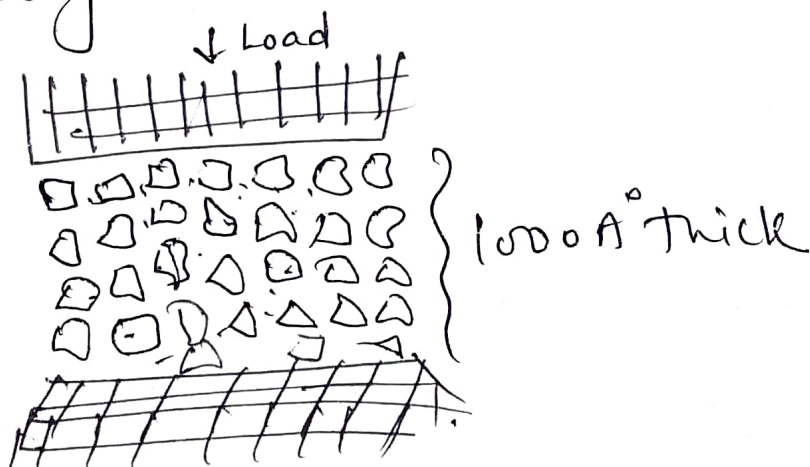


MECHANISM OF ACTION OF LUBRICANTS (2)

1) FLUID FILM OR THICK FILM OR HYDRO-DYNAMIC LUBRICATION MECHANISM: →

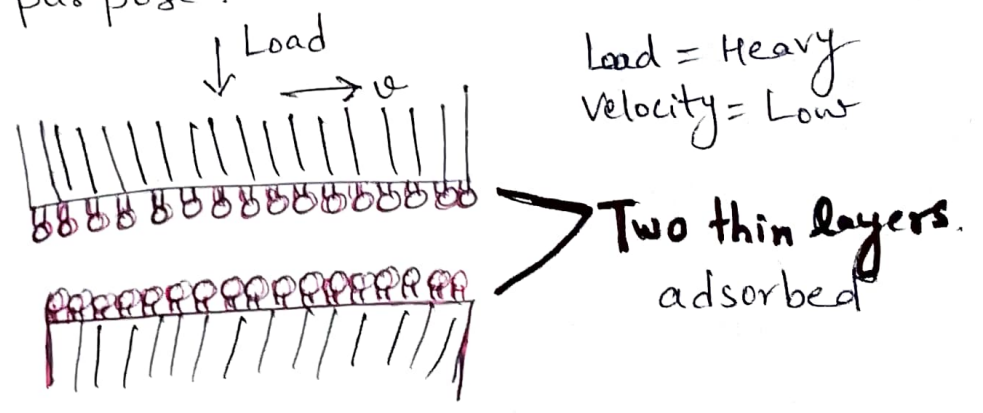
MAIN POINTS

- 1.) This type of lubrication is done in delicate instruments & light machines such as scientific instruments, watches, clocks, sewing machines. etc.
- 2.) A thick film of Lubricant (1000 \AA thick) is maintained b/w two moving or sliding surface to prevent wear & tear due to irregular surfaces
- 3.) The lubricating oil used for this purpose should have minimum viscosity.
- 4.) Hydrocarbon Oils blended with long chain polymer are used for this purpose.



2.) Thin Film Or Boundary Lubrication

- Main points : →
- 1.) This Type of lubrication is done when i) load is very high (ii) speed is very low
 - 2.) A thin layer of lubricating oil is adsorbed on both moving or sliding surface to prevent direct contact.
 - 3.) Oil used should have good oiliness, high viscosity index, low pour point etc.
 - 4.) Generally Vegetable & animal oil is used for this purpose.



Thin Layer Lubrication Mechanism

* CERAMICS : \rightarrow Derived from 'Keramikos' meant burning stuff
 Ceramics are inorganic, non-metallic substances, which are manufactured at high temperature.

Example : Tiles, sinks, pottery, sanitary fittings, dinner set etc.

* Classification of Ceramics : \rightarrow A) On the basis of composition : \rightarrow

- 1.) Oxide : Al_2O_3 (Alumina) CaO , K_2O , Na_2O etc.
- 2.) Carbide : SiC (Silicon Carbide - having excellent thermal property)
- 3.) Nitride : Si_3N_4 (Silicon Nitride) : high mechanical strength
- 4.) Boride : TiB_2 (Titanium boride) : High toughness
- 5.) Sulphides, fluorides etc. (TiS_2), (CaF_2)

B) Based on Applications : \rightarrow 1.) Glasses : Aluminosilicate along with other metal oxides.
 $R_2O \cdot MO \cdot 6SiO_2$ R = alkali metal, M = alkaline earth metal.

2.) Clay Products : These are hydrated aluminium silicates ($Al_2Si_2O_7 \cdot 2H_2O$) with other substances.
 example : bathroom tiles, bricks, terracotta.

3.) Refractories : \rightarrow These are non-metallic ceramics, which can tolerate high temperature.
 example : Quartzite, Carborundum, Zirconia.
 These are used for making linings of furnaces.

* Constituent of Ceramics : \rightarrow

- 1.) clay : Silica (flint) hydrated Aluminosilicate
 $Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$
- 2.) china clay : flint ! In the form of SiO_2
- 3.) Feldspar : It is a bonding material in the formation of ceramic products alkali Aluminosilicate
 $1/20 \cdot Al_2O_3 \cdot 6SiO_2 \cdot Na_2O$
 Feldspar $\rightarrow Na_2O \cdot Al_2O_3 \cdot 6SiO_2$ (soda feldspar)

Important Ceramic Materials ! →

- 1.) Alumina (Al_2O_3) : Dental & Medical applications.
- 2.) Aluminium Nitride (AlN) : Electronic application like making integrated circuits.
- 3.) Lead Zirconium Titanate (PZT) : used as piezo-electric material.
- 4.) Silica (SiO_2) : → Glassware, laboratory apparatus.
- 5.) Silicon Carbide (SiC) : used as abrasive material & thermal insulation.
- 6.) Silicon Nitride : In automotive & gas turbine engines.
- 7.) Titanium Oxide TiO_2 : Used as paint & pigment.
- 8.) Titanium Boride (TiB_2) : Electrical & thermal insulation devices.

INDUSTRIAL Applications of Ceramics

- 1.) In Manufacture of tiles & bricks.
- 2.) In making crucibles.
- 3.) In making cutting tools.
- 4.) In making kitchen-ware and decorative articles.
- 5.) In making sinks, bath-tubs, wash-basins.
- 6.) In making super-conductive ceramic materials.
- 7.) In dental filling.
- 8.) In electronic industries etc.