

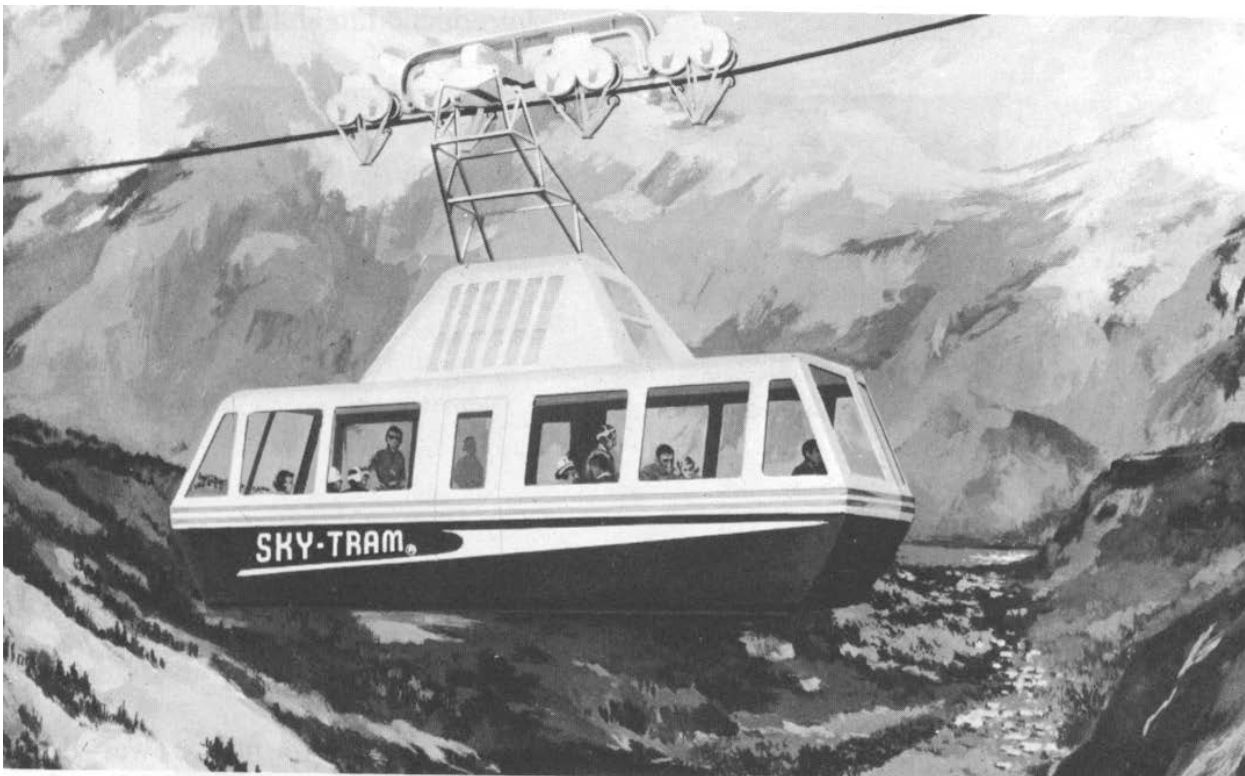
# Fluid power

## Definition

It is the technology that deals with the generation, control and transmission of power using pressurized fluids.

## Application

1 – Fluid power drives high – wire over head tram



2 – Fluid power is applied to harvesting corn.



3 – Hydraulics power brush drives.



4 – Fluid power position and holds parts for welding.

5 - Fluid power performs bridge maintenance.

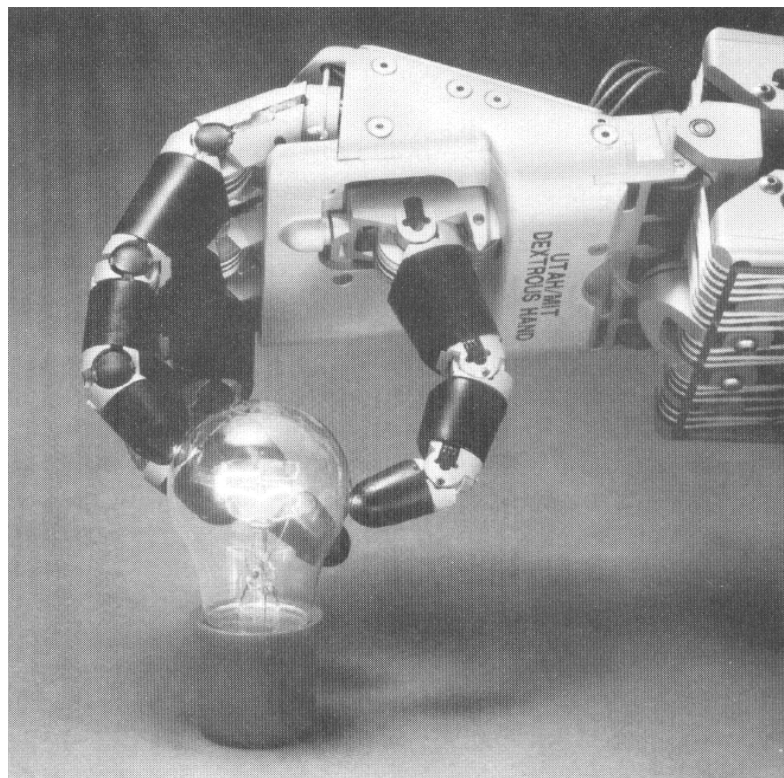
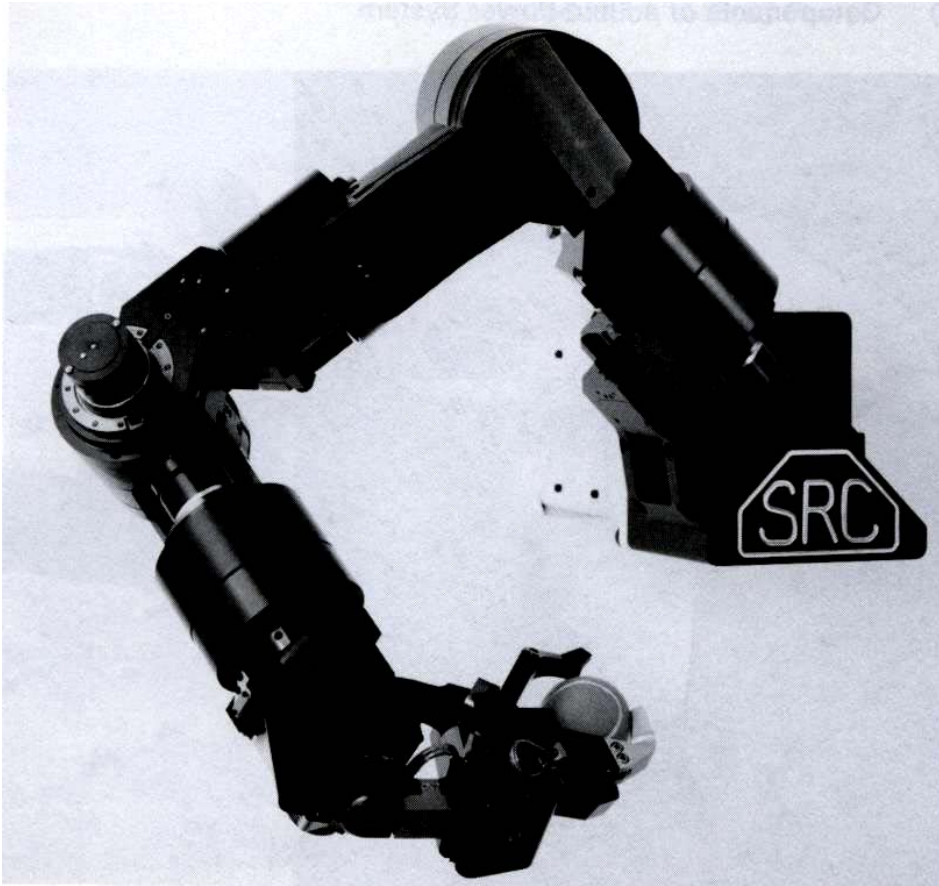
6 – Fluid power is the muscle in industrial till trucks.



7 - Fluid power drives front – end loaders.

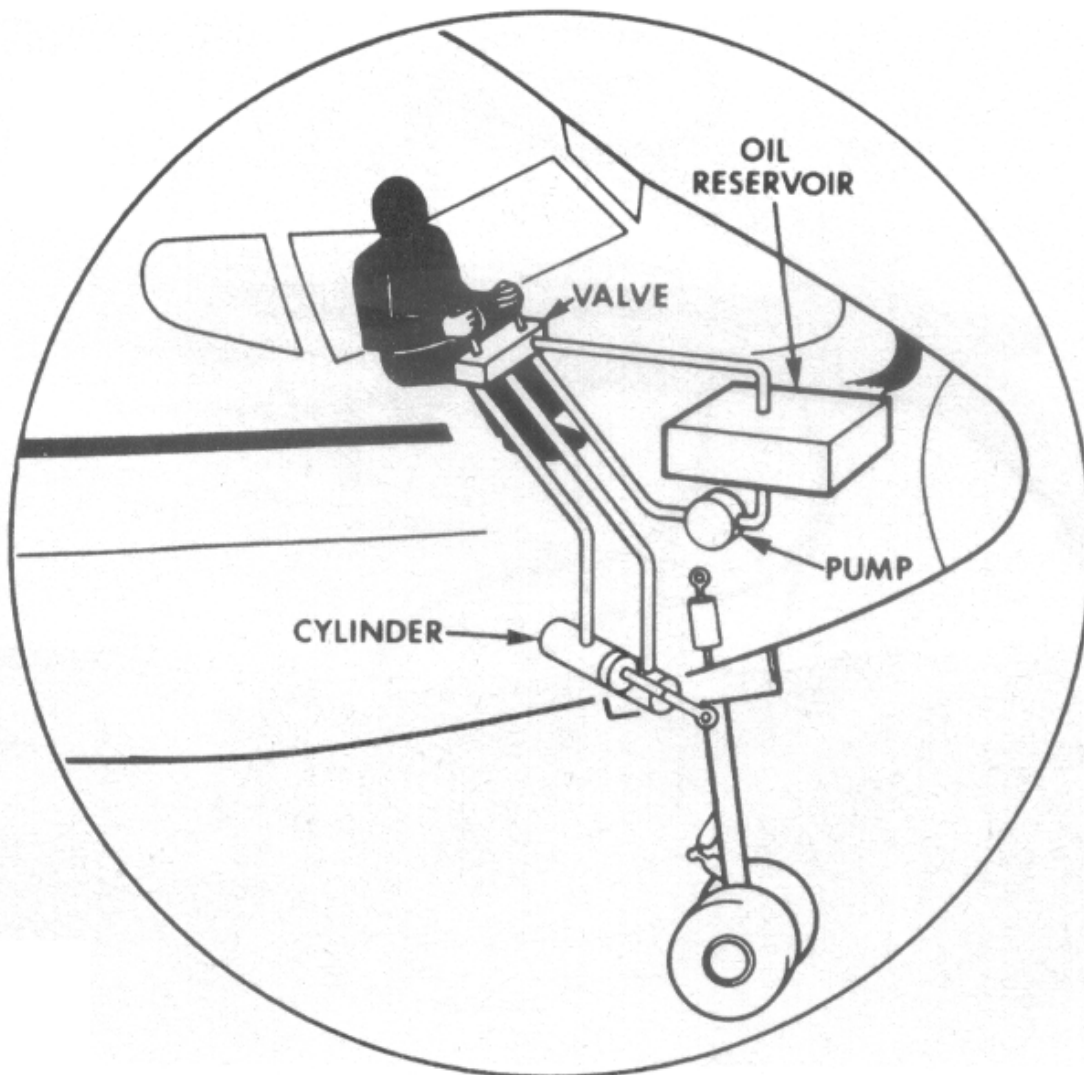


8 – Hydraulics power robotic dexterous arm.



## Advantages

- 1 – Ease and accuracy of control.
- 2 – Multiplication of force.
- 3 – Constant force or torque.
- 4 – Simplicity, safety and economy.
- 5 – Protection against overloads.
- 6 – Infinitely variable speed control.
- 7 – Have the highest horsepower - per - weight ratio of any known power source.



## **Drawbacks**

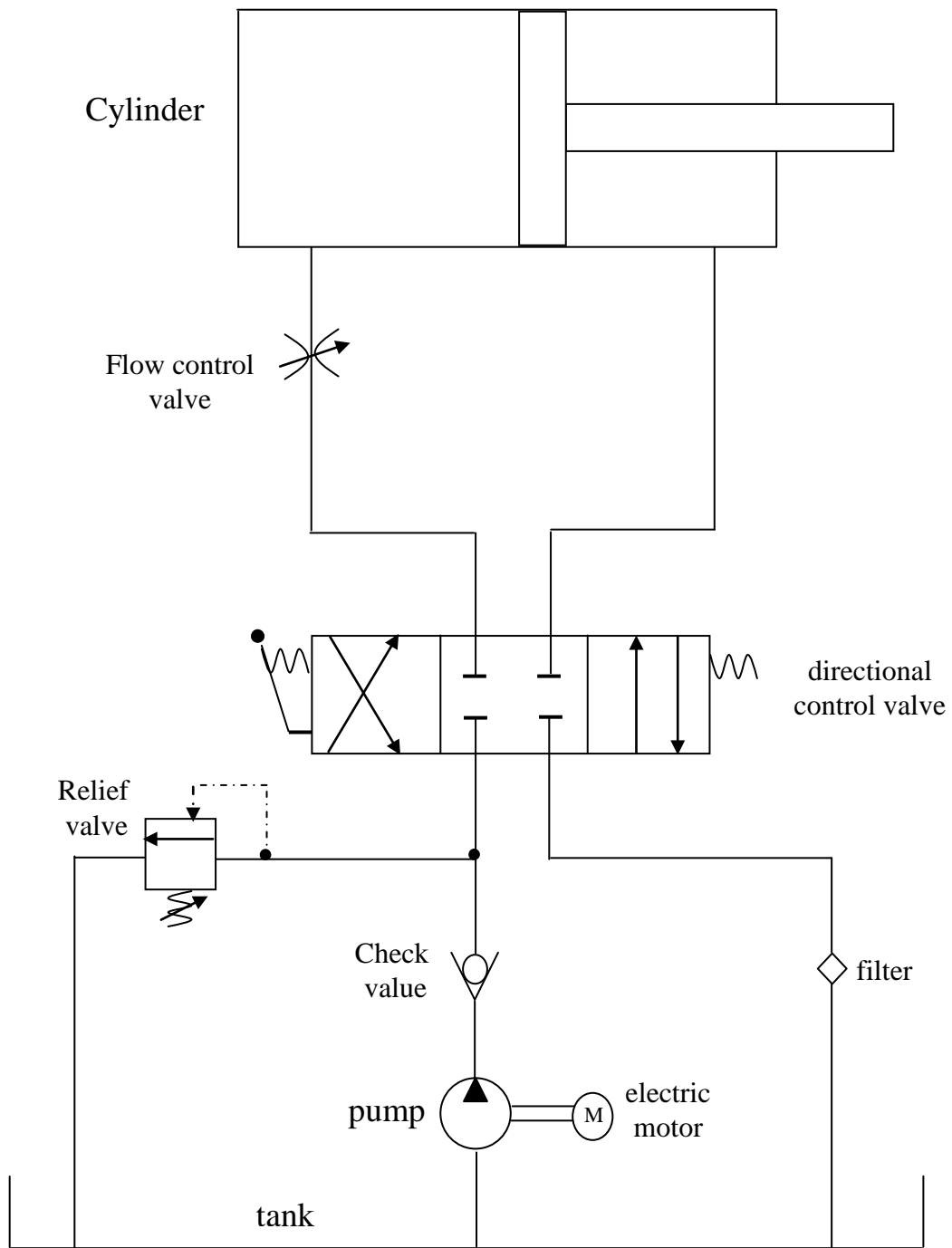
- 1 – Hydraulic oils are messy.
- 2 – Leakage is impossible to eliminate completely.
- 3 – Hydraulic lines can burst (high speed oil jets and flying pieces of metal).
- 4 – Loud noise from pumps (loss of hearing).
- 5 – Most hydraulic oils can cause fires if oil leaks in an area of hot equipment.

## **Components of fluid power system:**

### **A) Hydraulic system:**

Seven basic components:

- 1 – A tank (reservoir).
- 2 – Hydraulic oil.
- 3 – A pump to force the liquid through the system.
- 4 – An electric motor or other power source to drive the pump.
- 5 – Valves to control liquid direction, pressure, and flow rate.
- 6 – An actuator to convert the energy of the liquid into mechanical force or torque to do useful work (Linear motion from cylinders and rotary motion from hydraulic motor).
- 7 – Piping carries the liquid from one location to another.



Hydraulic circuit

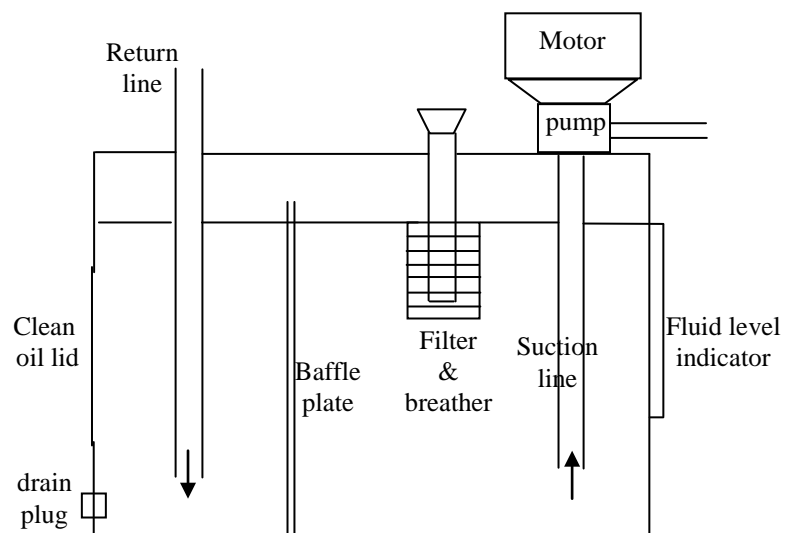
## **B) Pneumatic system:**

- 1 - An air tank to store a given volume of compressed air.
- 2- Compressed air.
- 3 – A compressor to compress the air that comes directly from the atmosphere.
- 4 – An electric motor or other prime mover to drive the compressor.
- 5 – Valves to control air direction, pressure and flow rate.
- 6 – Actuators, which are similar in operation to hydraulic actuators.
- 7 – Piping to carry the pressurized air from one location to another.

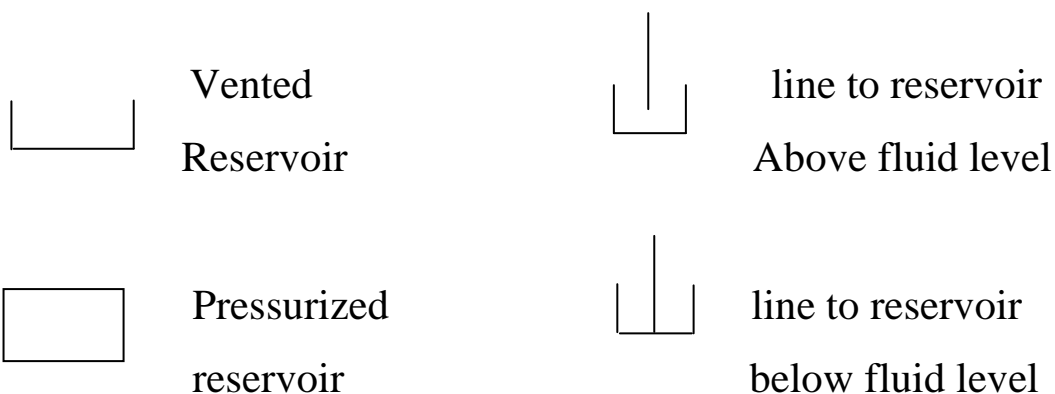
### **1 – Oil tank**

#### **Functions:**

- 1 – Storing oil
- 2 – Cooling oil
- 3 – Separation of air from oil
- 4 – Draining of impurities from the bottom of tank.



#### **\* Symbols:**





## **2- Hydraulic fluid**

### **Hydraulic fluid functions:**

- 1 – Transmit power.
- 2 – Lubricate moving parts
- 3 – Seal clearances between mating parts.
- 4 – Dissipate heat.
- 5 – Prevent corrosion.

### **Hydraulic fluid properties**

- 1 – Good lubricity.
- 2 – Ideal viscosity.
- 3 – Chemical and environmental stability.
- 4 – Compatibility with system materials.
- 5 – High degree of incompressible.
- 6 – Fire resistance.
- 7 – Good heat transfer capability.
- 8 – Low density.
- 9 – Foam resistance.
- 10 – No toxicity.
- 11 – Low volatility.
- 12 – Inexpensive.
- 13 – Ready availability.