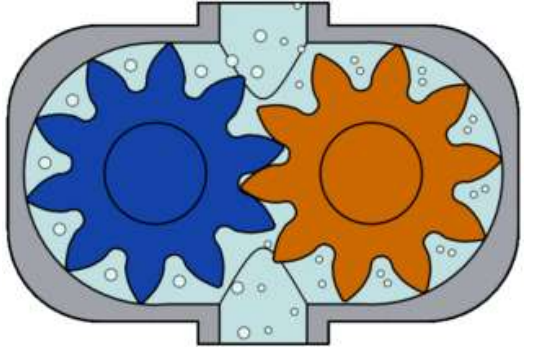


OVER VIEW OF FLUID POWER

Dr. N. SRIRANGARAJALU
Assistant Professor, (Sl. Gr.)
Department of Production Technology,
Madras Institute of Technology,
Anna University,
Chennai-600044.
nsrirangarajalu@mitindia.edu

What is fluid power?

- Fluid power is the technology that deals with the generation, control and transmission of power, using pressurized fluid power is the muscle that moves industry.
- This is because fluid power is used to push, pull, regulate or drive virtually all the machines of modern industry.
- Example: fluid power steers and brakes automobiles, launches spacecraft, moves earth, harvests crops, mines coal, drives machine tools, controls airplanes, process food and even drills teeth.

Two types of fluid systems

- Fluid transport system
- Fluid power system
- **Advantages of fluid power**
- Ease and accuracy of control
- Multiplication of force
- Constant force or torque
- Simplicity, safety, economy

Drawbacks of Fluid Power

- Hydraulic components must be properly design and installed to prevent oil leakage from the hydraulic system into the surroundings.
- Hydraulic pipeline can burst due to excessive oil pressure if proper system design is not implemented.

Causes:

- Fluid power systems must be properly designed, installed and maintained so that they operate in a safe, reliable, efficient and cost-effective manner

Applications of Fluid Power

- Fluid power drives high-wire overhead tram
- Fluid power is applied to harvesting soya beans
- Fluid power is the muscle in industrial lift trucks
- Fluid power drives excavators
- Hydraulics power robot to rescue humans
- Hydraulics control the pitch and yaw of wind turbines

A Hydraulic fluid has the following functions

- Transmit power
- Lubricate moving parts
- Seal clearances between mating parts
- Dissipate heat

Hydraulic fluid should have the following properties

- Good lubricity
- Ideal viscosity
- Chemical stability
- Compatibility with system materials
- High degree of incompressibility
- Fire resistance
- Good heat-transfer capability
- Low density
- Foam resistance
- Nontoxicity
- Low volatility

Physical differences between liquids and gases

Parameter	Liquid	Gas
Volume	Has its own volume	Volume is determined by container
Shape	Takes shape of container but only to its volume	Expands to completely fill and take the shape of the container
Compressibility	Incompressible for most engineering applications	Readily compressible

Why air is commonly used in fluid power systems?

- Air is inexpensive and readily available

- Air also has the following desirable features as a power fluid:

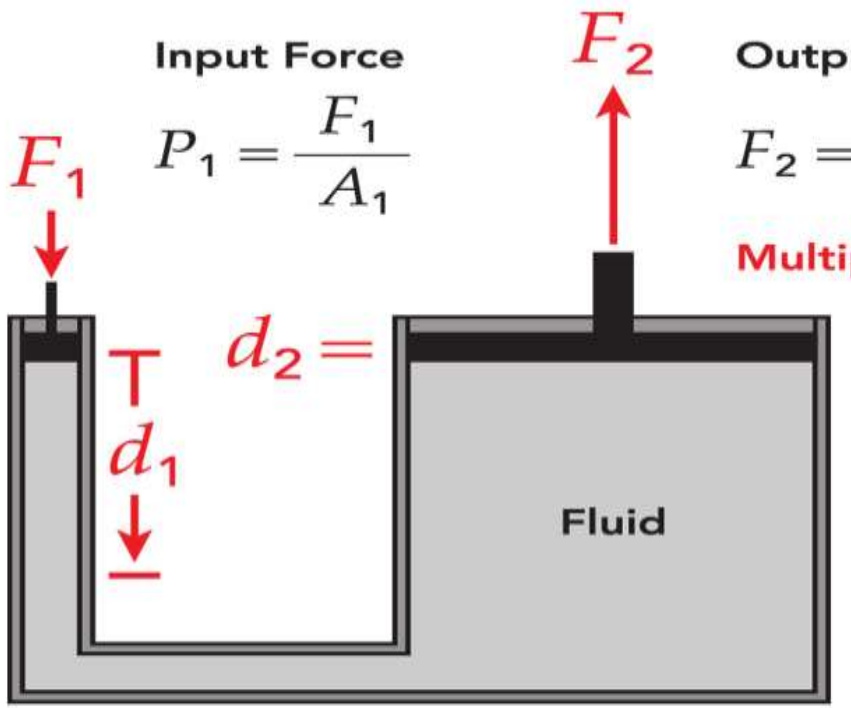
- It is fire resistant
- It is not messy
- It can be exhausted back into the atmosphere

The disadvantages of using air versus using hydraulic oil are:

- Due to its compressibility, air cannot be used in an application where accurate positioning or rigid holding is required.
- Because air is compressible, it tends to be sluggish
- Air can be corrosive, since it contains oxygen and water
- A lubricant must be added to air to lubricate valves and actuators
- Air pressures of greater than 250 psi are typically not used due to the explosion dangers involved if components such as air tanks should rupture.

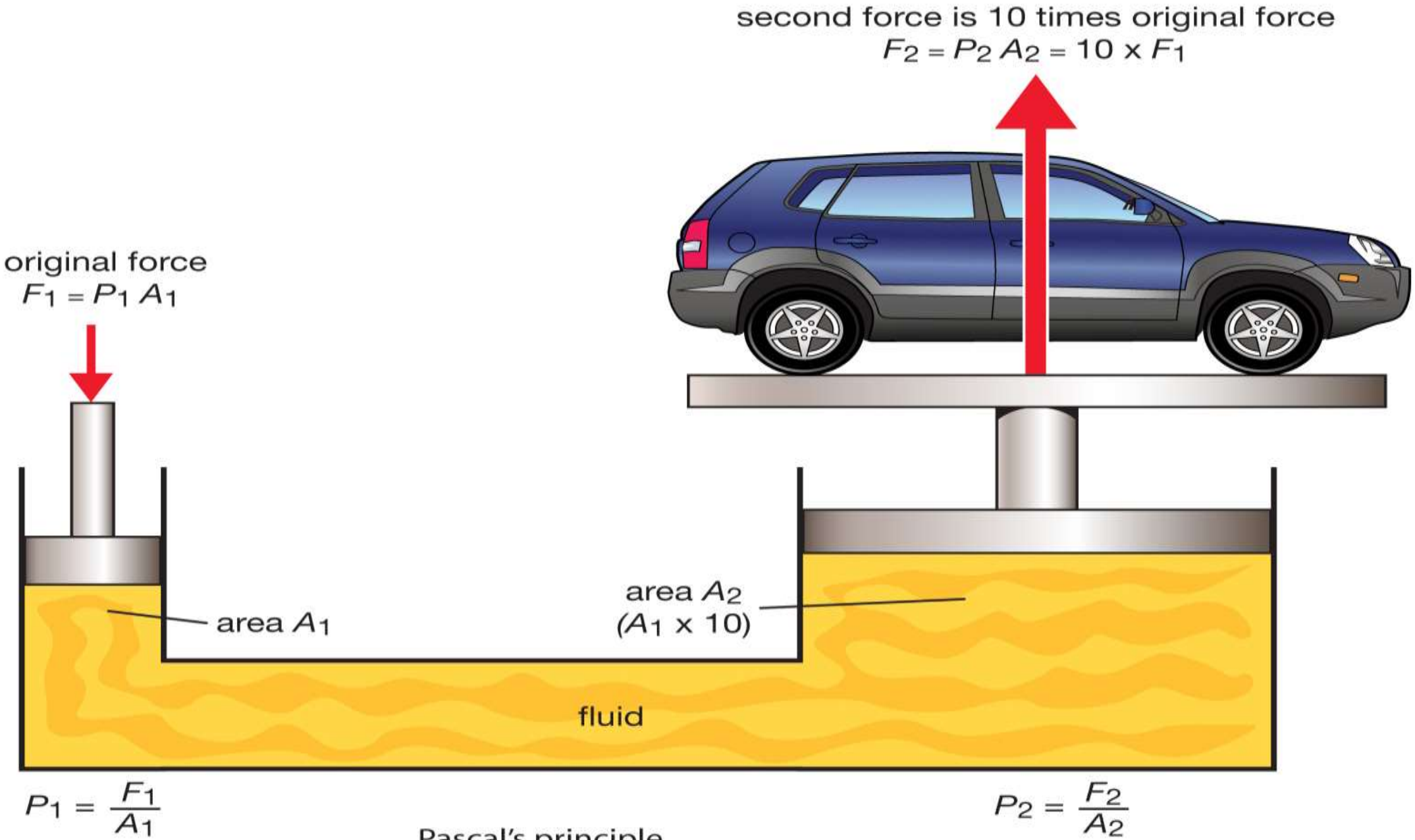
Pascal's Law

- Pressure applied to a confined fluid is transmitted undiminished in all directions throughout the fluid and acts perpendicular to the surfaces in contact with the fluid.



$$F_1 d_1 = F_2 d_2$$

$$d_1 = \frac{F_2}{F_1} d_2 = \frac{A_2}{A_1} d_2$$



Thank You!

Department of Production Technology,
MIT, Anna University, Chennai-44