DEPARTMENT OF MECHANICAL ENGINEERING

DESIGN AND FABRICATION OF PEDAL PRESS PNEUMATIC LIFTING JACK

A Thesis Submitted By

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ABSTRACT

To elevate a car and get at the underneath, there are many different kinds of jacks on the market. These jacks, however, are either too big to carry around or necessitate taking the car to a mechanic. An individual becomes more dependent on garage or other services. It becomes exceedingly difficult to change a flat tire or temporarily mend a broken axle on one's own in an emergency or in locations where the likelihood of finding a service station is quite low, such as hilly regions, rural areas, forest areas, etc. It is tiresome to wait for a support system to arrive. The cost of the service is especially high in locations with high demand, including forested areas or mountainous areas. The goal of this idea is to make it easier for people and physically handicapped people to repair a flat tire. Because the majority of people in the world are not trained to correctly position a mechanical jack and raise a car. The primary goal of the project is to enhance the micro pneumatic jack so that it is more effective for the user. This machine is powered by pneumatics, which have a low coefficient of friction. Power to raise the wheel is provided by an elevated pneumatic cylinder. There is no need for additional power sources to run this pneumatically driven device. Manual Air Pump, Pneumatic cylinder, Flow control valve, Connectors, Hoses etc. are essential parts.

Ref: https://ijarsct.co.in/Paper4439.pdf

CHAPTER-1

INTRODUCTION

OBJECTIVE:

This project & Implementation is very useful for heavy household appliance setup and vehicle maintenance work. A pedal press pneumatic jack compares a mini compressor who is serve the vehicle maintenance and set up our heavy household appliance such as Refrigerator, Almira, Sofa, Bedstead etc. The following reasons are affirming the benefits of pedal press pneumatic jacks-

›››› To reduce the time wastage

›››› To reduce the manpower cost

›››› To reduce the materials handling

›››› To reduce the fatigue of users

›››› To increase efficiency

1.1 PNEUMATIC SYSTEMS:

The word “Pneuma” comes from Greek and means wind. The word Pneumatics is the study of air movement and its phenomena is derived from the word Pneuma. Today Pneumatics is mainly understood to means the application of air as a working medium in industry especially the driving and controlling of machines and equipment.

Pneumatics has some considerable time between used for carrying out the simple mechanical tasks in more recent times has played a more important role in the development of Pneumatic technology for automation.

Pneumatic systems operate on a supply of compressed air which must be made available in sufficient quantity and at a pressure to suit the capacity of the system. When the Pneumatic system is being adopted for the first time, however it wills indeed the necessary to deal with the question of

compressed air supply. The key part of any facility for supply of compressed air is by means using reciprocating compressor.

1.2 ADVANTAGE OF PNEUMATICS SYSTEM:

›››› Air used in Pneumatic systems can be directly exhaust back into the surrounding environment

›››› Hence the no need of special or extra reservoirs.

›››› Pneumatic systems are simple and economical.

›››› Control of Pneumatic systems are very easier.

1.3 DISADVANTAGE OF PNEUMATICS SYSTEM:

«« Pneumatic systems exhibit spongy characteristics due to compressibility of air.

«« Pneumatic pressure is quite low to compressor design limitations.

Ref: **https://en.wikipedia.org/wiki/Pneumatics**

CHAPTER-2

LITERATURE REVIEW

A literature review is a survey of scholarly sources on a specific topic. It provides an overview of current knowledge, allowing you to identify relevant theories, methods, and gaps in the existing research that you can later apply to your paper, thesis, or dissertation topic.

A good literature review doesn't just summarize sources—it analyzes, synthesizes, and critically evaluates to give a clear picture of the state of knowledge on the subject.

2.1 Purpose of a literature review

When you write a thesis, dissertation, or research paper, you will likely have to conduct a literature review to situate your research within existing knowledge. The literature review gives you a chance to:

- Demonstrate your familiarity with the topic and its scholarly context
- Develop a theoretical framework and methodology for your research
- Position your work in relation to other researchers and theorists
- Show how your research addresses a gap or contributes to a debate
- Evaluate the current state of research and demonstrate your knowledge of the scholarly debates around your topic.

2.2 Vivek. J.V, IMMANUEL BHYSHON: ‘‘DESIGN AND FABRICATION OF PNEUMATIC JACK’’

To increase the productivity, the skilled labors were going for automation. To overcome this stage, we have selected project work is to acquire practical knowledge in the field of mechanism using jack. We selected PNEUMATIC LIFTING JACK, as our project work and we used this process in all machine attachment like, drilling, milling jig boring, and surface grinding. The material handling mechanism is achieved by movable of handle in this jack.

The purpose of this project is to design a quick lifting pneumatic jack using the power from the battery in car or using the power supply when it is to be utilized in the automobile garages. The principle behind this project is to make the work of the driver or the person who drives the car very easy when the tires of at the vehicle gets punctured and also to replace the tires considering the condition of the tires.

After analyzing the disadvantages in mechanical screw jack, the quick lifting pneumatic jack is an innovative one in which it consists of the gear arrangement combination of worm wheel and the worm shaft. And this plays a significant role in motion transformation. Here the worm arrangement is used due to its high transmission ratio.

2.3 S. SATHIYARAJ: ‘‘DESIGN AND FABRICATION OF PNEUMATIC JACK FORAUTOMOBILE’’

The main target of project is to improve version of a mini pneumatic jack. This will be more efficient for the user. This machine is pneumatic powered which has low co-efficient of friction. A pneumatic cylinder erected provides power to lift up the Jacky. This is a pneumatic powered machine and requires no other means of power to operate. The required components are Compressor, Pneumatic cylinder, Solenoid, Control circuit and Jack.

The working medium adopted is compressed air. The compressed air is transmitted through tubes to pneumatic cylinder where powers converted into reciprocating motion. The reciprocating motion is obtained by using an electrically controlled solenoid valve. The input to the solenoid valve is given through the control unit. The reciprocating motion transmitted to the jack through the piston which moves on the cylinder. The jack is placed under the vehicle chassis, where the vehicle to be lifted. The vehicle can be lifted when the solenoid valve is switched. The vehicle over the jack gets the reciprocating motion through the piston which is connected to the jack.

The project carried out by us made an impressing task in the field of automobile and automobile workshops. It is very usefully for the workers to work in the automobile workshop are in the service station. This project has also reduced the cost involved in the concern. Project has been designed to perform the entire requirement task which has also been provided.

2.4 MAYUR KAILAS LONE, MANSI BALASAHEB: ‘‘DESIGN AND DEVELOPMENT OF PNEUMATIC JACK IN AUTOMOBILE’’

There are many types of jacks available in the market to lift an automobile to access the underbelly of the vehicle. However, these jacks are too huge to carry around or require the vehicle to be taken to some garage. The dependency of an individual on garage or other services increases. During emergencies or

in places where the probability of finding a service station is very low such as hilly regions, rural areas, forest areas and etc. It becomes extremely hard to replace a punctured tire or temporarily fix a broken axle on one's own. The time taken for a support system to reach is tiresome. The service provided in high demand areas such as hilly regions or forests is also expensive.

The pneumatic jack is a device used for lifting heavy loads by the application of much smaller force. It is based on pascal's law, which states that intensity of pressure is transmitted equally in all direction through a mass of air at rest

In pneumatic system electric energy converted in mechanical motion and using this air compressed to higher pressure. The compressed air is used to developed the force. The force is used to do some mechanical work.

With some design consideration an inbuilt car lifting mechanism can easily be fitted in all light weight automobiles. The project works on hydraulic power provided by battery. Maintenance and service of the vehicle can be easily done by this project.

2.5 JACK SAINATH, MOHD "DESIGN OF MECHANICAL HYDRAULIC"

A jack is a device that uses force to lift heavy loads. The primary mechanism with which force is applied varies, depending on the specific type of jack, but is typically a screw thread or a hydraulic cylinder. Jacks can be categorized based on the type of force they employ: mechanical or hydraulic. Mechanical jacks, such as car jacks and house jacks, lift heavy equipment and are rated based on lifting capacity (for example, the number of tons they can lift). Hydraulic jack end to be stronger and can lift heavier loads higher, and include bottle jacks and floor jacks. HYDRAULIC JACKS depend on force generated by pressure. Essentially, if two cylinders (a large and a small one) are connected and force is applied to one-cylinder, equal pressure is generated in both cylinders.

2.6 SOURABH SAVADATTI, AMIT DODDAMANI "ANDROID CONTROLLED AUTOMATIC JACK SYSTEM FOR VEHICLE"

The concept of this work is to design and develop the automatic jack system using an android app. An automotive jack is a device used to raise all or part of a vehicle into the air in order to facilitate repairs. With the manually operated car jack most people are familiar with, that is still included as standard equipment with most new cars. Changing flat tire is not a very pleasant experience. Operating the manual car jack is quite difficult job. This purpose is to mainly encounter this problem. This paper presents the development of the car jack which is controlled by android app. A vehicle frame, also known as its chassis, is the supporting structure of a motor vehicle to which all the components are attached, comparable to the skeleton of an organism. Where the jack is placed in the middle of the chassis, to which the movement of the jack is control through the app. A car jack works on the 12Vpower supply which is obtained from the car battery itself. Operator only needs to press a button from the app without working in a bent or squatting position for a long period of time to change a tire. In order to fulfill the present car jack problem, some improvement in the present technology has to be made.

2.7 RAJMOHON G JAZIM HARIS: “INBUILT LIFTING ARRANGEMENTS FOR HEAVY VEHICLE”

An inbuilt lifting and safety arrangements for a Four-Wheeler with a hydraulic bottle jack system is attached to automobile vehicle on front and rear part of the chassis. During puncture or some repairs without lifting externally drop the hydraulic bottle jack with a single button. For heavy vehicles like truck, lorry etc., it will be easy to remove and fix the tire in case of inflated. In this paper, we are fixed a mechanism to lift the vehicles for the four sides and by operating the motor in single switch. The hydraulic jack is operated by a cam which works under the mechanism of single slider crank chain. It consists of one sliding pair and three turning pair; the lever is connected with a return spring rod. Force applied to the piston is 10 times lesser than the weight lifted. A hydraulic jack is a device used to elevate heavy weight without manpower. The device is accomplished of exerting great force. It thrust the liquid against a piston, pressure is reinforced in the jack's container. Based on Pascal's law that the pressure of a liquid in a container is the same at all points. The pumping rod is present at the center. Motor shaft is coupled with cam. Battery is operated by a motor; the motor is connected with cam. It is rotated with the specified rpm; the cam is connected to a hydraulic bottle jack when the continuous rotation of the cam the circular motion is converted to a reciprocating motion that reciprocating motion used to step up the bottle jack. The link is connected with the bottle jack is used to rise the arm. This arm connected to spring shaft is lower down and lift the vehicles

Ref: **https://www.ijraset.com/fileserve.php?FID=36062**

CHAPTER-3

DESIGN AND EQUIPMENT

3.1 PNEUMATIC COMPONENTS AND ITS SPECIFICATION:

The pneumatic jack machine consists of the following components to full fill the requirements of complete operation of the machine.

1. Double acting pneumatic cylinder

2. Pneumatic Hand valve

3. Connectors

4. Hoses

3.2 DESIGN:

1. **Double Acting Cylinder**
   Technical Data

Stroke length: cylinder stroke length 200 mm = 0.2m
Piston rod: 25mm =0.025 M
Quantity: 1
Seals: Nitride (Buna-N)
Eastover End cones: Cast iron
Piston: EN-8
Media: Air Temperature: 0-80°C
Pressure Range: 25 N/m

2. **Pneumatic hand Valve:**
   Technical Data

Port size: 0.635 x 10^{-2} m
Pressure: 0-8 x 10^{5} N/m2
Media: Air
Quantity: 1

3. **Connectors:**

Technical Data

Max working pressure: 10 x10^5 N/m2
Temperature: 0-100°C
Fluid media: Air
Material: Brass

4. **Hoses**

Technical Data

Max pressure: 10 x10^5 **N/m**2
Outer diameter: 10 mm = 0.010 m
Inner diameter: 6mm = 0.006 m

Pneumatic Unit

Type of cylinder: Double acting cylinder
Type of valve: flow control valve
Max air pressure: 8 x 10^5 N/m2

3.3 DESIGN CALCULATION:

Max pressure applied in the cylinder (p): 8 x 10^5 N/m2
Cylinder Dia (D)= 100 mm =0.1 M
Area of cylinder (A): $(\pi D^2) \div 4$
: $3.1416 \times (0.1)^2 \div 4$
: $7.85 \times 10^{-2}\ M^2$

Ref:**file:///C:/Users/Acer/Downloads/Design%20and%20Fabrication%20of%20Pneumatic%20Jack%20Low%20Cost%20for%20Automobile%20(1).pdf**

DESCRIBE ALL ARE THE EQUIPMENT:

3.4 PNEUMATIC CYLINDER:

Pneumatic cylinder imparts a force by converting the potential energy of compressed air into kinetic energy. This is achieved by the compressed air being able to expand, without external energy input, which itself occurs due to the pressure gradient established by the compressed air being a greater pressure than the atmospheric pressure. This air expansion forces a piston to move in the desired direction.

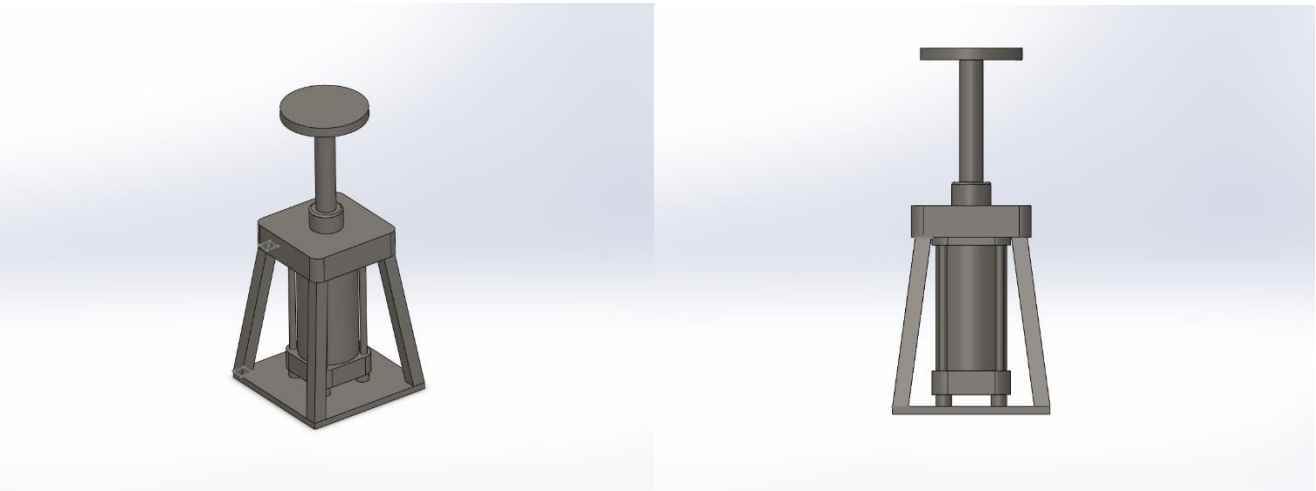

Fig-1

3.4.1 Components of Pneumatic cylinder:

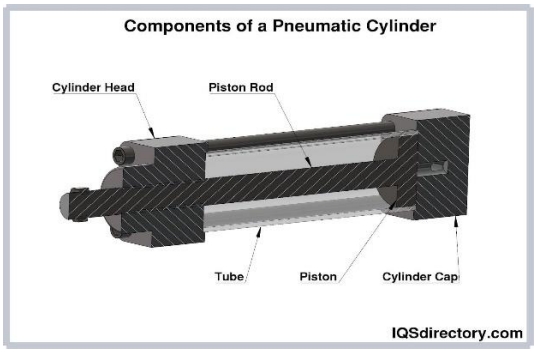

Fig-2

- **Pneumatic Cylinder Bore:** The pneumatic cylinder bore houses and protects the internal components. It is closed by two end caps: the **front-end** (cylinder head) and the **rear-end** (cylinder cap). The front-end cap is located adjacent to where the piston rod extends while the rear-end cap is mounted on the opposite side. One or both caps have ports that introduce pressurized air inside the bore. Seals with cushioning capability are placed between the bore and the caps to prevent leakage and high impact during actuation.

- **Piston:** The piston is the disc inside the pneumatic cylinder, which serves as a movable partition that divides the chamber. It reciprocates back and forth in a straight line. As compressed air enters the port of the rear-end cap, it exerts pressure on the piston, which causes it to move away from the rear-end cap and for the piston rod to protrude. This movement is called positive or plus movement and the pressurized chamber which causes this movement is

called the plus chamber. The minus chamber is located on the opposite side. The piston then returns to its original position. The manner of how the piston returns to its original position

depends on its type. The amount of force generated by the pneumatic cylinder is equivalent to the air pressure multiplied by the area of the piston. The diameter of the pneumatic cylinder

- **Piston Rod:** The piston rod is connected and driven by the piston. It is attached to the machine element or objects to be pushed or pulled. The stroke length refers to the distance that the piston and the piston rod have traveled.

- **Piston Cushioning:** The piston cushioning lowers the speed of the piston and rod assembly before it reaches the end cap. It helps to reduce impact, noise, and vibration at the end of every stroke and enables the piston to move at faster velocities.

- **Piston Static Seal:** The piston static seal ensures an airtight sealing between the piston and the rod.

- **Piston Seal:** A piston seal ensures an airtight sealing between the piston and the chamber. It prevents air from leaking to the other side of the chamber.

- **Piston Guide Rings:** Piston guide rings prevent direct metallic contact between the piston and the cylindrical chamber during sliding motion. They absorb radial forces acting in the cylinder. They are mounted in the piston and made of chemical resistant, low friction, and self-lubricating plastics such as PTFE and polyamide.

- **Sensors:** Sensors are used to detect the linear position of the piston inside the cylinder. They are important for positioning applications. Reed switches and Hall-effect sensors are the commonly used pneumatic cylinder sensors.

- **Tie Rods:** Tie rods are the threaded steel rods that hold the end caps to the pneumatic cylinder bore. A static seal is present between the end cap and bore interface. The tie rods run around the length of the cylinder. A pneumatic cylinder can have 4-20 tie rods depending on the size and force it produces, which makes the cylinder bulkier. The tie rods also protect the cylinder from possible impact and shock

3.4.2 Type of Pneumatic cylinder:

- ❖ Single-Acting Cylinders
- ❖ Double-Acting Cylinders
- ❖ Telescoping Cylinder
- ❖ Rod less Pneumatic Cylinder
- ❖ Air Hydraulic Cylinder

- **Single-Acting Cylinder**: Cylinders also exist which can only be moved pneumatically in one direction. The return movement is caused by a spring. Cylinders of this type are called “Single-action cylinders”. The compressor cylinder is a single-action cylinder. These cylinders have a compact, simple design and work well for when you want to use less air.

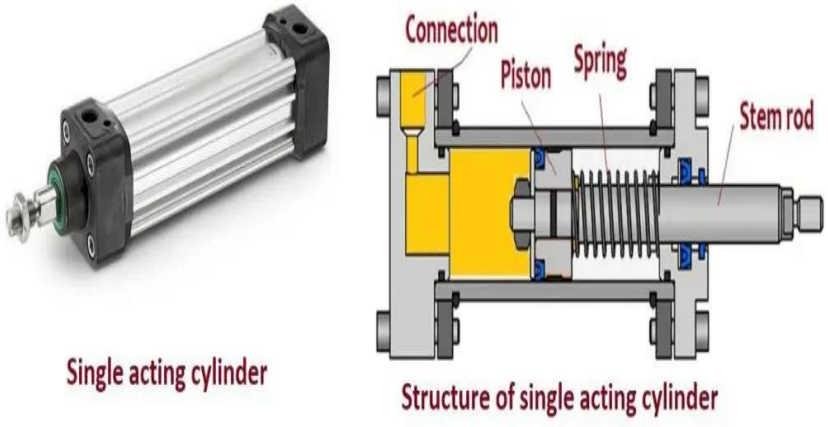

Fig-3

- **Double-Acting Cylinder**: In double-acting cylinders, compressed air can be introduced on both sides of the piston. The piston and rod assembly will move toward the side of the chamber with less internal pressure. Hence, the piston and rod assembly can perform both extension and retraction strokes. The piston and rod assembly returns to its original position by supplying pressurized air on the other side of the cylinder. The extension force of double-acting cylinders is greater than the retraction force because the area is greater on the side of the piston near the rear-end cap. This is true only when pressurized air supplied on both sides of the piston is equal. Moreover, the Page No.
  retraction speed is faster than the extension speed because the rod decreases the effective volume which makes the chamber filled with compressed air quicker.
  Double-acting cylinders are useful in gate and valve opening and closing. They are used for applications requiring high speed and high force. They have stronger and more constant output force and longer strokes. Hence, they require a stronger cushioning system. The movement of the piston and rod assembly is quicker and more controlled since pressurized air moves it in both ways. However, double-acting cylinders have

higher compressed air consumption and are more expensive. The piston's position cannot be determined in case of a sudden pressure or power loss.

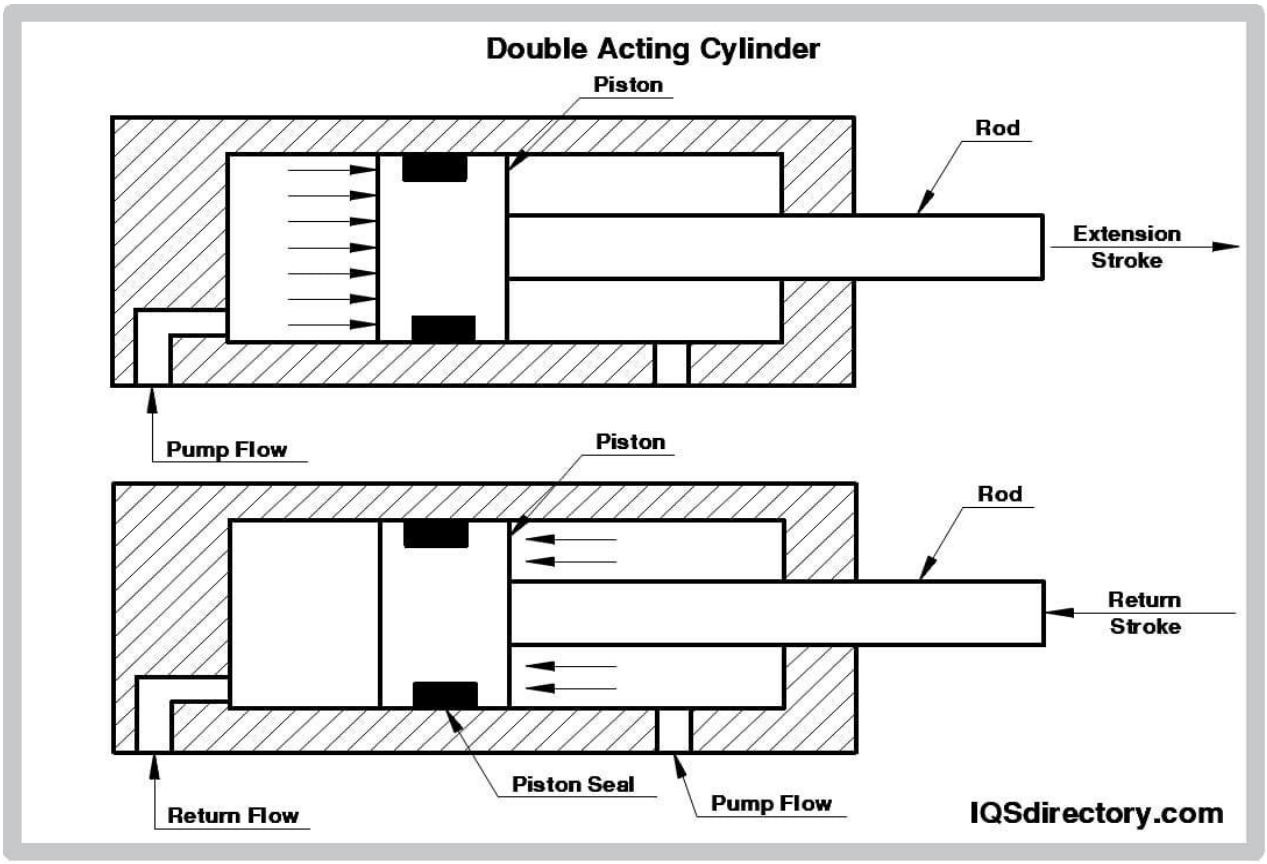

Fig-4

- **Telescoping Cylinder**: A multi-stage telescoping cylinder has a more complex design, with a collapsed length. The air flows through tubes of varying diameters, with the piston rod serving as the smallest. These tubes are called stages. Many telescopic cylinders are designed with six at maximum, though certain models have more.

  You can get single-acting and double-acting cylinders that are telescopic. Some even come with both types of thrust, combining the processes. They provide a very long stroke and require less mounting space. You will most likely see telescoping cylinders in the construction industry or for managing equipment.

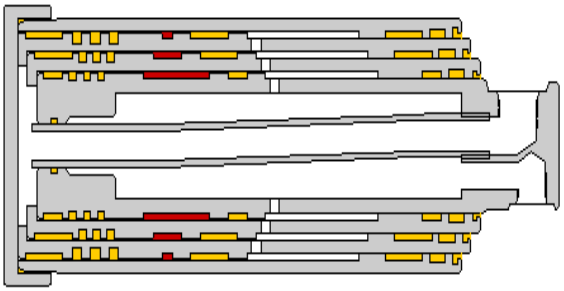

Fig-5

- **Rod less Pneumatic Cylinder:** Rod less pneumatic cylinders move loads along with a piston driven by compressed air. The piston is attached to a carrier where the load is

  mounted. The piston moves the carrier in a straight line. The direction of the piston movement is always to the side of the chamber with lower internal pressure.

  Rod less pneumatic cylinders offer strokes comparable to their assembly size at faster speeds. Hence, they are suitable if the overall length must be minimized due to limited space. End cushioning is necessary to prevent hard impact on the piston after full-length travel at the end caps.

  In less common types of single-acting cylinders, the retraction mechanism is accomplished by an external load or gravity.

  Single-acting cylinders have a simple construction and are cost-efficient due to less air consumption. They are ideal for the application of force in a single direction, such as clamping, punching, and positioning. They are also found in pumps and rams. However, the output force is limited due to the opposing spring force. The size of the spring limits

the stroke length. Piston strokes become inconsistent with prolonged usage of the spring.

There are three types of rodless pneumatic cylinders:

- **Band Cylinder:** In band cylinders, the carrier is connected to the piston by two sealing bands that run parallel to the stroke direction. The sealing bands can be made from plastic or stainless steel. The outer band is located on top of the cylinder bore slot, which is connected to the carrier. Meanwhile, the inner band is located inside the cylinder bore, which is connected to the piston. As the carrier moves to either end, it opens the sealing band towards its stroke direction while closing the band behind the moving carrier.

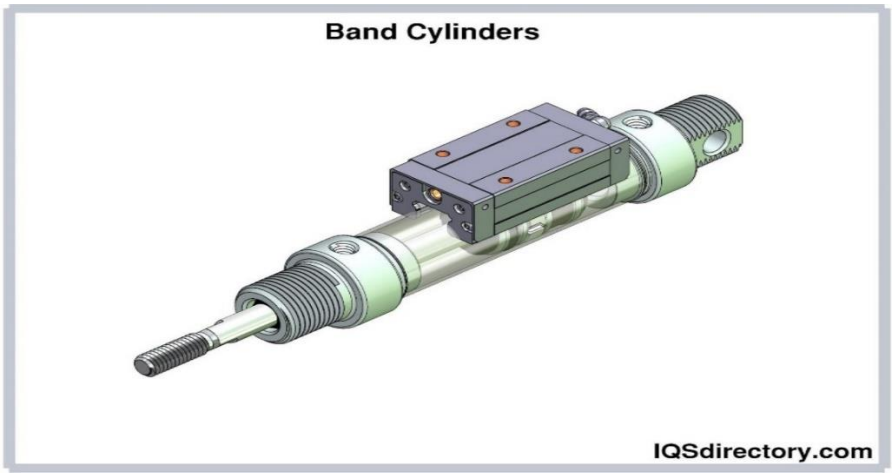

Fig-6

- **Cable Cylinder:** In cable cylinders, the piston is connected to the carrier by a cable that passes through a pulley on each end cap. The cable is pushed by the piston in order to move the carrier. Cable cylinders are inexpensive and have a simple construction. However, cable wear causes inaccurate carrier positioning and leakage.

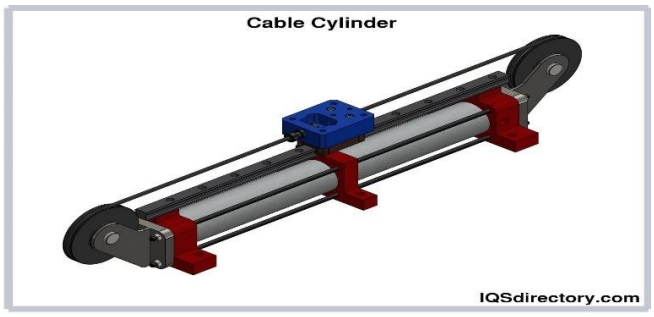

Fig-7

- **Magnetically Coupled Cylinder:** In magnetically coupled cylinders, the piston is not mechanically attached to the carrier. Instead, the carrier is moved by the piston through a strong magnetic field. Hence, air leakage is prevented since the cylinder is fully enclosed. However, the carrier may disengage from coupling and is reactive to moment loads.

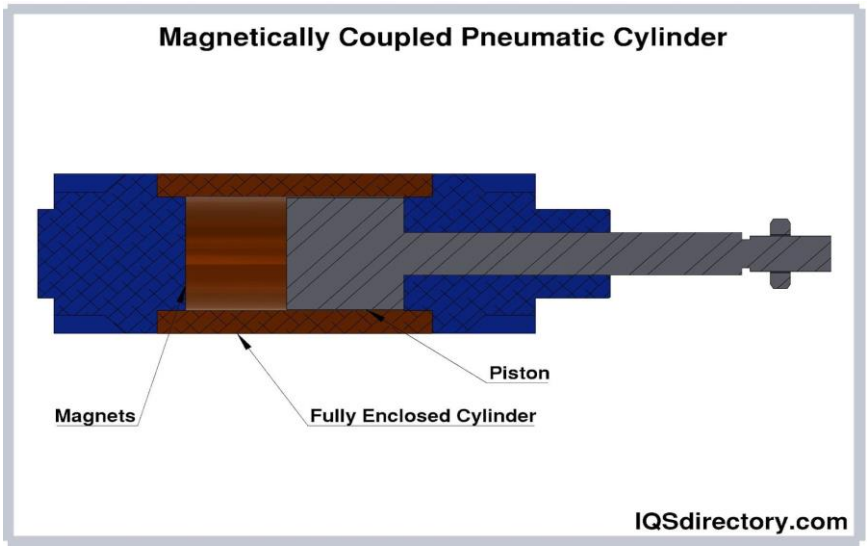

Fig-8

- **Air Hydraulic Cylinders:** Air hydraulic cylinders replace the driving force of oil with air. When activated, the piston in one chamber moves linearly until it is stopped which activates the air power system. Air flows into the piston chamber. As the air pressure builds, the piston in the chamber moves linearly in reverse to compress the oil in the working area. The oil forces the working piston to produce a power stroke. Once the stroke is completed, the air is vented and the components return to their start positions.

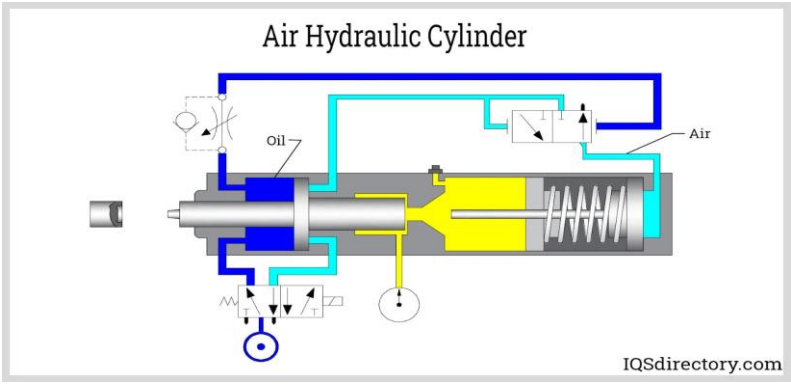

Fig-9

3.4.3 Materials used for Cylinder:

You can get cylinders made of various metals; they include plastic, aluminum, stainless steel, regular steel, and nickel-plated brass. You can get some that combine different metals for optimal performance. Factors that determine such performance can include the amount of work expected, humidity and heat. You won't want your cylinder to rust if working in the food processing industry, for example, which requires constant sanitation.

Stainless steel is the preferred material for pneumatic cylinders. It is waterproof, rustproof, and has a high heat threshold. This means that you can use it for industries that require large volumes of water and heat for their manufacturing. These cylinders require fewer replacements, will not corrode during production, and will give you more value.

3.4.5 MAINTENANCE OF PNEUMATIC CYLINDER:

Pneumatic cylinders convert compressed air into linear motion. While these cylinders are generally reliable, they can suffer from wear and damage over time, leading to decreased performance and even failure. Proper maintenance, including regular inspection and repair, can help prevent these issues and extend the life of the cylinder. This article explores some of the symptoms of a faulty cylinder, the causes of failure, and the steps involved in repairing or replacing a damaged cylinder.

- ✓ Faulty pneumatic cylinder symptoms
- ✓ Typical causes of pneumatic cylinder failure
- ✓ Pneumatic cylinder repair
- ✓ Pneumatic cylinder preventive maintenance checklist
- ✓ Replacing a pneumatic cylinder

❖ **FAULTY PNEUMATIC CYLINDER SYMPTOMS:**

- ✓ Slow actuation: Sluggish actuation or failure altogether are clear signs that there is an issue with the pneumatic cylinder. Consistent monitoring of actuation pressure is critical to avoid complete system failure.3
- ✓ Higher pressure needed for actuation: Typically, a pneumatic cylinder needing higher than normal pressure to actuate is caused by undersized control lines or a faulty metering choke valve that results in insufficient pilot control pressure.

- ✓ Hissing sounds: Hissing sounds originating from the air cylinder indicates a system leak caused by a damaged rod seal, worn-out rod, or damaged piston. This leak can cause pressure loss and impede cylinder performance.
- ✓ Intermittent start-up: Overloading air cylinders causes stress and higher friction in the seals, leading to intermittent start-up or the bending or breaking of rod ends. Additionally, systems containing energy-absorbing devices or speed-control mechanisms may experience pressure spikes that exceed normal operating pressures, causing the actuator to fall apart.
- ✓ Load pulsing: Load pulsing is when the load causes pressure fluctuations in the cylinder's air supply line. These pressure fluctuations can cause problems in pneumatic systems, such as reduced accuracy, slower cycle times, and increased wear on components. Smooth and silent cylinder operation is typical, and any load pulsing suggests the need for repair.
- ✓ Premature wear or corrosion: Visible corrosion or premature wear on the cylinder body or end caps is a result of exposure to harsh environmental conditions such as high humidity, heat, or chemicals, which can cause rust, erosion, or pitting, compromising the cylinder's structural integrity and eventually leading to failure.

❖ TYPICAL CAUSES OF PNEUMATIC CYLINDER FAILURE:

➢ SIDE LOADING:

Side loading in a pneumatic cylinder refers to the application of external forces or loads on the piston rod of the cylinder, which are not aligned with the cylinder's axis. When a pneumatic cylinder is designed, it is intended to bear loads in a specific direction along its axis, which is usually aligned with the cylinder's piston rod. However, if a load is applied to the cylinder from a direction that is not aligned with the cylinder axis, it can cause the cylinder to wear out faster or even malfunction. It can cause issues like uneven or accelerated piston rod and bearing wear, seal failure, and cylinder tube scoring (a type of damage that occurs on the inner surface of the cylinder tube due to the presence of foreign particles, corrosive substances, or moisture in the compressed air supply). Sideloading typically arises from improper cylinder installation into the operating system, and prompt repairs are necessary to prevent further damage.

➢ INSUFFICIENT LUBRICATIONS:

To avoid problems with a pneumatic cylinder, it is crucial to maintain proper lubrication. Without thorough and constant lubrication, the cylinder's seals will dry out and eventually fail, leading to a potential cause of failure.

➢ CONTAMINATION:

Contaminants such as particulate matter, oil, water, and other substances can block the operating parts of the cylinder, thereby reducing its functionality and potentially causing total system

failure. These contaminants can easily enter the cylinder through the operating environment or the pneumatic air supply, resulting in catastrophic consequences.

- **SYNCHRONIZATION ISSUES:**
  A system with more than one pneumatic cylinder requires perfect synchronization of each component to operate effectively. To maintain synchronization, various practices and methods must be implemented, and careful monitoring and management are necessary. If the pneumatic cylinders fall out of synchronization, the machine will stop functioning correctly, and the entire system may fail.

- **EXCEEDING OPERATIONAL LIMITS:**
  When the pneumatic cylinder is operated outside the intended, optimal performance range, it is subjected to excessive loads that stress its internal components, leading to poor performance and premature failure. Preventative checks and maintenance can help operate within the correct parameters and avoid this issue.

❖ PNEUMATIC CYLINDER REPAIR:

- ✓ **Turn off the power supply:** Before starting any repairs or maintenance on a pneumatic system, ensure the power supply is turned off, and any remaining compressed air is released. Compressed air in the system can be hazardous and increase the risk of accidents.
- ✓ **Check the tube, cylinder, and rod seal for rust or damage:** The cylinder rod, tube, and seal on the rod are the most susceptible to damage or rust. Therefore, inspect these components thoroughly for any signs of deterioration like visible cracks, corrosion, or damage to the seal. Replace the entire cylinder and mounting parts if the damage is significant. Also, ensure that no dust accumulates on the outer surface of the air cylinder or the mounting bracket. If the damage is minor, it may be possible to repair or replace the damaged components, such as the seal or rod.
- ✓ **Lubrication:** Check the manufacturer's instructions to see if the pneumatic cylinder requires lubrication. In some cases, extreme environmental conditions, such as high heat or chemical exposure, may require frequent lubrication to prevent damage to the equipment. However, if lubrication isn't necessary, it's best not to use it.

While inspecting the cylinder and its components, check if the seals are well-lubricated. Apply grease packs to the seals if they are not sufficiently lubricated. In general, the following components of the pneumatic cylinder require lubrication:

- Tube gaskets
- Rod seal
- The groove on the piston seal
- The surface of the piston rod

- The outer surface of the piston
- Tube inner surface, and,
- The outer and inner surfaces of the pistons.
- **Repairing cylinder seals:** Seals are essential components of pneumatic cylinders that can crack or leak over time, requiring replacement. When replacing seals, it is essential to follow these steps to ensure safe and effective replacement:

➢ Hold the tube cover securely using a vice, then loosen and remove the rod cover using a spanner.

➢ Disassemble the cylinder carefully, removing all parts and wiping them clean of grease with a clean cloth.

➢ Replace the seals with new ones; ensure you install them correctly.

➢ Reassemble the cylinder, ensuring the tube cover is tightened slightly more.

❖ PNEUMATIC CYLINDER PREVENTIVE MAINTENANCE CHECKLIST

Wear and tear of a pneumatic cylinder are inevitable. Nevertheless, taking a few simple measures can help prevent early failure, and implementing them consistently and correctly can save time and money.

- **Proper Installation:** Installing the cylinder correctly will significantly extend its lifespan. Improper tools used during installation can adversely impact the functionality and lifespan of the system. Ensuring that fasteners are properly torqued is crucial to correctly installing tie rods.
- **Filters:** As specified by the manufacturer, changing filters regularly can help shield the cylinder from contaminants that may cause damage.
- **Fittings:** It is essential to check for rust or wear on fittings, as many contaminants can infiltrate the pneumatic cylinder from contaminated fittings.

❖ REPLACING PNEUMATIC CYLINDER

Even with a regular pneumatic cylinder maintenance schedule, its parts occasionally fail and must be repaired or replaced.

- Pneumatic cylinder spare parts like pistons, cylinder bodies, seals, end caps, and mounting hardware can be purchased from the manufacturer and replaced with worn-out ones to ensure optimal performance.

- Pneumatic cylinders designed according to ISO standards can be replaced with any cylinder brand conforming to the same standard. This allows users to choose a pneumatic cylinder based on cost and availability.
- Several brands offer repair kits for the cylinders; stock these up and make repairs as quickly as possible. In some cases, pneumatic cylinders can be customized, and a custom-designed cylinder could render the best performance.

3.5 PNEUMATIC HAND VALVE

Pneumatics is a system that uses a difference in pressure of compressed air for its operation. Such schemes contain a number of different mechanisms through which compressed gas is distributed. All together, they act as a centralized system.

Valves are used to control, distribute and direct the flow in this structure. They perform a guiding and dosing function via locking and regulating elements. Thus, pneumatic valves act as a mediator between the source (compressor) and actuators (such as pneumatic actuator, pneumatic cylinder) in pneumatics.

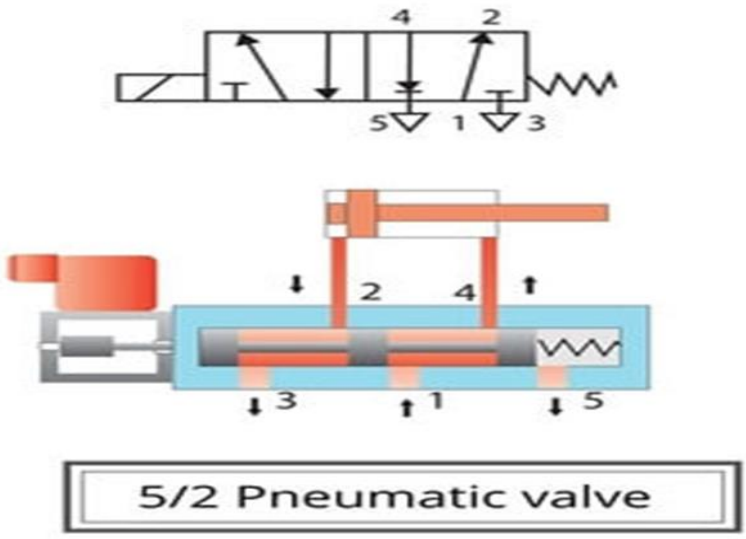

Fig-10

3.5.1 Pneumatic Valve Specifications:

We have some specifications for pneumatic valves, some essential ones of which are reviewed below. These parameters are for overall guidance, and you should know that each valve manufacturer and supplier may describe their valves separately. Furthermore, the precise specifications are based on several parameters such as desired porting, the manifold design, and the actuation mechanism for the valve.

- Operating pressure or pressure range: the pressure amount or range of pressures the valve is rated to handle (in psi, Bars, or Pa)
- Operating medium: the varieties of fluid that the valve can safely control. In most devices, it is compressed air.

- Flow capacity or flow coefficient: a measure of the capacity of the valve to pass or flow air through it, with the flow coefficient (CVS) expressing the proportionality constant between the flow rate and the differential pressure.
- Response time – the period of time needed for the valve to change states or positions when actuated.
- Cycle rate – the highest number of valve cycles at which the valve can work per unit of time.
- Coil rated voltage: in electrically actuated valves, a ratio of the maximum voltage that the actuation coil can provide and may be measured in DC and AC volts.
- Port size: the physical dimensional parameters specify the port sizes on the equipment and the thread style.

3.5.2 Types of Pneumatic Valves Based on Actuators

the pneumatic valves can be categorized based on the types of actuators they use. They can have electromagnetic, air-operated, or mechanical actuators.

- **Solenoid Valves:**

Solenoid valves are designed to open and close in response to an electric signal. They control airflow in a pneumatic system and liquid in a hydraulic one. You can get either a valve with a spool or poppet arrangement.

Generally, solenoid valves are used in industrial workplaces for manufacturing. The reason is for the valve to work properly, it needs a consistent temperature. If you want one to work in a constantly changing atmosphere, the valve must handle temperature extremes so as not to short out.

An example of the latter would be in a car, where it's used to start the ignition. When you turn your key, an electric signal is sent to open the valve and start the engine. The valve has to handle the emergence of heat from the engine and any cold from unfavorable weather conditions.

Other applications of solenoid valves include irrigation systems and dishwashers when referring to how they are used with fluids. They control the flow of water to allow for regular waterings of fields or cleaning your cups and plates, respectively. People value these models' versatility and durability.

Fig-11

❖ Air Operated Valves:

Air-operated valves from a design standpoint are shaped similarly to those used in solenoids. Instead of receiving an electric signal, however, they respond to air pressure applying force to a piston or diaphragm.

You will see air-operated valves in environments that demand a high output but don't want to rely on electricity and who wish to use them remotely. They are thus used in chemical factories and fertilizer

manufacturing facilities. Regarding the former, chemicals, if exposed to the wrong substances, can induce combustion and endanger their operators. In the latter, people are kept far from potentially noxious nitrogen compounds.

Fig-12

❖ Mechanical Valves:

Mechanical, or hand-operated valves, use manual power. You may see them in operations where electricity would be dangerous or impractical for the tasks at hand. As with solenoid valves, they can be used for either air or liquid flow.

Usually, you apply energy to these valves using your hand or feet to move them. The operator would need to apply a push-pull motion or simply press a button with their palm. Other types of mechanical valves are powered by lever arms or with the power of friction. These days, mechanical valves have to be a larger size to handle a higher flow rate.

An example of a mechanical valve would be those used to help people with heart disease. They assist in helping ensure that blood and oxygen flow through the human body. While such artificial hearts risk blood clots, they increase a person's lifespan with durable models.

Another would be a manual valve used in an older machine that has no electrical connection. Consider how old-fashioned sewing machines and spinning wheels would work by the user pressing a pedal; the energy would be transferred in a circular motion. They would use rudimentary pneumatics.

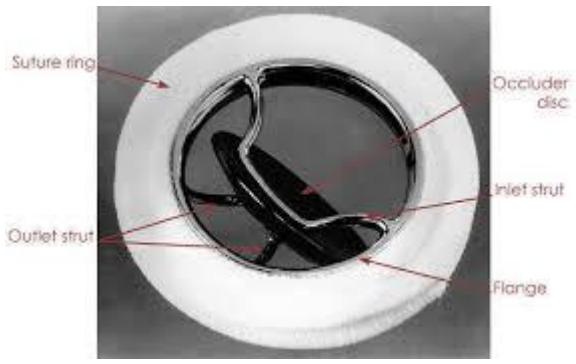

Fig-13

Pneumatic valves are the main regulators of compressed air and gas flow in pneumatic systems. Due to their wide variety, they can perform different complicated and simple tasks in the flow direction control. Each of the valves has its own special design.

3.5.3 Working Procedure of Pneumatic Valve

Although pneumatic machines come in various forms, most valves work the same way. Pressurized air is held in a reservoir or diaphragm. As air is fed into the reservoir through a compressor, it pushes against the walls of the area.

Once the pressure becomes strong enough, it compresses springs beneath the reservoir, pushing the diaphragm down. This, in turn, causes the valve stem to press downwards and close the valve.

When the air is exhausted out of the diaphragm, the springs uncoil and the valve stem moves back up, opening the valve.

In this way, the pressure is controlled and the movement of the machine is fluid.

3.5.4 Advantage of Pneumatic Hand Valve:

Pneumatic valves allow machinists and manufacturers to apply the controlled force necessary to make parts, move items and more.

The right valve has a profound effect on the success of the item it is in. In industrial machines, for example, a faulty valve can greatly impact the machine's speed, accuracy, and fluidity.

For delicate processes, valves provide a level of control that ensures items can be crafted according to specifications.

That same level of control also extends the lifespan of other parts that are continually in motion, propelled by the pneumatic force generated. If workers maintain the machine's other components, such as filters and lubricators, manufacturers can greatly elongate machine life, saving costs.

In addition, valves greatly enhance safety. If something goes wrong, valves can quickly de-pressurize a machine, eliminating safety concerns.

3.6 FOOT AIR PUMP:

This air pump does not require electricity but instead works like a cycle pump. It comes with a rubberized grip and features an analogue dial to indicate the pressure readings.

3.6.1 ADVANTAGE OF FOOT AIR PUMP:

- ✓ **EASY TO USE:** Just step on the lever of the floor pump with gauge to start the flow of air.
- ✓ MULTI-PURPOSE USES: Ideal for cars, motorcycles, electric bicycles, also for sports equipment and inflatables, like bicycles, balls, basketball, footballs, pool toys, etc.
- ✓ **QUICK AND SAFE:** Pumping the vehicle quickly and safely.
- ✓ Small size means it's easy to pack when touring.
- ✓ Maintaining the correct air pressure in motorcycle tires is critical for safety and performance.

- ✓ Motorcycle tires take a beating, as evidenced by their atrocious wear rates. Much of this has to do with the heating and cooling cycles that the tires experience during the ride.
- ✓ Motorcycle tires seem to get much hotter than other vehicle tires, and even a very small difference in air pressure can greatly affect the safety and performance of the tire.
- ✓ It has two air chambers that work to push air into the tire on both the up and the down stroke, so it takes half as many strokes to fill a tire as the single-action variety.
- ✓ The Mini Foot Pump has a rather ingenious design that allows it to be compacted to fit very tightly in its small carrying case.

3.6.2 DISADVANTAGE OF FOOT AIR PUMP:

- ✓ Conventional Foot air pumps have a flow rate that is very limited.
- ✓ Very low efficiency, only 20 to 50% in form of useful air horse power.
- ✓ The suction is limited.

3.6.3 WORKING PROCEDURE OF FOOT AIR PUMP:

pumps which operate using pneumatic power. Foot air pumps are designed for testing and instrument calibration. Attach air chuck into the valve stem/ adapter by lifting the quick connect thumb latch on top of the air chuck. Lock air chuck onto the valve stem/adapter by lowering the quick connect thumb latch back to its original position. Pump the foot pump by stepping on the black foot pad. Do not exceed maximum air pressure.

3.6.4 SPECIFICATION OF FOOT AIR PUMP:

The primary specifications to consider when selecting hand pumps and foot pumps are flowrate, pump head, pressure, and outlet diameter.

3.6.5 MATERIALS:

The base material of a hand pump or foot pump is important to consider, as it affects the type of media that can be handled effectively. System fluids may be abrasive, acidic, caustic, tacky, very hot, very cold, or otherwise hazardous. Base materials such as cast iron, plastic, and stainless steel possess different advantages for handling these various characteristics.

- **Plastics** are inexpensive and provide resistance to corrosion and a broad range of chemicals.
- **Steel and stainless-steel alloys** provide protection against chemical and rust corrosion, and have higher pressure ratings than most plastics.
- **Cast iron** provides strength, durability, and abrasion resistance, with high pressure ratings.

3.6.6 SALIENT FEATURES:

- ✓ All foot pumps are tested fully prior to dispatch likewise smooth working of foot pump, perfect working of pressure gauge, etc.
- ✓ Masko Brand Foot air Pump (Steel body) with 1-meter-long air fill rubber pipe & with extra washer, spring, nozzle bush and special brass adapter (Nipple) for cycle.
- ✓ Also available with Nylon body, in two sizes big and small.

3.6.7 APPLICATIONS:

Foot pumps and Hand pumps may also be called drum pumps, which will require handles, levers, and plungers to begin dispensing the fluid from a pail, drum, or tank. Drum pumps may mount manually or with a clamp. Although the actual foot pumps may be portable and lighter in weight, it may be preferable to keep the pail, drum or barrel stationary due to the properties of the fluid and the pumping environment.

Foot pumps and Hand pumps are portable and field operable where electric drives may not be available. A gauge is often attached to hand pumps to measure pressure. Calibration hand pumps can be sold as a kit or will require calibration instruments, indicators, gages, and other instrumentation.

3.6.8 TECHNICAL SPECIFICATIONS:

TYPE OF FOOT PUMP	**STEEL BODY**	**NYLON BODY**	**NYLON BODY (SMALL SIZE)**
Pump size	350 x 105 x 100mm	325 x 105 x 100 mm	275 x 85 x 95 mm
Pump size (with box)	355 x 115 x 115 mm	355 x 115 x 115mm	280 x 110 x 100mm
Pump weight	2.350 kgs	1.550 Kgs	1.100 kgs.
Cylinder inside dimensions	70 mm Dia – 145 mm long	62 mm Dia – 122 mm long	49 mm Dia – 106 mm long
Max. Stroke length	118 mm	100mm	89 mm
Max. Air volume delivered/stroke	454 cm3	305 cm 3	170 cm 3
Pressure Range	0-10.6 kg./cm2 (0 to 150 Lb. /inch2)	0-10.6 kg./cm2 (0 to 150 Lb./inch2)	0-10 kg/cm2 (0 to 150 lb./inch)
Max. Error in gauge reading	+0.140 kg/cm2 (+2Lb/inch2)	+0.140 kg./cm2) (+2Lcb/inch2)	+0.140 kg./cm2 (+2Lb/inch2)

Table-1

3.6.9 MAINTENANCE:

Periodically inspect the foot pump. Ensure that all parts move freely. Inspect the air hose for cracking and abrasions. Occasionally add a drop of motor oil to the pump piston.

3.6.10 What will happen if the spring of a foot-operated air pump is broken?

It won't be able to come back to its original position and in doing so the pump sucks the air from the environment and that air is then pressurized and pushed forcefully in the tire of where ever you want. These pumps have NRV as in non-returning valves. These valves can take the fluid in but can't allow it to go out. NRV closes because of its own pressure. All this process will not occur and your pump will not be able to collect and pressurize the air.

3.6.11 CLEANING:

Periodically inspect the foot pump for signs of rust or corrosion. If any rust spots are found, sand the affected area and cover with a suitable utility paint. Clean as needed and wipe with an oily cloth.

3.6.12 STORAGE:

When not in use, store with pump piston fully retracted and foot pedal latched. Store indoors, do not expose to moisture or heat radiation.

3.7 PNEUMATIC TUBE

Within industrial plants and facilities that rely on pneumatic equipment, pipes convey air from the compressor to various filters, dryers, and air preparation systems. Once at the machine level, tubing and hoses distribute air to valves, cylinders, pressure regulators, and other pneumatic components. Rather than using rigid pipes, most of today's pneumatic systems rely on flexible tubing and hose. While this may sound simple enough, many material choices are available to make these connections, so it pays to have a basic understanding of the most widely specified tubing and hose materials. What is best for one application is not necessarily the right fit for another.

Fig-14

Keep in mind that tubing is specified using the outside diameter (OD), primarily to ensure compatibility with push-to-connect fittings. Pneumatic tubing is often made of extruded nylon,

polyurethane, polyvinylchloride (PVC), or special materials such as polytetrafluoroethylene (PTFE). Typical tubing ODs for main air supply circuits range from ¼ to ½ in., while control circuits to cylinders and actuators use smaller ODs such as 1/8 to 3/8 in.

On the other hand, hose is specified by inner diameter (ID) and is commonly delivered with fittings already attached at both ends. Hoses tend to be used for more rugged applications and are often moved around factory and shop floors. For this reason, hose sometimes includes a nylon braid for added durability. Depending on the setting, heavy rubber may be used in place of less sturdy polyurethane or other materials. In any case, hoses are built to provide flexibility, strength, and resistance to kinks. Typical hose sizes include IDs of ¼, 3/8, and ½ in. and tend to cost more than tubing.

Let's explore some of the most commonly used tubing and hose materials:

Polyurethane – most widely specified tubing for industrial automation, combining the best features of plastic and rubber. Advantages include strength, flexibility, kink resistance, and chemical resistance including to petroleum-based chemicals. Working pressure is 150 psi or more, high enough for most plant settings. Available in a variety of colors.

PVC – low cost and highly flexible. Wide range of chemical and corrosion resistance, along with excellent wear resistance. Not quite as sturdy as polyurethane, but can be used in food and beverage applications. May be sterilized repeatedly. Can be made in custom sizes, shapes, and colors, but is usually clear.

Nylon and polyethylene – less flexible than PVC and polyurethane, but great for straight piping runs throughout plants or around large machines. Polyethylene was once the most popular tubing choice and is still widely used. It can kink if bent too much, is only rated to 125 psi (depending on size), and has a limited temperature range, but works extremely well in low-pressure applications. Advantages are low cost, light weight, and chemical inertness, making it suitable for food and beverage applications. Nylon is pricier, but features a temperature range to 200°F, working pressure to 800 psi (based on diameter), high chemical resistance, and is strong yet lightweight. Holds up to repeated flexing. Nylon-11 is available as food grade. Comes in a range of colors.

Polypropylene – lightest thermoplastic available. Advantages include superior dimensional stability and electrical properties, chemical resistance, and good surface hardness. Often used in food manufacturing. Resists UV radiation in outdoor settings. May be sterilized above 212°F.

PTFE – specialized material for applications with high temperature, pressure, and chemical resistance requirements. Suitable for temperatures to 500°F and features working pressure to more than 370 psi (based on diameter). Flame retardant, chemically inert, good dielectric properties, and can be used around static electricity.

When thinking about the best choice for your application, keep in mind flexibility, cost, and compatibility between the tubing and fittings that will connect it to the rest of the system.

Compatibility also means considering the environment, including pressure and temperature requirements as well as media such as lubricating oils and washdown fluids that will interact with tubing or hose. Flexibility is crucial for fitting in tight spaces and being able to move along with machine components as needed. Reduced air flow is often the result of kinked tubing that was not specified correctly. A helpful pneumatics industry acronym is STAMP: Remember to consider Size, Temperature, Application, Media, and Pressure when selecting your next tubing or hose material.

3.7.1 APPLICATIONS:

- In postal service
- In public transportation
- Pneumatic elevator
- In money transfer
- In medicine
- Department stores
- Waste disposal
- In production

3.7.2 ADVANTAGE OF PNEUMATIC TUBE:

These systems are gaining importance in verities purpose because of the host of benefits they provide:

- Increase the speed of tasks such as sample delivery to a greater extent.
- Pneumatic tube system saves a lot of space and time.
- Increase the efficiency of the workspace.
- Decrease the maiden turnaround time
- More reliable than traditional approached.

CHAPTER-4

WORKING PRINCIPLE

The working medium adopted is compressed air. The compressed air is transmitted through tubes to pneumatic cylinder where powers converted into reciprocating motion. The reciprocating motion is obtained by using an manual controlled pneumatic hand valve. The input to the hand valve is given through the control unit. The reciprocating motion transmitted to the jack through the piston which moves on the cylinder. The jack is placed under the vehicle chassis, where the vehicle to be lifted. The vehicle can be lifted when the hand valve is switched. The vehicle over the jack gets the reciprocating motion through the piston which is connected to the jack. Thus, using a pneumatic jack, the vehicle can be lifted with ease in operation.

Fig-15

4.1 WORKING PROCESS OF PADEL PRESS PNEUMATIC LIFTING JACK:

To build up a pedal press pneumatic jack at first need some elements which are the major parts of pedal press pneumatic jack. Also need some extra equipment like MS plate, MS pipe, Nut Bolt for solid structure.

At first MS plate shaped as per design then connected MS pipe with MS plate by nut & bolt. The structure attached with the pneumatic cylinder. Attached two push type nipples with pneumatic cylinder and connect two pneumatic tubes with cylinder. The other side of pneumatic tube connected with pneumatic hand valve. Now work to foot air pump. Attached a push type nipple with foot air pump and connect pneumatic tube with push type nipples. The other side of tube attached with pneumatic hand valve input.

Working process of Pedal press Pneumatic lifting jack video link -
https://youtu.be/52ooRreHDC0?si=C-7AC-sLYUVO1ii7

CHAPTER-5

RESULTS AND DISCUSSION

5.1 RESULT:

1) We can lift the weight of 100 kg at 36 psi.
2) The piston rod of the cylinder can rise to a height of 8 inches with the load.
3) Pneumatics working fluid is also widely available and most factories are pre-plumbed for compressed air distribution, hence pneumatic equipment is easier to set-up then hydraulics.
4) To control the system, only ON and OFF toggle switch are used and the system consists only of standard cylinders and other components, making it simpler than hydraulics.
5) The working fluid of the pneumatic system absorbs excessive force, leading to less frequent damage to equipment.
6) In case of excess pressure built-in, a pressure relief valve can be installed to release the excessive pressure when it crosses the required pressure limit.

We have load tested of this project several times. It was giving accurate reading almost every time.

Below are some load test data:

S/L	Air Pressure (psi))	Load (Kg)	Time(s)
1	4 psi	20 kg	4 Sec
2	10 psi	40 kg	12 sec
3	18 psi	60 kg	30 sec
4	28 psi	80 kg	48 sec
5	36 psi	100 kg	60 sec

Table-2

5.2 COSTING:

•There are three elements of any products are:

(1) Material

(2) Labor

(3) Expenses Material:

- Direct material:

  Material which is processed for final product but it is a part of the product is direct material cost is this material is called direct from market.

- In – direct material:

  Material which does not forms part of the final product but it is a must be for processing direct material is called in-direct material e.g. – Cotton waste, oil, etc. Labor:

- Direct labor:

  The worker who actually performed the work on the directly material rather mechanically of by machine is called direct labor.

- In-direct labor:

  It supervised the activity of the direct labor. Expenses:

- Direct Expenses:

  The expenses, which can be directly changed on the particular product, are called expenses.

- In – Direct Expenses:

  The expenses that cannot be directly or confidently changed on particular products are called in-direct expenses.

COST ESTIMATION

S/L	Types of cost	Cost (Taka)
1	Direct Material Cost	10200
2	Direct Labor Cost	900
3	Direct Other Expense	1200
	Total Cost	12300

Table-3

5.3 DISCUSSION:

This is a time efficient project where time can be reduced by costing little money and where no electricity and automation needed. We faced too many challenges while developing this project. First of all, we had no idea about this project. Had no idea about the price of the goods. We came to know about this technology by reading many reviews online due to which we faced many problems while actually working. We had to outsource a lot of work to build the infrastructure of the project which if we could have our own workshop the technology could have been made more beautiful.

Possible Outcomes:

1) From the evolution of Vehicles, the common problem when tire goes flat is changing of tires by lifting the vehicle using Jack and lever and it's a tedious job for any person in that case.

2) Generally, to operate it a person must bent down to squatting position which may lead a back pain. Especially for Senior citizens, female drivers and physically challenged drivers it is an impossible task. The work input on the jack completely depends on the weight of the vehicle that is to be lifted. In this project an inbuilt lifting pneumatic jack is built and placed in the vehicle.

3) Now a day we are using automated hydraulic jack which consists of spring, compressor, pressure gauge, storage, single acting cylinder etc. This lifting jack doesn't require any kind of human effort and can be operated by anyone like children, women, and old people. It does not make a person to bend or to be in squat position to operate.

CHAPTER-6

CONCLUSION

After completing the project, we have come to the conclusion that pneumatic power car lifter can act in the place of hydraulic jacks efficiently. The air required for the operating of the car lifter is easily available in the nature. Cost of the project is not high compared with other jacks. As our car lifter is inbuilt the fatigue is less. If made in the lot the cost could be less. It serves better than pneumatic jacks which is used for lifting. If the materials were available near the project, then the cost of the project could be reduced further.

The project carried out by us made an impressing task in the field of automobile and automobile workshops. It is very usefully for the workers to work in the automobile workshop are in the service station. This project has also reduced the cost involved in the concern. Project has been designed to perform the entire requirement task which has also been provided. The project thus gives a system that can easily fixed the work price & work on it. The pneumatic vice provides extremely high clamping force & High accuracy and repeatability. Pneumatic system can get high production rate. When compressed air is released from the pneumatic components then noise can produce. The operation of pneumatic systems does not produce pollutants.

So, the pneumatic vice can be use easily.

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