

# Design and Development of Automatic Pneumatic Hand Breaking and Releasing System

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**Abstract:-** Hand brake is one of the most important component in vehicles. Conventional handbrake system works using a ratchet locking mechanism that will keep it engaged until a release button is pressed. Driver error can lead to accidents in which handbrake is not engaged. To overcome this, an Automatic Hand Brake engaging and disengaging system is proposed. The hand brake engagement and disengagement is done using a combination of rack & pinion arrangement and Solenoid Valve controller. An automatic brake system for a vehicle consists of an electric motor, related to the motor for transmission motion from the motor to a brake lever that pushes the restraint. This project provides a brand new idea style of the pneumatic parking brakes system that has straightforward and cheap characteristics. This project deals with coming up with and fabrication of pneumatic breaking system.

## INTRODUCTION

In cars the hand brake is a latching brake usually used to keep the car stationary. automobiles e-brakes usually consist of a cable directly connected to a brake mechanism on one end and to some type of mechanism that can be actuated by the driver on the other end. The mechanisms is often a hand-operated lever, on the floor on either side of the driver, a pull handle located below and near the steering wheel column, or a pedal located far apart from the other pedals. Although sometimes known as an emergency brake, using it in any emergency where the footbrake is still operational is likely to badly upset the brake balance of the car and increase the likelihood of loss of control of a vehicle for example by initiating the rear wheel skid. Additionally, the stopping force provided using the hand brake or in addition to the footbrake is usually small and would not significantly aid in stopping the vehicle, again because it usually operates on rear wheel while braking. The emergency brake is instead intended for use in case of mechanical failure where the regular footbrake is inoperable or compromised, hopefully with opportunity to apply the brake in a controlled manner to bring the vehicle to a safe stop. If gentle half before seeking service assistance. The most common use for an automobile emergency brake is to keep the vehicle motionless when it is parked, thus the alternative name, parking brake. Car emergency brake have a ratchet locking mechanism that will keep them engaged until a release button is pressed.

## DEATH RATE DUE TO ACCIDENT:

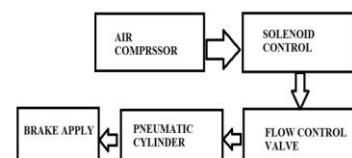
Road traffic injuries and deaths are a growing public health concern worldwide (Agnithotri, 2006). Studies have shown that road traffic injuries are a major cause of death and disability globally, with a disproportionate number occurring in developing countries (Banthia, et al 2006). Road crashes are the second leading cause of death globally among young people (WHO, 2004). The annual costs of road traffic crashes in low income and middle-income countries are estimated to be between US\$65-100 billion, more than the total annual amount received in development aid (UNGA, 2008).

## NEED OF NEW SYSTEM:

We have pleasure in introducing our new project "HAND BREAKING AND RELEASING SYSTEM", which is fully equipped by Pneumatic braking circuit. It is a genuine project which is fully equipped and designed for Automobile vehicles. This forms an integral part of best quality. This product underwent strenuous test in our Automobile vehicles and it is good. The HAND BREAKING AND RELEASING SYSTEM is a fully automation project.

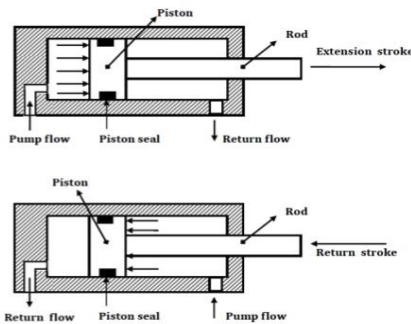
## EXPERIMENTAL SETUP:

1. Pneumatic cylinder
2. Pneumatic Solenoid
3. Bearing
4. Gear



## WORKING PRINCIPLE:

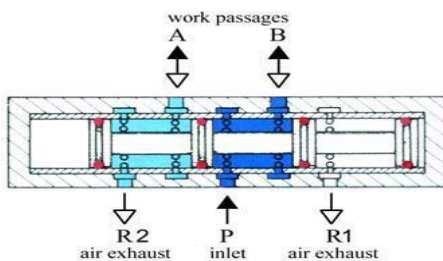
**DOUBLE-ACTING CYLINDERS:**



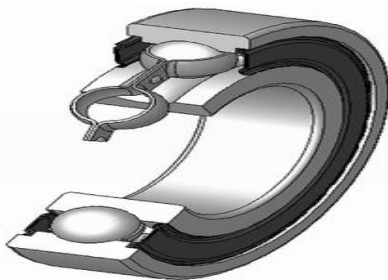
Many hydraulic and pneumatic cylinders use them where it is needed to produce a force in both directions. A double-acting hydraulic cylinder has a port at each end, supplied with hydraulic fluid for both the retraction and extension of the piston. A double-acting cylinder is used where an external force is not available to retract the piston or it can be used where high force is required in both directions of travel.

**SOLENOID VALVE:**

Pneumatic solenoid valves are used to control the flow direction of compressed air. A moving part inside the valve blocks or opens the ports of the valve. The moving part is called spool or piston. The movement of the spool can be controlled in two ways: direct operation, or indirect operation. With direct operation, the spool is directly actuated by the solenoid. Direct operated valves are independent on the system pressure, and can therefore be used for low pressures or vacuum.



**BEARING :**



A bearing is a type of rolling element bearing that uses ball to maintain the separation between the moving parts of bearing – the inner and outer part of bearing . The purpose

of ball bearing is reduce rotational friction and support radial and axial loads . low friction torque they are suitable for high speed



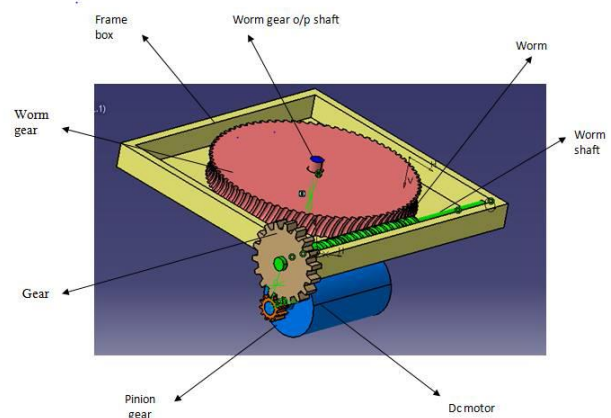
**SPUR GEAR**

A gear or cogwheel machine part having cut teeth which mesh with another tooothed part to transmit torque This project the gear used to power transmit and breaking and it connecting the shaft

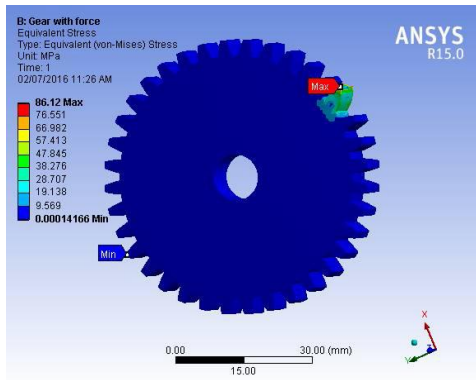
**DESIGN CALCULATION:**

- Ferrous materials
- MILD STEEL
- EN-4 TO EN-6
- [1]Carbon- 0.15% to 0.35%
- [2]Tensile strength-1200/1420 MPA
- [3]Yield strength-750/1170 MPA
- 40C8
- [1]Vehiclebon-0.25% to 0.35%
- [2]Tensile strength-620 MPA
- [3]Yield strength-400 MPA

**FEA MODEL:**



**MODEL OF COMPLETE ASSEMBLY OF NEW PARKING BRAKE DESIGNED SYSTEM**



Equivalent stress = 86.21 N/mm<sup>2</sup>

ALLOWABLE STATIC STRESS  $\Sigma \square = 153.33 \text{ N/MM}^2$



**HAND BREAKING AND RELEASING SYSTEM**

**CONCLUSION AND RESULT:**

- Hand breaking and releasing system is the braking system of future. The interdisciplinary interaction of mechanic and electronics provides its greatest benefits – sensors, valves and pneumatic cylinder work together and allow totally novel, highly dynamic brake.
- The Hand breaking and releasing system is useful in avoiding the damage and accidents occurs during the parking of vehicle in parking side specially when driver parking a vehicle from rear side

**APPLICATIONS OF SYSTEM:**

- As there is major problem happens during the parking of vehicle that vehicle damage or critical accidents.

So this system is applicable in modern as well as regular vehicle as the parking system.

- This system is also applicable in automobile industry, as advanced breaking system.

**FUTURE SCOPE OF SYSTEM:**

- ❖ The regular demands and requirements of human beings are increases for comfort and safe driving.
- ❖ Most of time it seems that the problem is creates during parking of vehicle.
- ❖ Driver unable to judge the actual and approximate distance at such time which results into damage of vehicle or serious accidents.
- ❖ Thus this advance system in breaking will open up new concept to automobile industry. There is no recent research on parking problems so this system will helpful to over come from such problems.

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