IARJSET

ISSN (Online) 2393-8021
ISSN (Print) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Vol. 8, Issue 3, March 2021

DOI: 10.17148/IARJSET.2021.8337

DESIGN AND FABRICATION OF EMERGENCY BRAKING SYSTEM

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Abstract: In Automobile vehicles braking system is an important safety feature. This Braking system is used in automobile field to stop vehicle in time to avoid collision with other vehicles. Even though there is a chance of failure of these brakes. Mostly brake failure occurs in heavy duty vehicles such as Lorries, Trucks and Buses which travel a long distance. This Brake failure may lead to accident. Then in other way, if driver attain unconsciousness due to health issues such as Cardiac arrest or fix, he may not able to apply Brakes. His unconsciousness may lead to an accident. At this condition the passenger's lives that travel in that vehicle is at risk. If the vehicle collides with an upcoming vehicle, the passenger in opposite vehicle is also in risk. To avoid these types of situations, we have introduced an emergency braking system. This emergency braking system can be actuated in emergency cases to avoid accident and Safeguard passenger's life.

INTRODUCTION

According to a finding by Malaysian Institute of Road Safety Research (MIROS), frontal collisions are the most frequent type of accidents in Malaysia. In addition, Breuer et al. in their work mentioned that among the main factors of the road accidents are due to the late and untimely driver's braking intervention as well as insufficient amount of braking torques yielded in the emergency scenarios. The European New Car Assessment Programme (Euro NCAP) has identified that the late braking intervention is due to the driver inattentiveness and human error. As a car safety equipment braking system is implemented. It is a Special safety Features have been built into cars and heavy-duty vehicles.

Most commonly all vehicles are using braking as a safety system to stop the vehicle. In some emergency cases like brakes failure or else by driver's health issue he may not able to apply brake by leg for a while. So this may lead to accident, in that time, driver can actuate the emergency braking system. In order to avoid all such disadvantages, this emergency braking system has been designed in such a way that it can be used to brake the vehicle very smoothly without any impact force. This control unit is fitted in the steering wheel. The operations are made be simple that even any person can handle, by just pressing the button.

WORKING PRINCIPLE

The push button is fixed near the driving person in steering wheel to operate easily in emergency situations. The air tank contains the compressed air which is already filled with the help of Air compressor. The switch is turned ON at the time of emergency, the solenoid valve will be activated via microcontroller when the driver pushes the push button. Microcontroller will pass the electrical signal to the Solenoid valve to open the stem to pass compressed air to the Single acting pneumatic cylinder. The compressed air flow from the air tank to the Single acting pneumatic cylinder through solenoid valve to retract the Cylinder rod. Then the braking liver is actuated, due to this process the brake shoes comes to contact with the Brake drum and friction is generated. Here the Velocity energy is converted into Heat energy and that heat energy is dissipated into the atmosphere. So that the vehicle gets brake applied and came to stop.

BRAKING SYSTEM

Brakes are one of the most important control components of vehicle. They are required to slow down or stop the vehicle within the shortest possible distance and this is done by converting the kinetic energy of the vehicle into the heat energy which is dissipated into the atmosphere.

TYPES OF BRAKING SYSTEM

There are two types of braking system, they are

- Drum Brake
- Disc Brake

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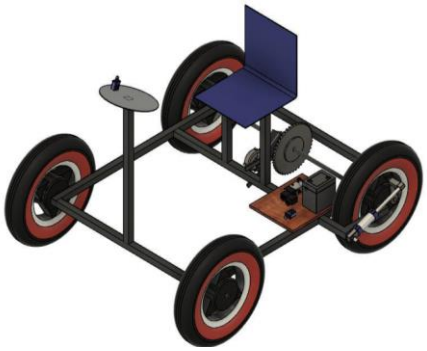
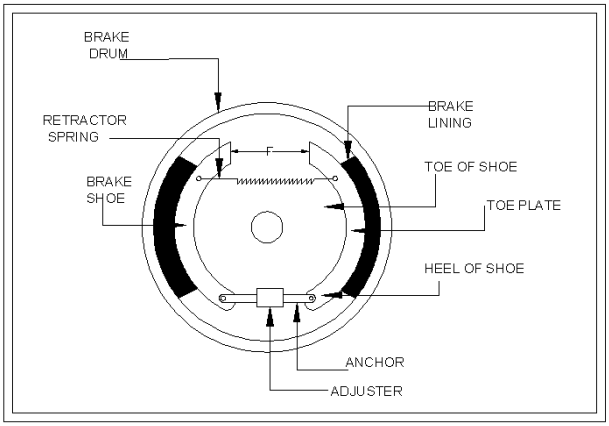


Drum Brake

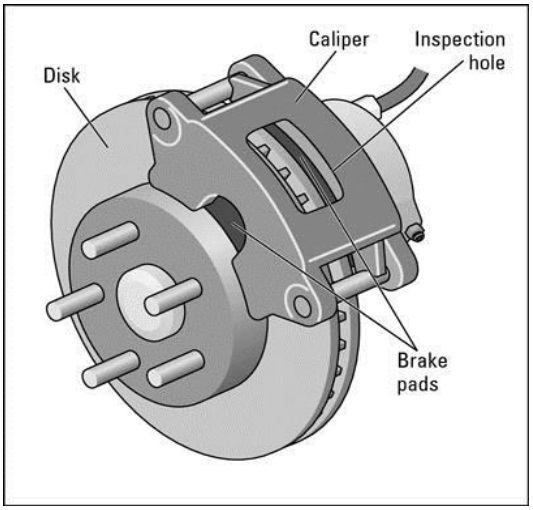
A drum brake is a brake that uses friction caused by a set of shoes or pads that press outward against a rotating cylinder - shaped part called a brake drum.The term drum brake usually means a brake in which shoes press on the inner surface of the drum.



Drum Brake

Disc Brake

A disc brake is a type of brake that uses the calipers to squeeze pairs of pads against a disc or a rotor to create friction. This action slows the rotation of a shaft, such as a vehicle axle, either to reduce its rotational speed or to hold it stationary.



Disc Brake

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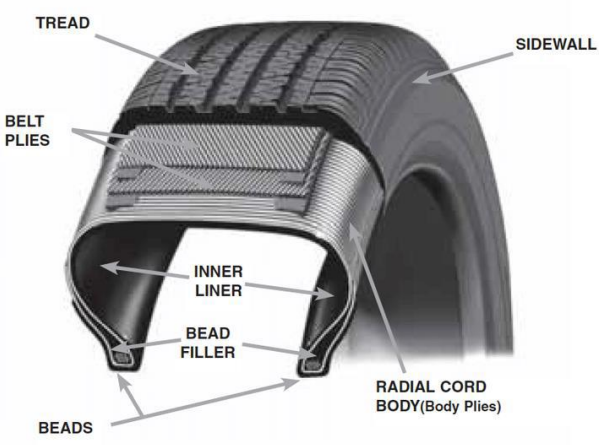
WHEEL

A Wheel is a circular device that is capable of rotating on its axis, facilitating movement or transportation. A wheel together with an axle overcomes friction by facilitating motion by rolling. In order for wheels to rotate a moment needs to be applied to the wheel about its axis, either by way of gravity or by application of another external force.



Wheel

Dimensions of Emergency Braking System

Technical Specification of Emergency Braking System
Overall length 1160 mm
Overall width 1000 mm
Overall height 850 mm
Overall weight 26.5 kg
Frame Size 930 x 720 mm
Frame thickness 25 x 25 x 2 mm
Wheel Dimension 400 x 90 mm
Tank Capacity 6 x 106 mm
DC Motor Capacity 12V, 1.5A, 45 rpm
Battery capacity 12V
Pressure Gauge Capacity Max 150psi
Pneumatic Cylinder
Single Acting Cylinder
Solenoid Valve
5/2 DCV
Switch
Push button Switch

SINGLE ACTING PNEUMATIC CYLINDER

A single acting pneumatic cylinder is a linear actuator and realizes a working stroke by filling the cylinder with compressed air. The return stroke is usually accomplished by a spring. The cylinder has one connection port that is used either to fill or vent the cylinder.

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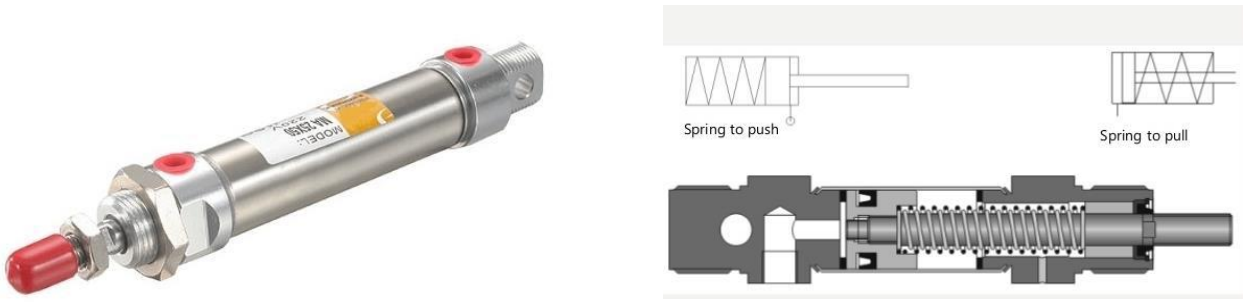

Single Acting Cylinder

A pneumatic cylinder is a linear actuator that works with compressed air. The cylinder's main parts are the piston, the piston rod, the cylinder tube, gaskets and seals. Single acting cylinders also have a spring inside the cylinder. A single acting cylinder works with compressed air to actuate the piston in one direction and spring force to return to the base position. Work can be performed in the air driven direction. The cylinder has one port that is used to both supply and vent compressed air.

Two types of single acting cylinders exist: spring return and spring extended. The most common type is the spring return cylinder. In the spring return cylinder, the spring is located between the front end of the cylinder and the piston (around the piston rod). In this design, the piston rod extends when compressed air is supplied to the cylinder.

CONCLUSION

The project carried out by us will make an impressing mark in the field of automobile. It is very usefully for drivers to drive the vehicle without tension. This project has also reduced the cost involved in the concern. The project has been designed to perform the required task taking minimum time. It has major chances to have built in modern vehicles in future.

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