

LUBRICANTSDefinition:-

In order to reduce frictional resistance and wear and tear of machine parts, a layer of fluid is introduced between the moving parts. This layer of fluid is known as Lubricants.

Function of Lubricants:-

1) Lubricants reduce the friction resistance

→ To reduce the frictional resistance, is one of the main functions of lubricants. It prevents the direct contact between the sliding metal surfaces so that the small peaks of the two metals do not interlock and hence frictional resistance is reduced.

2) It reduces the surface deformation, wear and tear:-

Through lubrication the direct contact between metal surfaces is avoided and hence the deformation as well as wear and tear of the machine parts is minimized.

3) It acts as a coolant:-

The lubricant oil absorbs the heat and hence acts as a coolant.

4) It provides protection against corrosion

The lubricants cover the metal surface and hence the attack of atmospheric corrosive environment on

metal surface is prevented.

5) It acts as a Seal in some cases:

Lubricants also act as a seal preventing the leakage of gases.

6) It improves the efficiency of the machine since the use of lubricants minimizes the liberation of frictional heat it reduces expansion of metals.

Mechanism of Lubrication

- 1) Hydrodynamic or Fluid Film Lubrication
- 2) Thin Film or boundary lubrication
- 3) Extreme pressure lubrication

Classification of Lubricants

- 1) Liquid lubricants or lubricating oils
- 2) Semi solid lubricants or greases
- 3) Solid lubricants

Liquid lubricants / Lubricating oils

It is used to reduce the friction and wear between two sliding metallic surfaces. Apart from reducing the friction they also act as cooling medium.

→ Lubricating oils can further be divided into three categories.

- a) Vegetable and animal oils
- b) Mineral oils or petroleum oils
- c) Blended oils

a) Animal and vegetable oils

These oils contain glycerides of higher fatty acids. These oils were used as lubricants before the development of petroleum industry after which they were replaced by mineral oils.

→ Animal and vegetable oils decompose on heating but do not distill and hence are also known as fixed oils.

e.g. Olive oil, Castor oil, Palm oil, Rapeseed oil etc.

b) Mineral oils

These oils are obtained by fractional distillation of crude petroleum. These are obtained as heavy residual fraction. This heavy residual fraction is subjected to vacuum distillation and the lubricating oil is extracted.

e.g. Tallow oil, Lard oil, whale oil etc.

c) Blended oils →

Small quantities of certain substances are added to the lubricating oils to improve their desirable properties. These substances are called additives.

The oils to which additives are added are known as blended oils or compounded oils.

2) Semi-solid Lubricants or Greases

In textile, paper and food mills, if liquid lubricants are applied to the metal surface of the machinery, there is always a possibility of spilling or splashing of lubricating oil. This is detrimental to the product being manufactured. In these cases the lubricating oil is thickened with the thickening agent and the semisolid so obtained is known as 'grease'.

3) Solid Lubricants

There are a number of situations where lubricating oils and greases can't be used satisfactorily -:

- i) where the operating temperatures and pressures are too high, the liquid lubricants can't be used because these are easily combustible,
- ii) where a liquid or semi-solid lubricant can't be maintained in position
- iii) where the contamination of lubricating oil by the entry of dust particles is not acceptable such as in aerospace devices.

Under these conditions, to minimize the friction, ~~and~~ solid lubricants are used.

eg Graphite, Molybdenum disulphide etc.