

INTRO (part 1)

(what does pneumatics mean btw ?)

Pneumatics is a greek word which is meaning wind or breath

(what is pneumatics ?)

Pneumatics is a branch of engineering that makes use of gas or pressurized air.

(What is a pneumatic system ?)

Pneumatic systems are collections of interconnected components using compressed air to do work for the automated system used in industry and are commonly powered by **compressed air** or **compressed inert gases**. So basically what a system does is that it performs a certain task in a particular fashion etc. So yaha pe as we see the pneumatic system usme the word pneumatic means wind or breath so tumlog relate kar paoge ki we have some interconnection of components dealing with air which performs work for the automatic system functioning.... now yaha pe the work is done with the help of the compressed air or compressed inert gas.

So isme as we have a compressor which is located in the center and it is powered by the electricity which helps the other pneumatic devices to work.

(Now what is a hydraulic system ?)

Uses liquid to do their work, the liquids being used are not compressible and the system always has to be closed systems.

So yaha pe u can relate to the word hydro related system thus it uses liquid to do its work and vo liquid jo hai that isn't compressible i.e irrespective of the pressure variations the volume of the liquid remains the same and also is a closed system {no matter exchange}

Pneumatics:-

1. A Pneumatic system uses a constant supply of compressed air to transmit and control energy
2. **Components** of a pneumatic system are :

a. Compressor

Compressor. It is a mechanical device that increases the pressure of air by reducing its volume.

This is a **pump powered by gas or electricity**.

It compresses the air to a higher PSI (pounds per square inch). Compressors have a **tank connected to store the air before it's released into the pneumatic track**. An air compressor is a specific type of gas compressors.

b. Control Valves

A control valve is a valve used to **control fluid flow by varying the size of the flow passage as directed by a signal from a controller**. This enables the direct control of flow rate and the consequential control of process quantities such as pressure, temperature, and liquid level.

b. Pneumatic actuator

Actuators. These are the components of the pneumatic system that do the hard work. Many types of actuators are powered by pressurised air. The most frequently used are cylinder and plunger. The pressurised air is released into the cylinder to make a piston move forward as the air is forced to the chamber.

So ye jo Actuators hai ye hai systems ke sabse mehnati log hai.....so mostly they are powered by the pressureied air jisme jo kafi zyada use hota hai that is the c

c. Mufflers(to reduce noise)

Pneumatic mufflers, also called silencers, safely and quietly vent pressurized air to the atmosphere. They are commonly installed on air valves, cylinders, manifolds and fittings. ... These miniature pneumatic mufflers use porous sintered bronze mesh to reduce air exhaust noise.

1. Directional control valve

(What is the function of a directional control valve?)

A directional valve exists to do three things: stop fluid flow, allow fluid flow, and change the direction of fluid flow. They are a fundamental part of hydraulic and pneumatic systems that use hydraulic oil, water, or air from various sources.

As the name indicates, the **directional control valve** is used to control the direction of fluids. Fluids are liquids or gases. Directional control valves are extensively used in industries for the passage of fluid in the system. It is difficult to adjust manually every control valve at the right time. It controls the fluid flow in a hydraulic or pneumatic system by changing the position of its internal components. It permits or restricts fluid flow to the actuator by opening and closing its ports. There is a difference between the directional control valve used for liquids and gases. The liquids exert high pressure, so the directional control valve is heavier and strong in construction, while DCV used for gases is generally aluminum.

Classification of Directional Control Valves

The below are the types of directional control valves as follows.

1. Based on the type of construction.
2. Based on the number of ports.
3. Based on the number of switching positions.
4. Based on actuating mechanisms.

2. Flow control valves

A flow control valve regulates the flow or pressure of a fluid. Control valves normally respond to signals generated by independent devices such as flow meters or temperature gauges.

The purpose of flow control in a hydraulic system is to regulate speed. All the devices discussed here control the speed of an actuator by regulating the flow rate. Flow rate also determines rate of energy transfer at any given pressure.

The two are related in that the actuator force multiplied by the distance through which it moves (stroke) equals the work done on the load. The energy transferred must also equal the work done. Actuator speed determines the rate of energy transfer (i.e., horsepower), and speed is thus a function of flow rate.

Applications:-

(Pneumatic brake system)

A compressed air brake system is in which the compressed fluid from the hydraulic system is replaced by compressed air to pressurize the piston of the master cylinder, which in turn stops to pressurize the brake pad or vehicle.

(Applications of Pneumatic Systems)

- **Air Brakes**

(Why do trucks still use air brakes?)

Air brakes on a semi-truck work using compressed air instead of hydraulic brake fluid. Since semi-trucks are carrying so much weight, they rely on air **because compressed air can be constantly produced**, unlike hydraulic fluid, which requires refills and can leak, causing the brakes to fail.

(Applications of Hydraulic Systems)

- **Hydraulic press**

(What is hydraulic press used for?)

A hydraulic press is a device used to press out materials, aiding facilities in fabrication, assembly and maintenance. It employs pressure generated by a pump to push a steel cylinder into a material at a set force.

- **Hydraulic Excavator**

One such heavy equipment is the hydraulic excavator that is popularly used in the construction and mining industry. The major components of the excavator are a bucket, arm, rotating cab, and movable tracks; and its operations are controlled

by hydraulics.