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Automatic Pneumatic Bumper and Brake Actuation Before Collision

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I. INTRODUCTION

An automobile's **bumper** is the front-most or rear-most part, ostensibly designed to allow the car to sustain an impact without damage to the vehicle's safety systems. They are not capable of reducing injury to vehicle occupants in high-speed impacts, but are increasingly being designed to mitigate injury to pedestrians struck by cars.

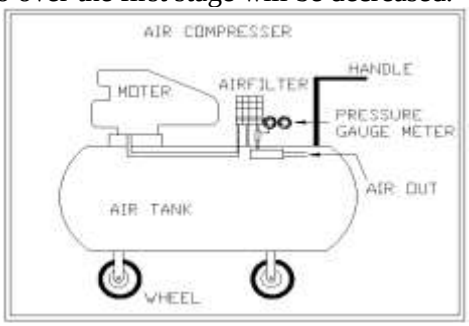
MAIN COMPONENTS

1.PNEUMATICS

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 for some considerable time between used for carrying out the simplest 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.

II. COMPRESSOR

Compressor is the air producing machine. They collect the airs from the atmosphere are in the running of machine are engine. Air compressors are utilized to raise the pressure of a volume of air. Air compressors are available in many configurations and will operate over a very wide range of flow rates and pressures. Compressed air was expelled by primitive man to give glowing embers sufficient oxygen to allow them to flare up into a fire. During the compression process, the temperature increases as the pressure increases. This is known as polytypic compression. The amount of compression power also increases as the temperature increases. Compressors are staged thereby reducing the temperature rise and improving the compression efficiency. The temperature of the air leaving each stage is cooled prior to entering the next stage. This cooling process is called intercooling. Volumetric efficiency also increases with multi-stage compression since the pressure ratio over the first stage will be decreased.



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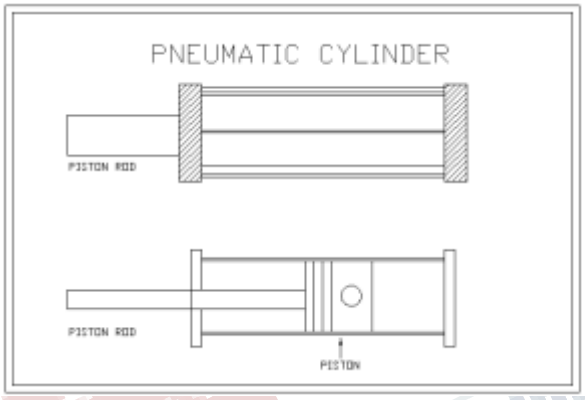
III. PNEUMATIC CYLINDER

An air cylinder is an operative device in which the state input energy of compressed air i.e.penuamtic power is converted into mechanical Output power, by reducing the pressure of the air to that of the atmosphere.Single acting cylinder is only capable of performing an operating medium in only one direction. Single acting cylinders equipped with one inlet for the operating air pressure, can be production in several fundamentally different designs. Single cylinders Develop power in one direction only.Therefore no heavy control equipment should be attached to them, which requires to be moved on the piston return stroke single action cylinder requires only about half the air volume consumed by a double acting for one operating cycle.



IV. SOLENOID VALVE

A solenoid valve is an electromechanicalvalve for use with liquid or gas controlled by running or stopping an electrical current through a solenoid, which is a coil of wire, thus changing the state of the valve. The operation of a solenoid valve is similar to that of a light switch, but typically controls the flow of air or water, whereas a light switch typically controls the flow of electricity. Solenoid valves may have two or more ports: in the case of a two-port valve the flow is switched on or off; in the case of a three-port valve, the outflow is switched between the two outlet ports. Multiple solenoid valves can be placed together on a manifold

V. ULTRASONIC SENSOR

Ultrasonic sensors (also known as tranceivers when they both send and receive) work on a principle similar to radar or sonar which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object.

This technology can be used for measuring: wind speed and direction (anemometer), fullness of a tank and speed through air or water. For measuring speed or direction a device uses multiple detectors and calculates the speed from the relative distances to particulates in the air or water.

To measure the amount of liquid in a tank, the sensor measures the distance to the surface of the fluid. Further applications include: humidifiers, sonar, medical ultrasonography, burglar alarms and non-destructive testing.Systems typically use a transducer which generates sound waves in the ultrasonic range, above 20,000 hertz, by turning electrical energy into sound, then upon receiving the echo turn the sound waves into electrical energy which can be measured and displayed.

The technology is limited by the shapes of surfaces and the density or consistency of the material. For example foam on the surface of a fluid in a tank could distort a reading.An ultrasonic transmitter-receiver is characterized in that a diaphragm is disposed at the center of a laminated piezo-electric element and the periphery of the diaphragm is flexibly fixed in a housing

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through a buffer member of elastic rubber or the like in order to suppress mechanical oscillation.A directional ultrasonic vibrator has at least one resonant reed, at least one ultrasonic transducer secured to the

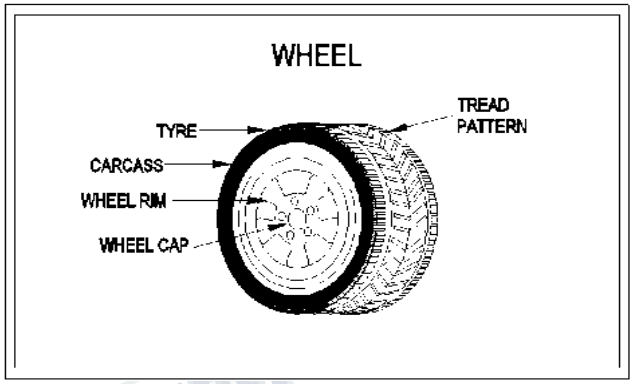
reed for producing bending moments in the reed along its longitudinal axis, all adapted to perform an operation selected from the group consisting of transmission and reception by the transducer in response to an input electrical signal applied thereto predetermined dimensions and material being employed to permit resonant longitudinal bending vibrations in the reed at a predetermined frequency of said input electrical signal. The parameters are selected with respect to the material and medium in which it is immersed.

VI. WHEEL

A wheel is a circular device that is capable of rotating on its axis, facilitating movement or transportation or performing labour in machines. 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. Common examples are found in transport applications. More generally the term is also used for other circular objects that rotate or turn, such as a Ship's wheel and flywheel. The wheel most likely originated in ancient

The wheel is a device that enables efficient movement of an object across a surface where there is a force pressing the object to the surface. Common examples are a cart drawn by a horse, and the rollers on an aircraft flap mechanism.The wheel is not a machine, and should not be confused with the wheel and axle, one of the simple machines. A driven wheel is a

special case, that is a wheel and axle. Wheels are used in conjunction with axles, either the wheel turns on the axle or the axle turns in the object body. The mechanics are the same in either case. The normal force at the sliding interface is the same. The sliding distance is reduced for a given distance of travel. The coefficient of friction at the interface is usually lower.



WORKING PRINCIPLE

In this project we are using ultrasonic sensor for detecting the objects or vehicles in front of our vehicle. It also measures the distance between our vehicle and opposite object or vehicle. It consists of ultrasonic transmitter and receiver. The transmitter always transmits the waves the receiver receives the reflected wave and converts it in to digital pulse. The ultrasonic sensor sends a high-low pulse to the controller. The pulse time will vary depends on the closeness between the sensor and the object. Using this pulse timing the controller measures the distance. When the distance becomes low, the controller will switch ON the solenoid valve. Then the solenoid valve allows the air to both pneumatic cylinder, Due to this the piston moves forward stroke and actuate the bumper and braking

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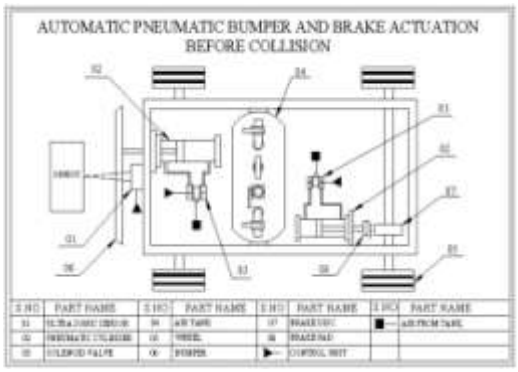
system. Before applying braking, the controller will display the alert in the LCD display.

DRAWING



MERITS & DEMERITS

MERITS

- Compatible size
- Low cost
- Reduce the security tensions
- Maintenance is easy
- Power can be easily transmitted

DEMERITS

- Need separate tank for air storage
- Operation is noisy

APPLICATIONS

- Applicable in all automobiles and very useful for learners.
- It is applicable in all types of four wheelers.

FACTORS DETERMINING THE CHOICE OF MATERIALS

The various factors which determine the choice of material are discussed below.

1. PROPERTIES

The material selected must posses the necessary properties for the proposed application. The various requirements to be satisfied.Itan be weight, surface finish, rigidity, ability to withstand environmental attack from chemicals, service life, reliability etc.The following four types of principle properties of materials decisively affect their selection

- Physical
- Mechanical
- From manufacturing point of view
- Chemical

The various physical properties concerned are melting point, thermal Conductivity, specific heat, coefficient of thermal expansion, specific gravity, electrical conductivity, magnetic purposes etc.The various Mechanical properties Concerned are strength in tensile,Compressive shear, bending, torsion and buckling load, fatigue resistance, impact resistance, elastic limit, endurance limit, and modulus of elasticity, hardness, wear resistance and sliding properties.

The various properties concerned from the manufacturing point of view are,

- Cast ability
- Weld ability
- Surface properties
- Shrinkage
- Deep drawing etc.

2. MANUFACTURING CASE

Sometimes the demand for lowest possible manufacturing cost or surface qualities obtainable by the application of suitable coating substances may demand the use of special materials.

3. QUALITY REQUIRED

This generally affects the manufacturing process and ultimately the material. For example, it would never be desirable to go casting of a less number of components which can be fabricated much more economically by welding or hand forging the steel.

4. AVAILABILITY OF MATERIAL

Some materials may be scarce or in short supply, it then becomes obligatory for the designer to use some other material which though may not be a perfect substitute for the material designed. The delivery

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of materials and the delivery date of product should also be kept in mind.

5. SPACE CONSIDERATION

Sometimes high strength materials have to be selected because the forces involved are high and space limitations are there.

TO SOLVE THE PROBLEM

VII. CONCLUSION

This project is made with pre planning, that it provides flexibility in operation. This innovation has made the more desirable and economical. This project "AUTOMATIC PNEUMATIC BUMPER AND BRAKE ACTUATION BEFORE COLLISION" is designed with the hope that it is very much economical and help full to hospitals and nursing homes.This project helped us to know the periodic steps in completing a project work. Thus we have completed the project successfully.