

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



# UNIT I- FLUID POWER SYSTEM FUNDAMENTALS

Positive Displacement pumps

19MEE305/FPA

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#### Gear pump

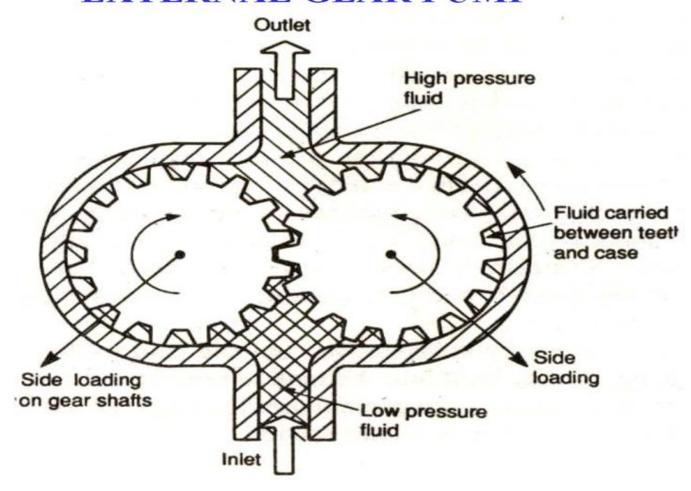
Types

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





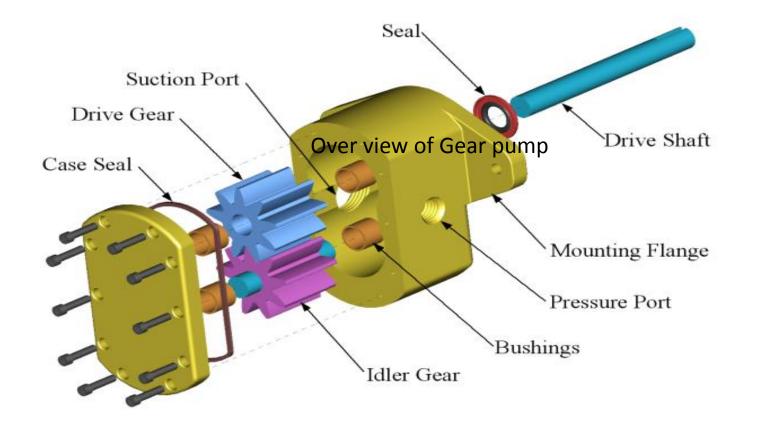
#### Gear pump EXTERNAL GEAR PUMP







#### Over view of Gear pump







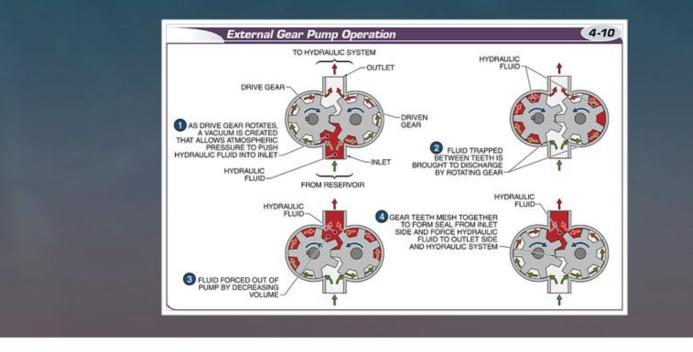
### Over view of Gear pump

- 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<sup>2</sup>





#### 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 positivedisplacement 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(commercially available)-
- Min. speed of rotation from 400 to 500 rpm-Max. speed of 3000 to 6000 rpm





### Manufacturing range

# • $\mathbf{Q}_{\mathsf{T}} = \mathbf{V}_{\mathsf{d}} \times \mathbf{N}$

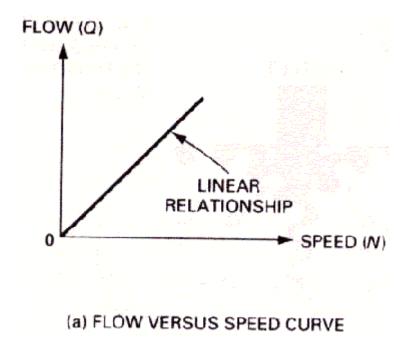
 $V_D$  – volumetric displacement

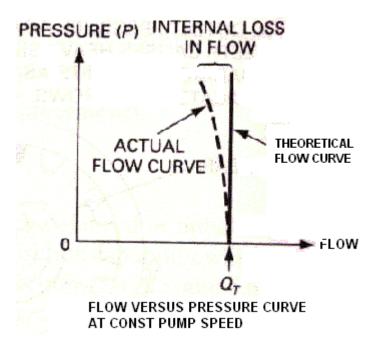
 $D_{o}$  Outside diameter of gear teeth  $D_{i}$  inside diameter of gear teeth L – Width of gear teeth N- rpm of pump

- Volumetric efficiency  $\eta_v = Q_A / Q_T$ 
  - Q<sub>A</sub> Actual discharge













# 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