This group includes base oils that are white oils and petrolatums.

Generally, the MSDS must state the cancer hazard of a lubricant and define its risk category. As with any risk, caution is advised when handling any lubricant.

Recently I heard something called REACH concerning EHS of chemicals. What is it and does it affect lubricants?

REACH is the new European Union (EU) regulatory system for chemicals. It came into force on 1st June 2007 and will involve the registration of some 30,000 chemicals.

REACH is a significant new piece of European legislation. The acronym stands for:

Registration
Evaluation
Authorisation
and restriction of CHemicals

The new regulation replaces numerous European Union Directives and regulations and places responsibility on the chemicals industry to demonstrate the safety of its products.

Approximately 30,000 chemicals will have to be registered in an 11-year period following the legislation's enactment on 1st June 2007.

The European Commission believes REACH will deliver significant benefits by:

- Providing a high level of protection to human health and the environment
- Fostering innovation within the EU chemicals industry and ensuring high safety standards for its products
- Providing a single EU regulatory system with a streamlined decision-making process and clear timelines

This system is envisaged to affect lubricants registration also as they are deemed to be chemicals. However, this will affect Europe and products imported into Europe and may latter affect other continents

Interpreting Motor vehicles Owners manual

By Joseph Ndungu

Every motor vehicle comes with an owner manual which stipulates, amongst other things, the recommended lubricant specifications for the engine, radiator, brake system, gear box, differentials, torque convertors and steering system. Such products form the OEM (original equipment manufacturer) recommended lubricants.

The life and proper performance of any of the above vehicle parts largely depends on using the recommended lubricants and lubrication intervals. Typically the owner's manual will only give the general engine oil specifications without recommending a particular brand. However in some cases it will recommend suitable brands or Genuine oils. Genuine oils are lubricants bearing the vehicle manufacturer name. These are oils that have been formulated and packaged for the vehicle manufacturer by lubricant manufacturer to meet the specifications of the equipment. Common examples of genuine oils include GM'S ACdelco , Nissan genuine oils by Nissan, Toyota genuine oil by Toyota and CAT genuine oils by caterpillar.

GM'S ACdelco genuine oil

The following examples illustrate in more detail the information normally contained in vehicles owners manual.

Kia sportage

Kia sportage owner's manual recommends various lubricants as below;

Lubricant		Volume	Classification
Engine Oil *1 *2 (with filter change)	2.0L	4.0l(4.2qts)	API Service SL or SM
	2.7L	4.5*l*(4.8qts)	ILSAC GF-3 or above
Manual transaxle fluid		2.10*l*(2.22 qts)	API Service GL-4(SAE 75W-85, fill for life)
Automatic transaxle fluid		7.8*l*(8.2 qts)	DIAMOND ATF SP-III or SK ATF SP-III
Transfer case fluid (4WD)		0.8*l*(0.85 qts)	API Service GL-5 or above SAE 80W-90, SHELL SPIRAX AX or equivalent)
Rear differential fluid (4WD)		0.75*l*(0.79 qts)	
Power Steering		0.9*l*(0.95 qts)	PSF-III
Coolant		7.0*l*(7.4 qts)	Ethylene glycol base for aluminium radiator
Brake/Clutch fluid		0.7-*08l*(0.7-0.8 qts)	FMVSS116 DOT-4
FUEL	2.0L	*58l*(15.3gal)	Unleaded gasoline with AKI 87 or higher
	2.7L	65l(17.2 gal)	

Temperature Range for SAE Viscosity Numbers

Temperature (°C)	-30	-20	-10	0	10	20	30	40	50
(°F)	-10	0	20	40	60	80		100	120
Engine Oil			10W-30						
	5W-20, 5W-30								

From the above extract of KIA owner's manual, the vehicle manufacture has given the recommended products and it is up to the user to choose products that meets these specs. For engine oil, a lubricant meeting the specification API SL or API SM is recommended. A temperature chart is also given to help select the correct grade of oil for the climatic conditions the vehicle is likely to operate in. For example a KIA sportage operating in this region which an average ambient temperature range of 5 ° C – 30°C could use any of the grades listed in the chart i.e. 10W-30, 5W-20 or 5W-30. For rear differential and transfer box, Shell Spirax, is recommended alongside the general lubricants specifications.

Nissan maxima

Nissan Maxima owner's manual recommends lubricants meeting API SM and SAE 15W-30 specifications. Additionally they recommend usage of a genuine Nissan filter with every oil change.

API certification mark

API service symbol

ENGINE OIL AND OIL FILTER RECOMMENDATIONS

Selecting the correct oil
It is essential to choose the correct grade quality and viscosity engine oil to ensure satisfactory engine life and perfomance. Nissan recommends the use of an energy conserving oil in order to improve fuel economy.

Select only engine oils that meet an American Petroleum Institute(API) certification or international Lubricants Standardization and Approval Committee (ILSAC)certification and SAE viscosity standard.These oils have the API certification mark on the front of the container. Oils which do not have the specified quality label should not be used as they could cause engine damage.

Oil additives
NISSAN does not recommend the use of oil additives.The use of an oil additive is not necessarry when the proper oil type is used and maintainance intervals are followed.Oil which may contain foreign matter or has been previously used should not be used.

Oil viscosity
The engine oil viscosity or thinckness changes with temperature.Because of this it is important to select the engine oil viscosity based on the temperatures at which the vehicle will be operated before the next oil change. Choosing an oil viscosity other than that recommended could cause a serious engine damage.

Selecting the correct oil filter
Your new nissan vehicle is equipped with a high quality genuine NISSAN oil filter.When replacing,use a genuine NISSAN oil filter or its equivalent for the reason described in "Change interval."

Change Intervals
The oil and oil change intervals for your engine are based on the use of specified quality oils and filters. Using engine oil and filters that are not of the specified quality or exceeding recommended oil and filter change intervals could reduce engine life. Damage to the engine caused by improper maintenance or use of incorrect oil and filter quality and/or viscosity is not covered by the NISSAN new vehicle limited warranty.

Your engine was filled with high quality engine oil when it was built.

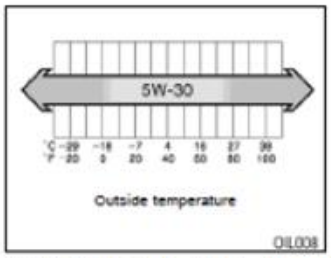
Toyota Prius

The Toyota Prius manual reads as below;

Engine oil selection
"Toyota genuine motor oil"is used in you toyota vehicle.Use toyota approved "ToyotaGeniune motor Oil" or equivalent to satisfy the following grade and viscosity.

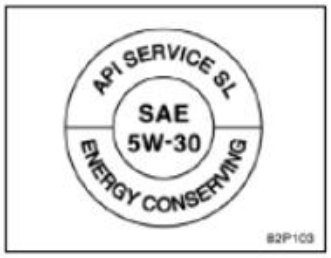
Oil grade.
API grade SL "Energy Conserving"Or ILSAC multigrade engine oil.

Recommended viscosity:
SAE 5W-30



SAE 5W-30 is the best choice for good fuel economy and good starting in cold weather.

If SAE 5W-30 oil is not available, SAE 10W-30 oil may be used. However it should be replced with SAE 5W-30 at the next oil change.



Toyota recommends API SL, SAE 5W-30. In addition the company recommends use of Toyota genuine oil which makes it easier for the vehicle owner to choose the appropriate lubricant. However where this is not readily available, any oil meeting the specified API and SAE classification will do.

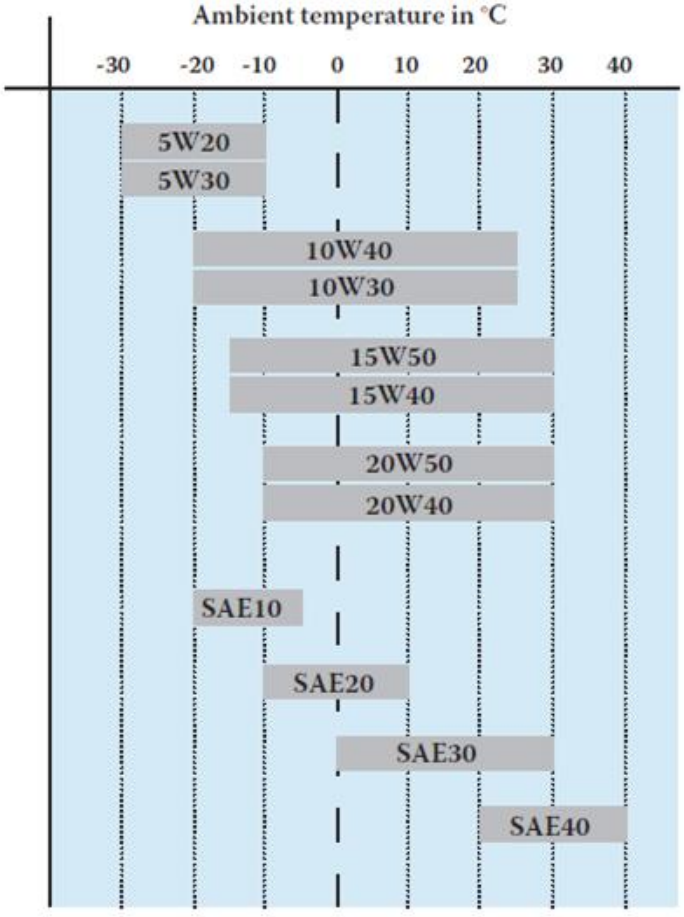
From the foregoing, the most commonly used specifications for engine oils is API and SAE. The viscosity rating and the classification system when combined give the information needed to select the correct engine oil. The impVortance of understanding these designations cannot be overstated.

SAE viscosity ratings

SAE (Society of Automotive Engineers) rates engine oils according the oil's viscosity; simply put, how thick or thin oil is at a certain temperature. For example SAE 40 oil is "thinner" (less viscous) than SAE 50 oil. In technical terms, Viscosity is defined as a fluids resistance to flow. The higher the resistance the higher the viscosity and vice versa.

The vast majority of carmakers specify multi grade oils which are designed to act like thin oil when cold so that they can circulate through the engine quickly on start up, and like thicker oil when hot, to provide the necessary engine protection. An example of a multi grade oil designation is 10W-40. The 10W (W = winter) indicates how the oil would behave when cold, while the 40 is how it acts when hot.

The SAE temperature chart can be used to determine a suitable viscosity grade based on the prevailing climatic conditions . For instance , the popular 20W- 50 and 15W-40 viscosity grade oils are suitable for the ambient tempearture ranges typically, experienced in the region.



SAE grades temperature chart

Gasoline Engines

Category	Status	Service
SM	Current	For all automotive engines presently in use. Introduced November 30, 2004. SM oils are designed to provide improved oxidation resistence, improved deposit protection, better wear protection, and better low-temperature performance over the life of the oil. Some SM oils may also meet the latest ILSAC specification and/or qualify as Energy Conserving.
SL	Current	For 2004 and older automotive engines.
SJ	Current	For 2001 and older automotive engines.
SH	Obsolete	For 1996 and older engines. Valid when preceded by current C categories.
SG	Obsolete	For 1993 and older engines.
SF	Obsolete	For 1988 and older engines.
SE	Obsolete	CAUTION - Not suitable for use in gasoline-powered automobile engines build after 1979.
SD	Obsolete	CAUTION - Not suitable for use in gasoline-powered automobile engines build after 1971. Use in more modern engines may cause unsatisfactory performance or equipment harm.
SC	Obsolete	CAUTION - Not suitable for use in gasoline-powered automobile engines build after 1967. Use in more modern engines may cause unsatisfactory performance or equipment harm.
SB	Obsolete	CAUTION - Not suitable for use in gasoline-powered automobile engines build after 1963. Use in more modern engines may cause unsatisfactory performance or equipment harm.
SA	Obsolete	CAUTION - Not suitable for use in gasoline-powered automobile engines build after 1930. Use in more modern engines may cause unsatisfactory performance or equipment harm.

API service classifications

American Petroleum Institute's (API) service classifications are a two-letter rating beginning with "S" for petrol engine oils and "C" for diesel engine oils. The second letter designates the oil's quality standard, beginning with the letter "A". The further along the alphabet, the higher the oil's quality. For example API SM is of higher quality than API SF. Many oils meet standards for both petrol and diesel engines and will be marked with a dual service classification, example.g. SH/CD, however this is not universal and it is becoming more common for oils to be specified for only one type of engine. The chart below gives detailed description of various API grades.

Diesel Engines		
Category	**Status**	**Service**
CI-4	Current	Introduced September 5, 2002. For high-speed, four-stroke engines designed to meet 2004 exhaust emission standards implemented in 2002. CI-4 oils are formulated to sustain engine durability where exhaust gas recirculation (EGR) is used and are intended for use with diesel fuels ranging in sulfur content up to 0.5% weight. Can be used in place of CD, CE, CF-4, CG-4, and CH-4 oils.
CH-4	Current	Introduced in 1998. For high-speed, four-stroke engines designed to meet 1998 exhaust emission standards. CH-4 oils are specifically compounded for use with diesel fuels ranging in sulfur content up to 0.5% weight. Can be used in place of CD, CE, CF-4, and CG-4 oils.
CG-4	Current	Introduced in 1995. For severe duty, high speed, four-stroke engines using fuel with less than 0.5% weight sulfur. CG-4 oils are required for engines meeting 1994 emission standards. Can be used in place of CD, CE, and CF-4 oils.
CF-4	Current	Introduced in 1990. For high-speed, four-stroke, naturally aspirated and turbocharged engines. Can be used in place of CD and CE oils.
CF-2	Current	Introduced in 1994. For severe duty, two-stroke cycle engines. Can be used in place of CD-II oils.
CF	Current	Introduced in 1994. For off-road, indirect injected and other diesel engines including those using fuel with over 0.5% weight sulfur. Can be used in place of CD oils.
CE	Obsolete	Introduced in 1987. For high-speed, four-stroke, naturally aspirated and turbocharged engines. Can be used in place of CC and CD oils.
CD-II	Obsolete	Introduced in 1987. For two-stroke-cycle engines.
CD	Obsolete	Introduced in 1955. For certain naturally aspirated and turbocharged engines.
CC	Obsolete	For engines introduced in 1961.
CB	Obsolete	For moderate duty engines from 1949 to 1960.
CA	Obsolete	For light duty engines (1940's and 1950's).

Conclusion

Given that technical information on lubricants is yet to be widely available in this region, many motorists will generally require further guidance on the OEM recommended lubricants stipulated in the owner's manual. The local motor vehicle dealers could partner with lubricant manufacturers to come up with a lubricant recommendation chart, which not only gives OEM oil specs but also goes a step further to list several lubricant brands that the motorist can buy from the local market. The use of Genuine oil could also help but it's limited distribution means that such products are only available to a few end-users.

The Four R'S of Lubrication

Lubrication is simply defined as the application of some oily or greasy substance to a machine, or parts of a mechanism or equipment, so at to ease friction and subsequently reduce, NOT ELIMINATE, wear and tear. Lubrication also protects critical equipment areas from over heating, corrosion and sludge deposits.

By Sammy Malala

The aforementioned purposes and roles of lubrication can however be rendered futile for as long as the basic lubrication principles are not adhered to.

Always use the RIGHT lubricant! This may sound like common sense but when it comes to lubrication, some times there are instances of using the wrong lubricant. Using a wrong lubricant can have far reaching consequences, the worst case scenario being equipment failure. Whenever there is need for lubrication, always stick to the minimum specifications and recommendations as guided by the Original Equipment Manufacturer(OEM). When in doubt, always consult with a Lubes Specialist for guidance and advice.

Now, consider the thought of using the right lubricant? Your equipment will be happy, and so will you.

There was a case in an independent mechanics' service bay where the apprentice mechanic used a gear oil inadvertently to top up the engine oil crankcase! Luckily, the guru mechanic noticed the mix up before any vehicle ignition. The apprentice knew that the vehicle required a change of gear oil. Correct! The apprentice dosed the engine oil crankcase with the gear oil. Wrong! This points to "correct lubrication, but wrong application". I would not want to know how the engine would have reacted had it run on the manual transmission gear oil as opposed to the usual crankcase engine oil.

The above therefore calls for endorsement of the second lubrication right. Always lubricate the RIGHT place!

Lubricants when still unused have a recommended shelf life. Mostly, five years at the very least. Put into use, lubricants then degenerate with time. The additive package shall be depleted or the base oil component shall be degraded or both. This simply implies that with time, we have to change our oils. Given the high prices of petroleum products, from which most lubricants have their origins, we really need to abide by proper timelines for oil changes. Too early, we lose out since the lubricating oils still have efficacy. Too late, we are pushing our equipment to damage by straining it to use already degraded oils. We therefore need to be cost managers with time when it applies to lubrication. To simplify, always change the oil or lubricate at the RIGHT time!

An adage goes, too much of something is poisonous. And we also know that for any need, too little of it is just as bad. The same applies to lubrication. Using larger than required amounts of a lubricant means that we are employing a wasteful culture, the prices of lubes, high as they are, notwithstanding! Let us use an example of a motor vehicle. Using more than recommended amounts of engine oil could cause aeration problems as well as some oil splashing and spilling into the combustion unit. This causes black smoke. Not good! Excess engine oils could also leak into the piston rings and associated bearings leading to some damage. Again, not good! What if we use less than recommended amounts of oil? The cylinder heads could get cracked. The piston rods could bend and break. The gaskets will blow. The engine stops, or ceases. None of these sound good!

Thus, we must always adhere to lubricating using the RIGHT quantity!

We have therefore seen that lubrication is a very important affair and we must always follow the RIGHT principles; use the RIGHT LUBRICANT at the RIGHT PLACE at the RIGHT TIME and in the RIGHT AMOUNT.

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AVIATION LUBRICANTS piston engine oils

By Jonathan Njine

Lack of Lubrication Linked To Alaska Airlines Crash

on January 31, 2000 Alaska Airlines Flight 261, a McDonnell Douglas MD-83 aircraft, experienced a fatal accident on January 31, 2000 at the Pacific Ocean about 4.3 km north of Anacapa Island, California. The two pilots, three cabin crewmembers, and 83 passengers on board were killed and the aircraft was destroyed. The subsequent investigation by the National Transportation Safety Board (NTSB) determined that inadequate maintenance led to excessive wear and catastrophic failure of a critical flight control system during flight. The probable cause was stated to be "a loss of airplane pitch control resulting from the in-flight failure of the horizontal stabilizer trim system jackscrew assembly's acme nut threads. The thread failure was caused by excessive wear.

The NTSB considered a number of potential reasons for this excessive wear, including the substitution by Alaska Airlines (with the approval of the aircraft manufacturer Boeing) of Aeroshell 33 grease instead of the previously approved lubricant, Mobilgrease 28. The use of Aeroshell 33 was found not to be a factor in this accident. Insufficient lubrication of the components was also considered as a reason for the wear. Examination of the jackscrew and acme nut revealed that no effective lubrication was present on these components at the time of the accident. Ultimately, the **lack of lubrication and resultant excessive wear** of the acme nut threads were determined to be the direct causes of the accident.

By Jonathan Njine

The above real life scenario best illustrates why understanding lubricants and lubrication is of paramount importance, with far reaching implications, in aviation safety. The global market is dominated by a few players notably ExxonMobil, Air BP, Shell and others like Royco, Air Phillips etc with each controlling market share as shown in figure 1.

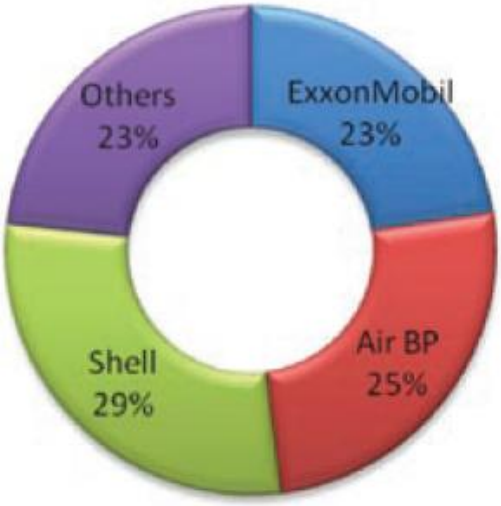

Fig. 1 Global aviation market shares

Classification of aviation lubricants

In general, the aviation lubricants and greases can be classified by application as follows:
Piston Engine Oils, Turbine Engine Oils, Hydraulic and other Fluids, Greases and Compounds.
The engine oils classifications are based on the two types of aviation engines, namely Piston engine and Turbine engine.

Whitney corp - Piston engine

AVIATION PISTON ENGINE OILS

Aviation engine oils are tasked with the following functions;

- Reduction of friction between moving parts
- Providing necessary cooling to internal areas
- Cushioning moving parts against shock and help seal piston rings to cylinder walls
- Protection of highly finished internal parts of the engine from rust and corrosion
- Keeping interior of engine clean and free of dirt, sludge, varnish and other harmful contaminants

Specifications used to qualify piston engine oils
Two SAE specifications are used to specify and qualify piston engine oils;

- SAE J1899 (formerly MIL-L-22851) - used for Ashless Dispersant oils
- SAE J1966 (formerly MIL-L-6082) – used for Straight grade mineral oils

The military specifications were superseded by the SAE specifications in the late 1990s. Reference is likely to be made to the military specifications for many years to come as they are embedded in the industry. Qualification against one of these specifications is only achieved after an extensive test programme overseen by the US Navy. This begins with laboratory testing, then progresses to a 150 hour engine test before finally being evaluated on wing.

TYPES OF AVIATION PISTON ENGINE OILS

A) Straight grade oil

Straight monograde oils are designed to be used when breaking-in a new or recently overhauled engine. They are formulated from mineral base stocks, typically further enhanced by a low concentration of anti-oxidant and pour point depressant for improved low temperature performance.

These oils are also referred to as Running-In or Break-In oils. They are designed and formulated to provide the correct level of lubricant breakdown, and controlled cylinder wear to help lap and seal the piston rings. Straight monograde piston engine oils are approved against SAE J1966 specification (superseded MIL-L-6082E). Some engines use these oils beyond break-in so if in doubt reference should be made to the engine manual/manufacturer.

Aeroshell oil 100, an example of straight grade oil

B) Ashless Dispersant oil (AD oils)

Ashless Dispersant oils are formulated from base stocks blended with additives designed with a range of objectives, which may include enhancing low temperature fluidity, high temperature stability, corrosion inhibition and anti-wear protection. The additive system is ashless and of a dispersant nature offering greater engine cleanliness. Ashless means that the product does not contain any metallic components - this is important because it reduces the formation of harmful metallic ash deposits within the

engine. Dispersant means it will hold small particles in suspension if they do not dissolve, allowing these particles to be carried away from critical areas and filtered out. This helps keep the engine clean. Because they suspend engine by-products, AD oils darken faster than non-Ashless Dispersant oils. This is a sign that the oil is preventing by-products from solidifying on interior engine surfaces. All Ashless Dispersant aviation oils contain oxidation inhibitors as part of their standard additive chemistry. Ashless Dispersant oils will not dislodge quantities of sludge from interior engine surfaces that lead to restricted oil screens. AD oils do not add deposit build-up. Instead, they help dissipate existing by-products over time. For example, if an operator uses a non-AD oil for 500 hours, then switches to an oil with an AD package for 500 hours, the AD oil will not "clean out" the first 500 hours worth of engine deposits. Ad oils can come un-monograde or multigrade. Ashless Dispersant piston engine oils are approved against SAE J1899 specification (superseding MIL-L-22851D).

C) Synthetic piston engine lubricants

Synthetic piston engine oils are premium multigrade oils approved by SAE 1899, formerly MIL-L-22851. They offer best Low Temp Performance, reduces Fuel & Oil Consumption Oil Temp, Wear and Rusting. They are recommended for Cold Climates and Temperature Extremes.

The decision to use synthetic oils should be based on the expected use of the oil. Since synthetics cost at least twice as much as mineral oil-based products, there is a tendency on the part of the operator to expect them to outperform in all circumstances. In a piston engine aircraft environment, however, the favorable properties of synthetic oils are marginal. Supporters of synthetic oils have basically two main claims: one, they increase time between oil changes and second, they improve start ability at extreme low temperatures. Synthetic oils will become contaminated just as quickly as mineral oil in a piston aircraft engine and synthetics do not show any appreciable difference in wear levels. OEMs do not distinguish between synthetics and mineral-based products for oil change recommendations. Also, for piston-powered aircraft, any possible low temperature benefit to a synthetic oil is irrelevant because piston aircraft started in temperatures of 20F or below must be pre-heated. With regard to extremely high-temperature operation, very few, if any, piston-powered aircraft are operated at temperatures that highlight the benefits of synthetic oils.

Type	Grade	MIL Specification	SAE Spec.	Typical Grades	SAE Viscosity Grade	NATO Code
Ashless Dispersant	Monograde	MIL-L-22851D	SAE J-1899	W65	SAE 30	NONE
		MIL-L-22851D	SAE J-1899	W80	SAE 40	O-123 (Deleted)
		MIL-L-22851D	SAE J-1899	W100	SAE 50	O-127
		MIL-L-22851D	SAE J-1899	W120	SAE 60	O-128 (Deleted)
	Multigrade	MIL-L-22851D	SAE J-1899	15W-40 20W-60	SAE 50	O-162
Ashless non-dispersant	Monograde	MIL-L-6082E	SAE J-1966	80		O-115 (Deleted)
		MIL-L-6082E	SAE J-1966	100		O-117 (Deleted)
		MIL-L-6082E	SAE J-1966	120		NONE

Figure 1; classifications of aviation piston engine oils

Selection of right grade of oil

For the majority of aircraft piston engines the selection of the right grade is important to maximise engine performance and engine life. For Running-in, straight grade oils should be used while for Normal operation Ashless dispersant Oils are recommended.

New marketer clinches KPA lubes tender

The Kenya Ports Authority recently concluded awarding its lubricants tender. Qualified bidders had been invited to tender for supply of lubricants for a period of 3 years. The successful bidder was also required to install a lubricants management software. This is one of the most anticipated tenders in the industry and saw all the oil majors and emerging independent lubricants companies participating. The tender was awarded to Global Marketing, a new player in the industry.

Kenya Power Transformer Oil Tender

Kenya power has floated tender for supply of transformer oils. As the biggest consumer of this product in the country, this tender is bound to excite the market.

Total intensifies *mbele iko sawa* campaign

French giant Total has been running a communication campaign dubbed *mbele iko sawa*. This is aimed at promoting its diesel range of lubricants –**RUBIA**. Billboards and other forms of mass communication such as electronic and print media have been effectively used to communicate the suitability of **RUBIA** for modern diesel engines.

Shell'S free top – up promotion

Shell is running a free give-away promotion featuring its diesel range of lubricants, **Rimula**. Customers are offered a free one litre oil pack with every purchase of the five litre pack.

Completion in the lower tier Lubes market stiffens

The lower tier market segment is set for a bruising competition with entrance of Powerex lubricants. The company has been carrying out an aggressive print media campaign to recruiting resellers for their products. This market segment is characterized by cut throat pricing models and low specs lubricants.

Shell to Keep Kenya Lube Operations

Shell announced that it planned to sell the lube businesses in all 21 African countries except South Africa and Egypt recently. Shell now confirms that it is to retain the lubes business in Kenya and also prefers to retain its lubricant blending plant in Mombasa.

Shell also intends to appoint third-party distributors for Shell-branded lubricants in Morocco, Tunisia, Algeria and Ghana under licensing agreements.

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