Fluid-film or thick-film or hydrodynamic lubrication

In this, the moving or sliding Surfaces are separated from each other by a thick-film of fluid, so that direct surface-to surface contact and welding of junctions rarely occurs. The lubricant film covers or fills the irregularities of the sliding or moving surfaces and forms a thick layer in between them, so that there is no direct contact between the material surfaces. This consequently reduces wear.

The resistance to movement of sliding or moving parts is only due to the internal resistance between the particles of the lubricant moving over each other. Therefore, the lubricant chosen should have the minimum viscosity.

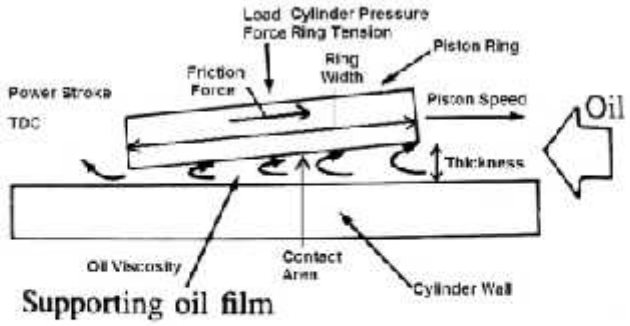
For example consider a block resting on a flat surface covered with a layer of lubricating oil. If the weight of the block is very high or the oil is thin, the oil will squeeze out.

In other words, thick oil can support a higher load than that supported by a thin oil. When this block is moved over the surface, a wedge shaped oil film is built up between the moving block and the surface. This wedge shaped film is thicker at the leading edge than at the rear.

Hydrodynamic lubrication In other words the moving block acts as a pump to force oil into clearance that narrows down progressively as the block moves. This generates appreciable oil film pressure which carries the load. This type of lubrication where a wedge-shaped oil film is formed between two moving surfaces is called hydrodynamic lubrication.

The main advantage of this type of lubrication is that the load carrying capacity of the bearing increases with increase in relative speed of the moving surfaces. The force required to move the block over the surface depends upon the weight of the block, the speed of movement, and the thickness or viscosity of the oil. This force divided by the pressure caused by the weight of the block is called the coefficient of friction.

A higher coefficient of friction signifies a greater force to move the block. The flat surface lubrication of the kind referred above exists at places such as thrust bearings, valve tips and cam lifters. Many other surfaces which use hydrodynamic lubrication are cylinder wall, valve guide, connecting rod bearings and camshaft bearings.



Hydrodynamic lubrication