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DEPARTMENT OF AUTOMOBILE ENGINEERING

COURSE NAME : 19AUB301 – AUTOMOTIVE FUELS AND LUBRICANTS

III YEAR / V SEMESTER

Unit 3 - Lubricants

Topic : Classifications of Lubricants, Types and Properties of Lubricating oil



CLASSIFICATION OF LUBRICANTS



- Lubricants are classified on the basis of their physical state, as follows;
 - ❖ Liquid lubricants or Lubricating Oils,
 - ❖ Semi-solid lubricants or Greases
 - ❖ Solid lubricants.



SEMI SOLID LUBRICANT OR GREASE



- A semi-solid lubricant obtained by combining lubricating oil with thickening agents.
- Lubricating oil is the principal component and it can be either petroleum oil or a synthetic hydrocarbon of low to high viscosity.
- The thickeners consist primarily of special soaps of Li, Na, Ca, Ba, Al, etc.
- Non-soap thickeners include carbon black, silica gel, polyureas and other synthetic polymers, clays, etc.
- Grease can support much heavier load at lower speed.
- Internal resistance of grease is much higher than that of lubricating oils
- Compared to lubricating oils, grease cannot effectively dissipate heat from the bearing.



SOLID LUBRICANT



- The most common solid lubricants are graphite, molybdenum disulphide, tungsten disulphide and zinc oxide.
- They can withstand temperature upto 650°C and can be applied in continuously operating situations.
- They are also used as additives to mineral oils and greases in order to increase the load carrying capacity of the lubricant.
- Other solid lubricants in use are soapstone (talc) and mica.
- They are available as dispersions in non-volatile carriers like soaps, fats, waxes, etc and as soft metal films.



SOLID LUBRICANT



- They are preferred where
 - ❖ The operating conditions are such that a lubricating film cannot be secured by the use of lubricating oils or grease
 - ❖ Contamination of lubricating oils or grease is unacceptable
 - ❖ The operating temperature or load is too high, even for grease to remain in position
 - ❖ Combustible lubricants must be avoided.
- They are used either in the dry powder form or with binders to make them stick firmly to the metal surfaces while in use.



LUBRICATION OIL OR LIQUID LUBRICANTS



- Liquid lubricants are liquids that separate and reduce friction between two moving surfaces and decrease wear and tear
- Lubricating oils also known as liquid lubricants and further classified into three categories
 - ❖ Animal and Vegetables oils
 - ❖ Mineral or Petroleum oils
 - ❖ Blended oils.



ANIMAL AND VEGETABLE OIL



- Animal oils are extracted from the crude fat and vegetables oils such as cotton seed oil and castor oils.
- These oils possess good oiliness and hence they can stick on metal surfaces effectively even under elevated temperatures and heavy loads.
- But they suffer from the disadvantages that they are costly, undergo easy oxidation and hydrolyze easily on contact with moist air or water.
- Hence they are only rarely used these days for lubrication.
- But they are still used as blending agents in petroleum based lubricants to get improved oiliness.



MINERAL OR PETROLEUM OIL



- These are basically lower molecular weight hydrocarbons with about 12 to 50 carbon atoms.
- As they are cheap, available in abundance and stable under service conditions, hence they are widely used.
- But the oiliness of mineral oils is less, so the addition of higher molecular weight compounds like oleic acid and stearic acid increases the oiliness of mineral oil.



BLENDING OIL



- No single oil possesses all the properties required for a good lubricant and hence addition of proper additives is essential to make them perform well.
- Such additives added lubricating oils are called blended oils.
- Examples: The addition of higher molecular weight compounds like oleic acid, stearic acid, palmetic acid, etc or vegetables oil like coconut oil, castor oil, etc increases the oiliness of mineral oil.



PROPERTIES OF LUBRICATION OIL



- **Viscosity:** It is the property of liquid by virtue of which it offers resistance to its own flow
- **Flash Point:** Flash point is the lowest temperature at which the lubricant oil gives off enough vapours that ignite for a moment, when a tiny flame is brought near it; while
- **Fire Point:** Fire point is the lowest temperature at which the vapours of the lubricant oil burn continuously for at least five seconds, when a tiny flame is brought near it.



PROPERTIES OF LUBRICATION OIL



- **Cloud Point and Pour Point:** When the lubricant oil is cooled slowly, the temperature at which it becomes cloudy or hazy in appearance, is called its cloud point; while the temperature at which the lubricant oil cease to flow or pour, is called its pour point.
- **Aniline Point:** Aniline point of the lubricant oil is defined as the minimum equilibrium solution temperature for equal volumes of aniline and lubricant oil samples.



REFERENCE



- <https://en.wikipedia.org/wiki/Lubricant#:~:text=A%20lubricant%20is%20a%20substance,heating%20or%20cooling%20the%20surfaces.>



THANK YOU !!!