



# “DESIGN AND DEVELOPMENT OF AUTOMATIC PNEUMATIC JACK FOR FOUR WHEELER”

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## ABSTRACT

This fabrication is based on pneumatics which deals with the study and application of pressurized air to produce mechanical motion. Pneumatic jack is a fabricated model which when installed in four wheeler, will ease in the problems arising in the conventional operated jack. This fabricated model consists of a small size reciprocating air compressor which is driven by the battery used in four wheeler, an air tank to store the compressed air, and a pneumatic control valve which regulates the air flow and double acting cylinder used as a jack which performs lifting. Thus the car is lifted using jack and the problem related to tyres such as puncture tyres, tyre replacement and wheel balancing can be resolved with less effort and time.

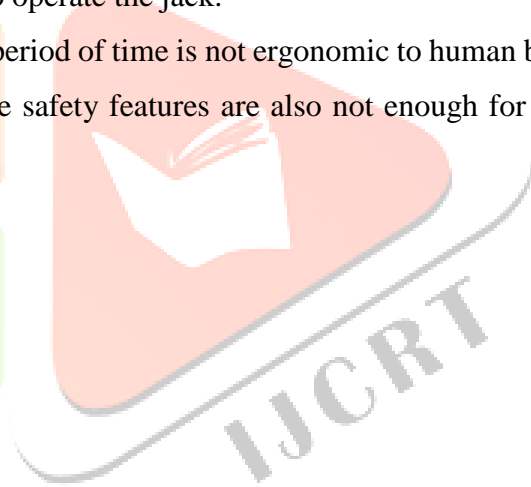
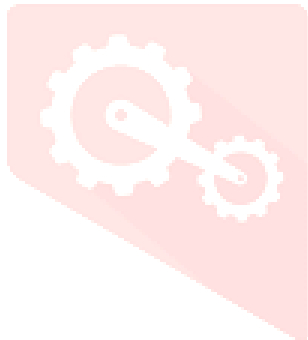
**Keyword:** - Compressor, Valves, conventional operated jack etc...

## 1. INTRODUCTION

Due to the difficulty of operating automobile jacks, various forms of electric jacks have been proffered. With the development of such electric jacks has gradually come an understanding of some of the problems associated therewith. Due to the torque needed to lift something as heavy as most automobiles, as a severe mechanical advantage must be utilized. Jacks that are built into an automobile have not been accepted due to expense and the need to at least lift each side of an auto, if not all corners individually. To reduce the human effort for operating any kind of jack separately. This will most appropriately benefit senior citizens to provide a safe and simple automatic pneumatic jacking system without manual effort. To provide a novel jacking system that can be operated from within the vehicle by means of a valve control. There are certain mechanisms already available for the same purpose which has a definite capacity to lift the car wheels viz.

### 1.1 Problem Statement

- Presently available jacks are difficult to lift for the elderly, women and are especially disadvantageous under adverse weather conditions. These presently available jacks further require the operator to remain in prolonged bent or squatting position to operate the jack.
- Doing work in a bent or squatting position for a period of time is not ergonomic to human body. It will giveback problem in due of time. Moreover, the safety features are also not enough for operator to operate the present jack.



- Present car jack do not have a lock or extra beam to withstand the massive load of the car. This is for the safety precaution in case if the pneumatic break.

## 1.2 Objectives

In order to fulfil the needs of present car jack, some improvement must be made base on the problems statement:

- To design and develop efficient jack system.
- To minimize human effort.

## 1.3 Scopes

- The developed automatic car jack must be operated on a flat surface.
- The developed jack car is only a prototype and not readily functioning as commercial product.
- The developed automatic car jack can only withstand below.
- The design is based on current pneumatic jack & cars in the market

## 2. WORKING

The working medium adopted is compressed air. The compressed air is transmitted through tubes to pneumatic cylinder where power is 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. Thus using a pneumatic jack the vehicle can be lifted with ease in operation.

- Power can be easily transmission.
- Less loss in transmission
- A single compressor can supply power to many pneumatic Jacky.
- Low cost.
- Easy to work and reduces the manual stress.

### 3. FABRICATION PROCESS

In order to mount a pneumatic jack an additional frame mounting is imperative as frame is the support structure for the jack. Frame mounting is the first step in manufacturing of the pneumatic jack . Steel tubes are used as the frame structure, they are joined by welding .One end of the frame is to the front end of the vehicle and other end is rear. The frame is connected to wheel by spot welding. However certain considerations are made so the geometry of the frame does not hinder the riding comfort of the driver.

#### 3.1 FRAME-

It is used for support for the setup. Sheet metal is used for the chassis.



Fig 3.1 . Frame

### 3.2 Wheel-

It is used for the moving of prototype. The layout of wheel are used for rubber wheel.



**Fig no 3.2:** Rubber wheel

### 3.3 CYLINDER

The piston is a cylindrical member of certain length which reciprocates inside the cylinder.



**Fig 3.1.4:** pneumatic cylinder

### 4. IMPLIFICATION FOR FINAL DESIGN



**Fig no 4.1:** fabricated model

### 5. RESULT

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 than hydraulics. To control the system, only ON and OFF are used and the system consists only of standard cylinders and other components, making it simpler than hydraulics. The working fluid of the pneumatic system absorbs excessive force, leading to less

frequent damage to equipment. We can lift the weight of 25 kg at pressure of 2bar.

## 6. CONCLUSIONS

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

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