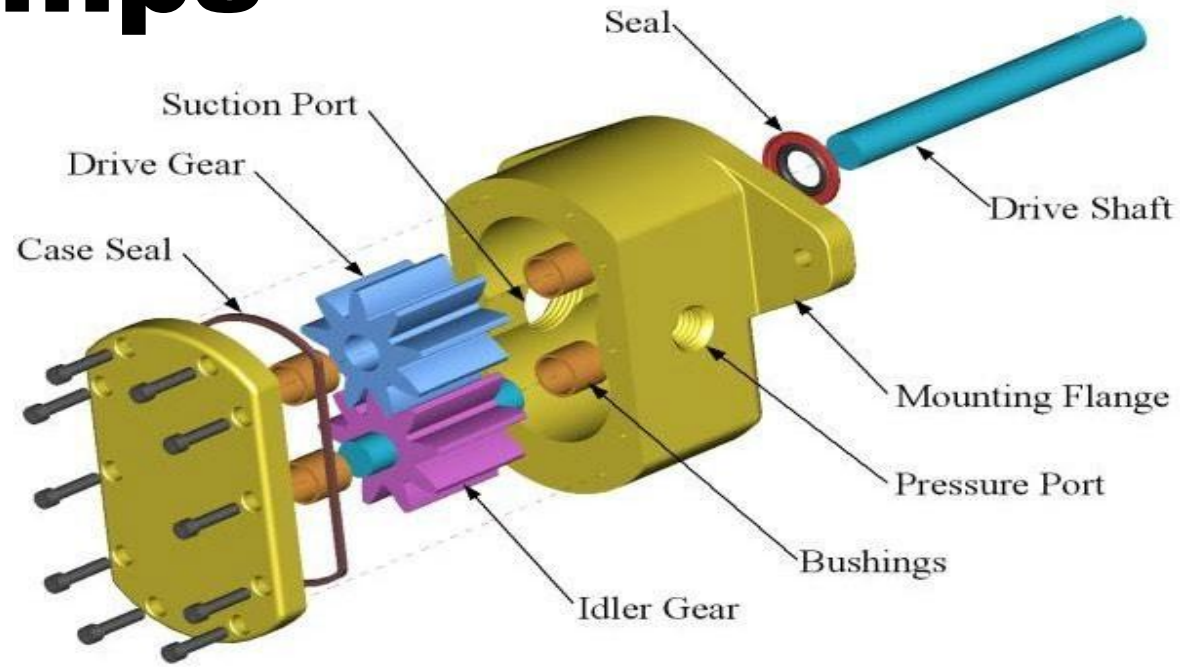
SNS COLLEGE OF TECHNOLOGY, Coimbatore - 641 035
(An Autonomous Institution)
Department of Mechatronics Engineering

UNIT I- FLUID POWER PRINCIPLES AND HYDRAULIC PUMPS

Gear pumps



Types

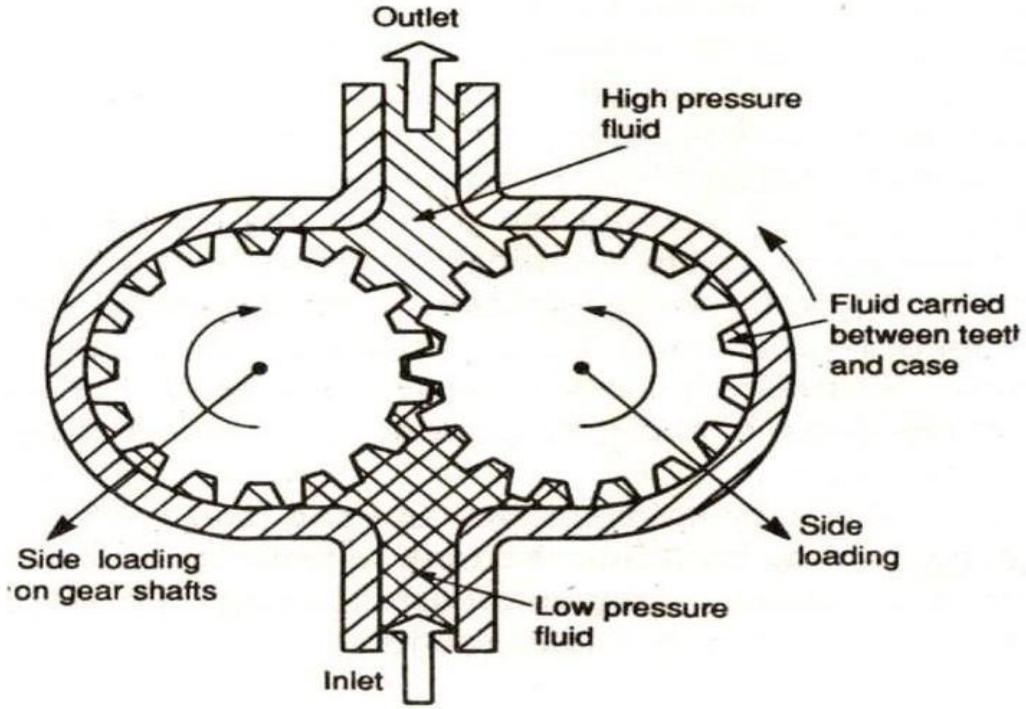
1. Internal gear pump (Teeth mesh internally)
2. External gear pump(Teeth mesh externally)

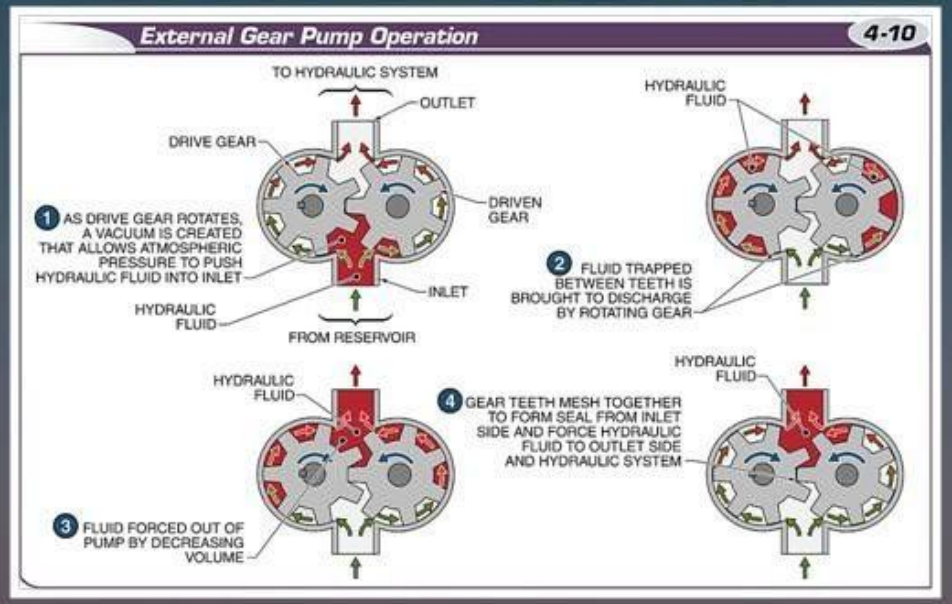
Over view of Gear pump

- 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

EXTERNAL 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.





- 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

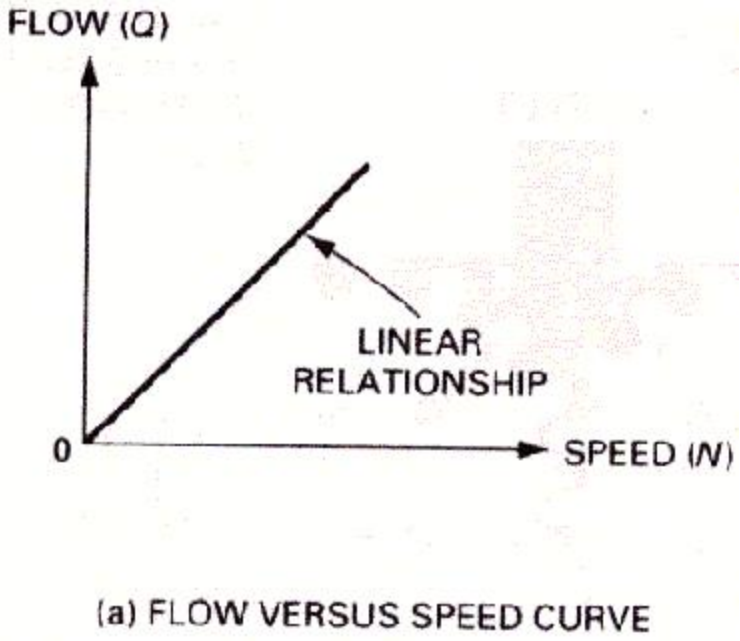
Manufacturing range

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

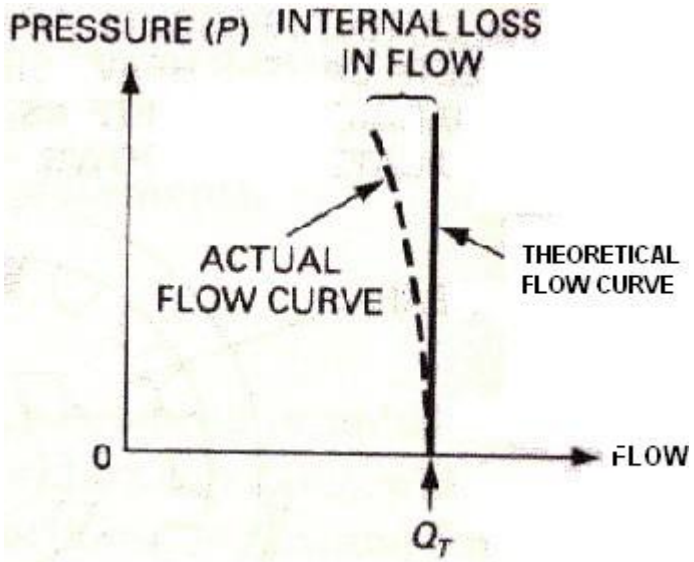
- **$Q_T = V_d x N$**

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