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Research Article

GENERAL DESCRIPTION OF LUBRICATING MATERIAL

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ABSTRACT

Lubricants minimise friction and wear in rubbing contacts by reducing metal–metal contact, removing wear debris, and carrying away frictional heat. They may also prevent rusting and with liquid lubricants remove heat. Lubricants may be solid, such as graphite, molybdenum disulphide, polytetrafluoroethylene and talc; or gaseous, commonly air; but the principal lubricants are liquids such as mineral oil, or the semi-solid greases formed from liquids by the use of thickening agents.

KEYWORDS

Cooling function, anti-corrosion function, sealing action, Solid lubricants, Semi-solid lubricants.

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INTRODUCTION

The main task of engine lubricating oils is to reduce friction and prevent wear of working elements. This has a direct effect on reducing the need for electricity required for the maintenance of the mechanism, as well as ensuring a long service life and more efficient operation [1-3]. In practice, modern lubricants are also expected to perform a number of additional functions, such as:

- Cooling function - removal of heat generated, for example, as a result of friction,
- Anti-corrosion function - prevention of the appearance of local and local corrosion links, sealing action – creating seals (e.g. in the case of piston rings), cleaning action - cleaning the surface of contaminants and preventing their occurrence.

The main physical and chemical properties of lubricating oils are:

Viscosity and viscosity index - too low or high viscosity will not provide sufficient lubricating properties, thereby leading to faster wear of machine elements. The viscosity index indicates the change in oil viscosity as temperature changes. The higher the value of this parameter, the better the lubricating properties of the product, Foaming - Lubricants should have low foaming ability and be able to bleed quickly [4-7]. Good fire-fighting properties ensure proper operation of hydraulic systems and prevent cavitation damage, Oxidation resistance and thermal stability - these parameters indicate the service life of the oil, both under operating conditions and during storage, Lack of toxicity.

Lubricant types:

- Lubricants come in a variety of forms and types. As a rule, they are divided into three main groups: solid, liquid and semi-solid.
- Solid lubricants

THE MAIN PART

These are materials that, despite the presence of a solid phase, have the ability to reduce friction between two moving surfaces. They provide adequate lubricating properties at temperatures higher than liquid lubricants. They are intended for use in conditions where conventional additives do not provide effective use. An example would be very high temperatures and extreme loads (eg in metal forming where severe plastic deformation is required). The most common solid lubricants are: graphite, molybdenum disulfide, boron nitride and polytetrafluoroethylene (PTFE), also known as Teflon [8-11].

Semi-solid lubricants

They are produced using oils (including mineral oil) and a number of different additives, such as thickeners. Sometimes they also contain additives of solid lubricants, such as: PTFE, MoS2 or graphite. They can perform a protective function,

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protecting the surface from corrosion and damage. They are available in different consistency and are used mainly as lubricants for gears, bearings, chains and other

Liquid lubricants

This group of lubricants includes products based on oils of animal and vegetable origin, as well as mineral and synthetic. The first two types are practically not used anymore due to their high price and relatively weak lubricating properties. In turn, oils on a mineral and synthetic basis have found wide industrial use. Mineral oils are mixtures of higher hydrocarbons, which are obtained mainly in the process of oil refining. They are used as non-conductive coolants or thermal fluids in electrical components. They are used, for example, in high voltage transformers and switchgears. Mineral oils are also used as heating oils and hydraulic fluids due to their incompressibility. The second group consists of synthetic oils, consisting of long polymer chains and a number of additives that modify their properties. They are characterized by significantly better lubricity than mineral oils. They also show higher viscosity at low and high temperatures. In addition, they are resistant to oxidation, thermal degradation and the formation of deposits, eg in engines. Unfortunately, they are much more expensive than mineral oils. Polyalkylene glycols (PAGs) are an excellent example of liquid synthetic lubricating oils. An important advantage of PAGs is their reduced tendency to form carbon deposits and deposits (compared to mineral oils), which makes it easier to maintain cleanliness and extend the life of machine parts and devices lubricated by them [12-15]. Products manufactured by PCC Holding called Rokolub, belonging to the group of PAGs, can be used as components for the production of liquid working and process fluids for metalworking in various industries. They are also used as finished products, eg hydraulic oils, lubricating oils for gas and refrigeration compressors. Despite the fact that correct lubrication is one of the most crucial aspects of a reliability programme for rotating equipment, lubrication is often perceived as a lowly job that doesn't require much experience or skill. Lubrication-related failures are probably the most preventable type of all failures of rotating machinery, yet it's an area of industry that isn't always allocated the appropriate level of attention [15-17]. Machine reliability relies on the right methods of lubrication, the right quantities and formulations of lubrication and the appropriate application procedures and intervals – and a vigilant machinery operator will be able to maximise the performance and the operating life of the equipment by adhering to a well-planned and appropriate maintenance programme.

Most people believe that lubrication is only important because it makes the parts 'slippery'. In reality, lubricants are substances which play a major role in bearing and machinery function and longevity by:

Reducing wear of moving parts

Reducing friction between rotating parts and stationery ones

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Absorbing shock

Reducing operating temperatures

Minimising corrosion of metal surfaces

Keeping contaminants out of the system

Sealing and protecting components

The incorrect choice and application of lubricants is said to account for around 40% of all machine failures, and so lubrication procedures are a critical factor in maximizing your equipment's reliability.

To ensure optimum lubrication, it is important to use the right type and quality of lubricant, in the right amounts, at the right place and at the right time. Once lubrication has been applied, the equipment and the lubricant should be tested to see if:

The correct formulation of lubricant was used for the application

Whether the lubricant solved – or merely masked – the problem

Whether the amount of lubrication applied was correct

The need for frequent lubrication may well be a symptom of underlying machinery damage (such as wear or damage to bearings, shafts or seals) so the solution isn't simply to lubricate to stop vibration or excessive noise. In fact, too much lubrication can be just as detrimental as too little lubrication. Under lubrication can cause bearings to wear out before their time, whereas over-lubrication can lead to catastrophic results to the bearings or long-term damage to motor coils and windings.

Lubricants are classified into two categories as internal and external lubricants. Internal lubricants reduce friction between the molecular chains, whereas external lubricants reduce the adherence between polymer melt and metal surfaces. Lubricants also reduce friction between polymer–filler, filler–filler, and filler–metal. Additives that demonstrate mutual effects of internal and external lubrication are known as combined lubricants. Lubricants facilitate manufacturing by increasing the processing window of the polymer and thus increases throughput or reduces cycle time.

Generally, internal lubricants are used to promote flow, increase weld line strength, reduce sink marks, enhance die filling, decrease die swell, reduced pressures, and lower HDT. Common examples of internal lubricants include fatty alcohols, esters (low esterification), and EVA wax. External lubricants provide metal release and help reduce process temperature. Common examples of external lubricants include PE waxes, paraffin, metal soaps, esters (high esterification), amides, and fatty acids. Lubricants such as graphite, molybdenum disulfide, PTFE, and PE could be added to engineered plastics to reduce coefficient of friction between sliding parts such as gears and bearings

Requirements for lubricants.

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Lubricants are usually required to have an effective life of some hundreds or thousands of hours during which its necessary properties are sensibly unaltered. They may, however, change in whole or part by thermal decomposition, oxidation or by hydrolysis. Thermal decomposition followed by polymerisation results in the formation of materials of very high molecular weight, especially insoluble coke-like substances, as well as low molecular weight materials including gases. The viscosity and flash point of the lubricant therefore generally drops. Similar materials are also formed during oxidation, but in addition highly oxygenated species including lacquers and organic acids are formed and the viscosity generally increases. This viscosity increase, the amount of insoluble material and the increase in organic acidity, are conveniently used as expressions of the degree of oxidation. Lubricants based on esters and lubricants containing esters or salts as components, e.g. as additives, are subject to hydrolysis and here again acidity, perhaps with a corrosion test for a sensitive metal such as lead, are used as criteria of stability.

Water-containing lubricants require particularly clean working conditions as contamination may lead to bacterial attack and thus to unpleasant odour, corrosion, and reduced effectiveness. Systems should be prepared and regularly cleaned by flushing with 5% solutions of caustic soda, detergent solutions or both. Biostats or biocides may also be helpful. It is critical to follow the manufacturers' recommendations and use the right type and quantities of lubricant with the appropriate frequency of application that is best suited to the machinery's optimal functioning. An optimal lubrication programme requires vigilance, skill and experience from the operator and should include thorough checking and testing procedures using quality equipment. Ultrasound technology has advanced significantly over the years and is ideally suited for testing for lubrication flaws and condition-monitoring of bearings. Ultrasound technology will not only improve machine reliability and help a production line run more smoothly, the big picture is that it can help to decrease the cost of production and the cost of maintenance, enhance safety and improve quality control. The key focus should be on finding the best technology that meets organizational needs and making sure that it delivers both financial and operational benefits.

CONCLUSION

Best practice lubrication regimes will ensure world-class machinery reliability, so it's worth talking to an experienced supplier of technical equipment to ensure your testing and inspection procedures are up to the task. Some tips on lubricants. To its seasonality before purchasing or using lubricants pay attention. Focus on quality, not price, of oil and petroleum products; because it is cheap the composition of the oils sold is to serve a sufficient distance for the car does not have a feature. Remember to change the engine oil at the specified and recommended distance the oil that is changed in a timely manner keeps the car engine running helps save.

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