



SNS COLLEGE OF TECHNOLOGY, Coimbatore - 641 035
(An Autonomous Institution)

Department of Mechanical Engineering



UNIT I- FLUID POWER SYSTEM FUNDAMENTALS

Positive Displacement pumps



Gear pump

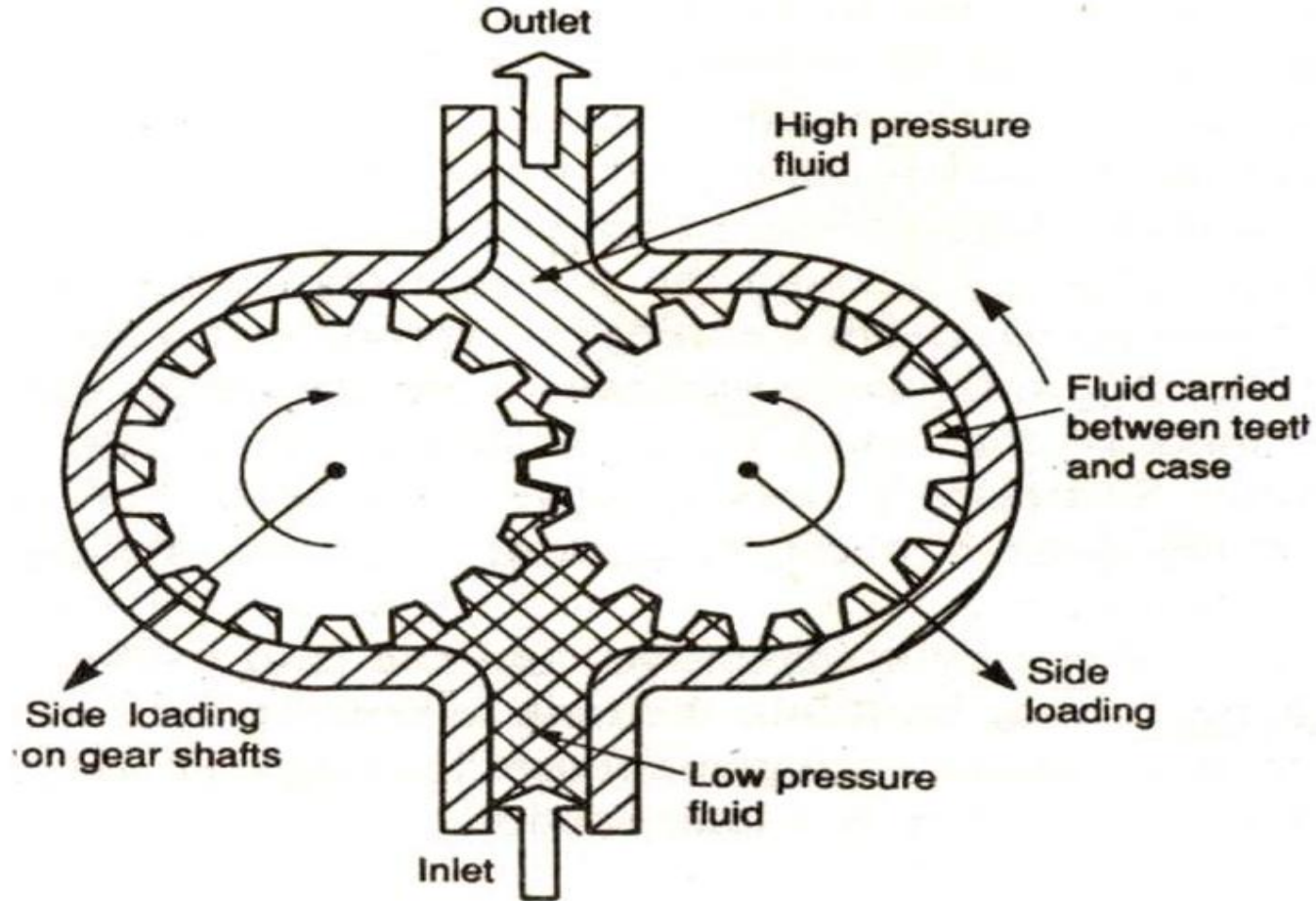
Types

1. Internal gear pump (Teeth mesh internally)
2. External gear pump (Teeth mesh externally)



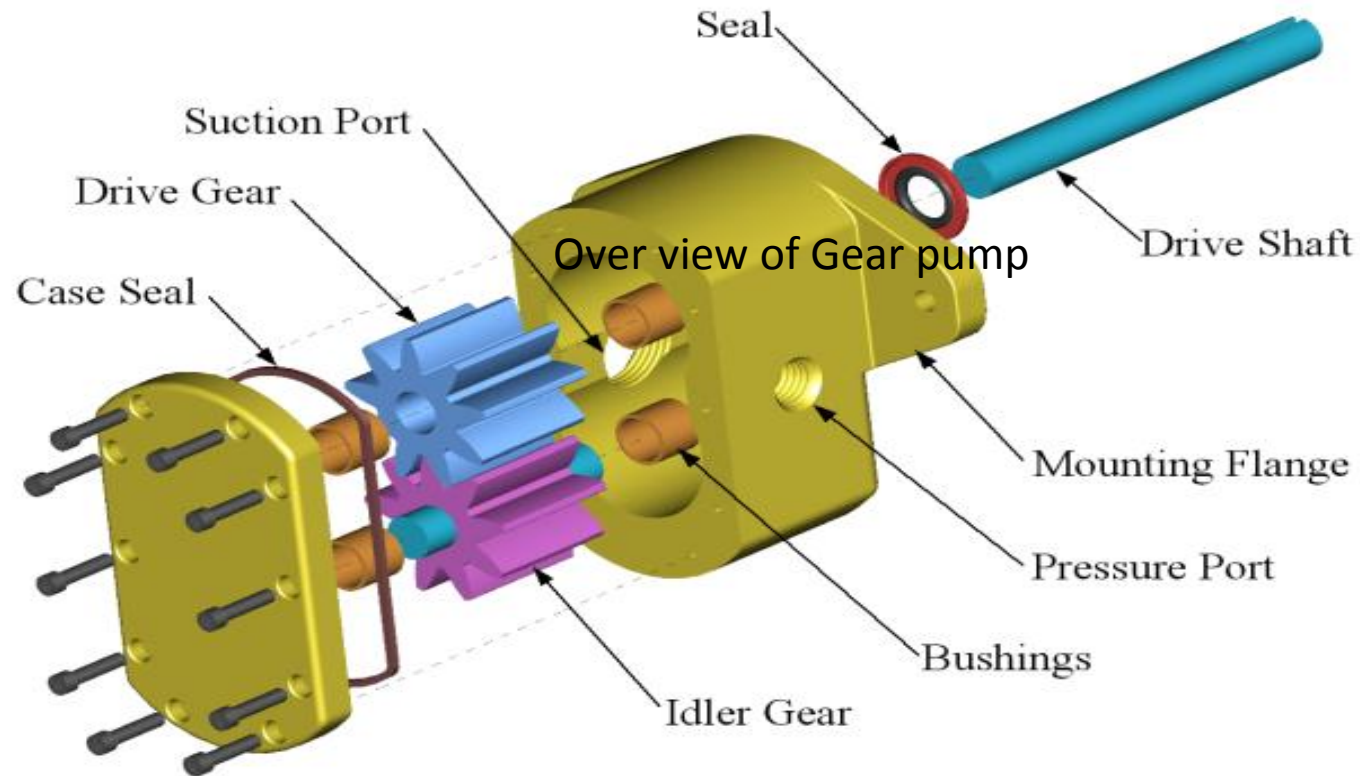
Gear pump

EXTERNAL GEAR PUMP





Over view of Gear pump





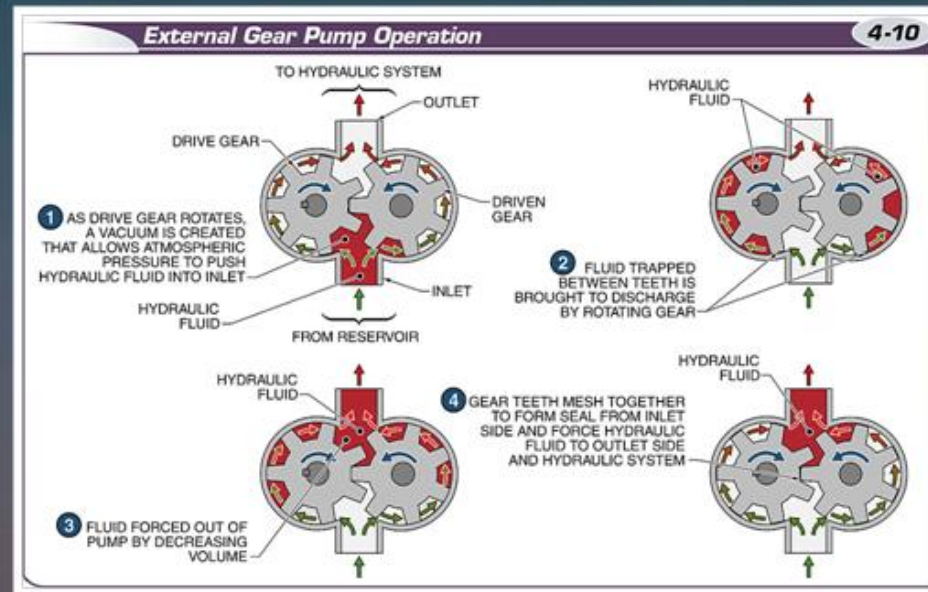
Over view of Gear pump

- This is the most common type used in **automotive engine**.
- One of the gears is on the idle shaft and other on the main shaft.
- The **main shaft is driven by cam shaft**.
- The two gears revolve in opposite direction and develop a pressure of 4 kg/cm^2



Over view of Gear pump

An external gear pump consists of meshing gears that form a seal with the pump housing and operates similar to the four basic steps of a positive-displacement pump.





Over view of Gear pump

- One of the gear is connected to drive shaft which in turn is coupled with prime mover
- Second gear gets driven because of meshing (spur gears)
- **Suction side** –teeth unmeshed
- **Discharge side** –teeth mesh
- Vacuum generation due to evacuation of teeth
- Line contact of the gear teeth over one another prevents flow through the mesh & the close fitting of the housing prevents flow back around the periphery



Manufacturing range

- Continuous pressure of **200 bar-Min.**
- pressure range of **10 to 100 bar(commmercially available)-**
- **Min. speed** of rotation from **400** to **500** rpm-**Max. speed** of **3000** to **6000** rpm



Manufacturing range

- $Q_T = V_d \times N$

V_D – volumetric displacement

D_o – Outside diameter of gear teeth

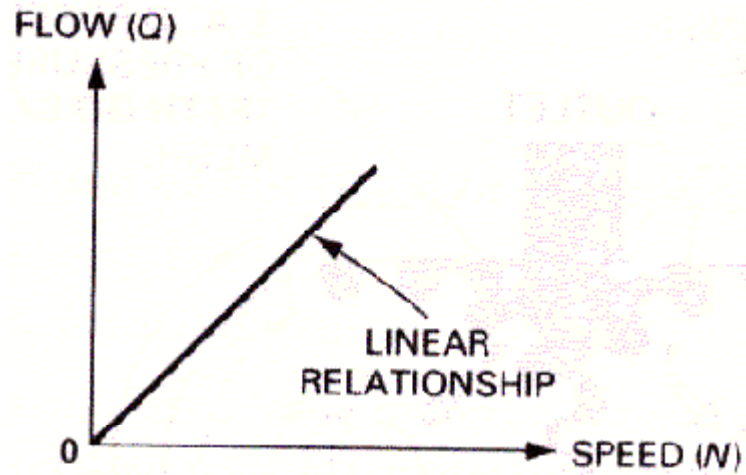
D_i – inside diameter of gear teeth

L – Width of gear teeth

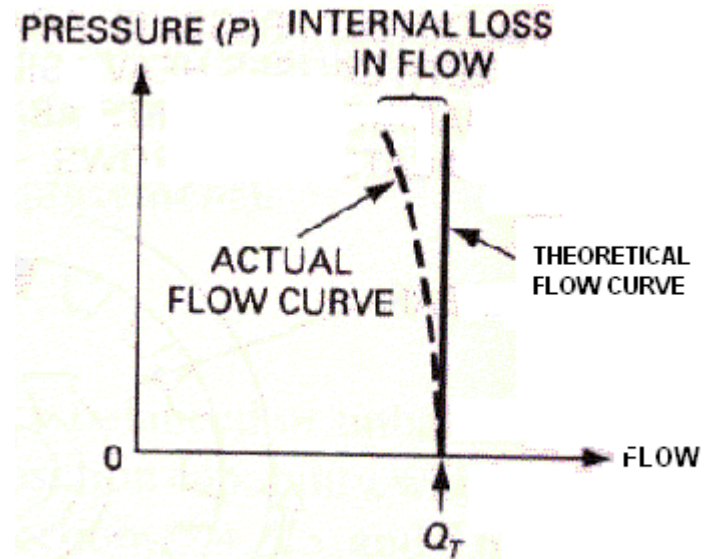
N – rpm of pump

- Volumetric efficiency $\eta_v = Q_A / Q_T$

- Q_A – Actual discharge



(a) FLOW VERSUS SPEED CURVE



FLOW VERSUS PRESSURE CURVE
AT CONST PUMP SPEED



Advantages of external gear pump

- High speed
- High pressure
- No overhung bearing loads
- Relatively quiet operation

Dis – Advantages

- Four bushings in liquid area
- No solids allowed
- Fixed End Clearances