National Conference on Information, Communication and Energy Systems and Technologies - 2019
© 2019 IJSRSET | Volume 5 | Issue 7 | Print ISSN : 2395-1990 | Online ISSN : 2394-4099

Pneumatic Speed Breaker with Day and Night Control

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ABSTRACT

On roads, speed breakers provided to control the speed of traffic in rushed areas. The potential energy in terms of weight of vehicle is loss on speed breaker can be utilized for useful purposes. This paper describes the potential energy of such type of energy available on roads and its utilization for useful work. The stages of development of a speed breaker device are described and the mechanism to generate electricity using rack, pinion and speed increasing gear box and generator and store compressed air with the help of piston cylinder compressor arrangement. Whenever the vehicle is allowed to pass over the speed breaker dome, it gets pressed downwards. As the springs are attached to the dome, they get compressed and the rack, which is attached to the bottom of the dome, moves down in reciprocating motion

Keywords- Speed Breaker, Rack &Pinion, Gear, Air Compressor, Generator.

I. INTRODUCTION

On road vehicles waste a tremendous amount of energy on speed breakers, where there is a necessity to provided speed breaker to control the speed of the vehicles. The annual rate of growth of motor vehicle population in India has been almost 20 percent during the last decade. There is tremendous vehicular growth in year by year. The increasing traffic and number speed breakers on roads motivate to manufacture an innovative device which can channelize the energy of vehicles that is wasted on speed breakers to some useful work. In this practical manufacturing processes and steps of speed breaker device for generation of compressed are described which can be used to generate compresses air on highways in remote areas. The reciprocating air compressors are used for pressurized air generation taking advantage of design simplicity and also these are the most common type of compressors found in various applications. This paper based on the principle of reciprocating air compressor in which compressor compresses the air by reducing the volume of air that has been isolated. we put our machine underground of road exactly below speed barker, the head of piston rod is bring up to level of road surface. When vehicles move on rack it will be pushed down. The piston is reciprocating in the cylinder. The piston and cylinder arrangement convert reciprocating motion in to air compression. The second part is specially planned to design and fabricate the conversion unit for utilizing the available unconventional energy source. That is tremendously available energy in low intensity with ample quantity can be utilized. This machine converts reciprocating motion in to rotary motion. The rotational power is converted into the electrical energy by using speed increasing gear box and generator that generate electricity. And this generated electricity is used in various applications.

II. LITERATURE SURVEY

PNUEMATIC SPEED BREAKER WITH DAY AND NIGHT CONTROL

S.Vigneswari1, V.Vinodhini (2014), "Compressed Air Production Using Vehicle Suspension" in this paper Nonconventional energy system is very essential at this time to our nation. Compressed air Production using vehicle suspensor needs no fuel input power to produce the output of the air. For this project the conversion of the force energy in to air. The control mechanism carries the air cylinder (vehicle suspensor), quick exhaust valve, and Nonreturn valve and spring arrangement. We have discussed the various applications and further extension also. The initial cost of this arrangement is high.

III. PROBLEM STATEMENT

- Design and develop a prototype model of showing the concept of PNEUMATIC SPEED BREAKER WITH DAY NIGHT CONTROLLER which will show the working of application of brakes speed breaker while driving on speed breaker.
- Also fabricate the model of the same which will show the working desired by emergency braking on slopes in hill station roads.

IV. GOALS & OBJECTIVES

- To Design and develop a prototype model of showing the concept of Pneumatic speed Breaker with day night controller while driving on speed breaker.
- To fabricate the model of the same which will show the working desired by emergency braking on slopes in hill station roads.
- To provide safety options while driving in speed breaker.
- To test the model under different conditions of speed.

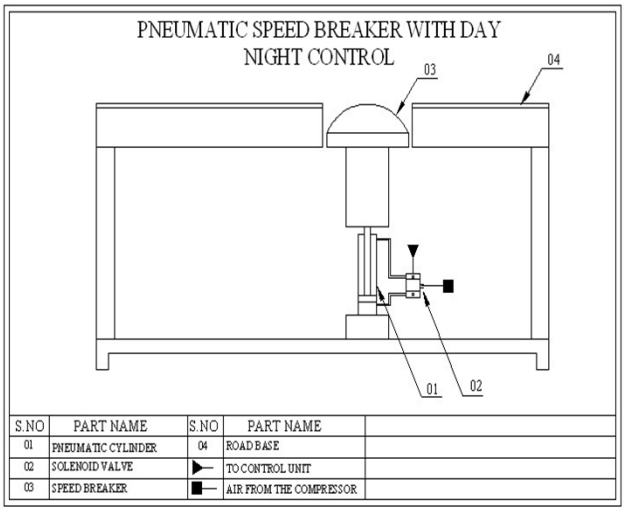
V. PROPOSED SYSTEM

Our project automatic speed breaker is a new concept in this field and its innovative too. The device mainly consists of a speed breaker which is operated with the help of electric power. This system is mainly employed in the areas where the need of speed breaker is restricted to certain specific timings in areas like school and collage roads, theatre roads etc. and during the other hours the inconvenience of the speed breaker can be removed by folding down the speed breaker below the road surface. Hence they seem to be more effective in against over speeding and helps in traffic management.

We know that the number of automobiles, especially in cities is increasing at a tremendous rate so as the number of accidents due to over speeding. We consider this topic for not only with the academic interest but also we take it as our moral and social responsibility to reduce accidents with effective traffic management. Mostly the speed breakers are employed near sensitive and highly crowded areas like near schools and colleges, theater roads, shopping malls etc which will be crowded with vehicles too. So continuous employment of ordinary speed breakers creates much traffic block . but in such areas the use of speed breakers is needed only for few peak hours .So this project can be effective and useful in such areas.

This system is employed in countries like Germany, Austria, Swedenetc and was found very effective there. Researches are in progress by various agencies of government for the practical application of automated speed breaker in India. Modifications in the automated speed breaker can be used by police and other security agencies as they can be used as a big hindrance on the road against the motion of vehicles in the cases of emergency situations. Researches are also in progress to substitute the

electrical power from battery or other electric sources with renewable form of energies like solar energy, wind energy etc.



S.NO	PART NAME	S.NO	PART NAME
01	PNEUMATIC CYLINDER	04	ROAD BASE
02	SOLENOID VALVE	▶	TO CONTROL UNIT
03	SPEED BREAKER	■	AIR FROM THE COMPRESSOR

VI. SYSTEM ARCHITECTURE

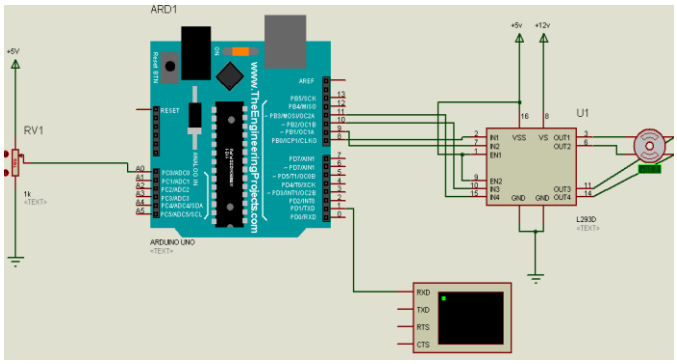


Fig.2 Architecture Diagram

DESIGN

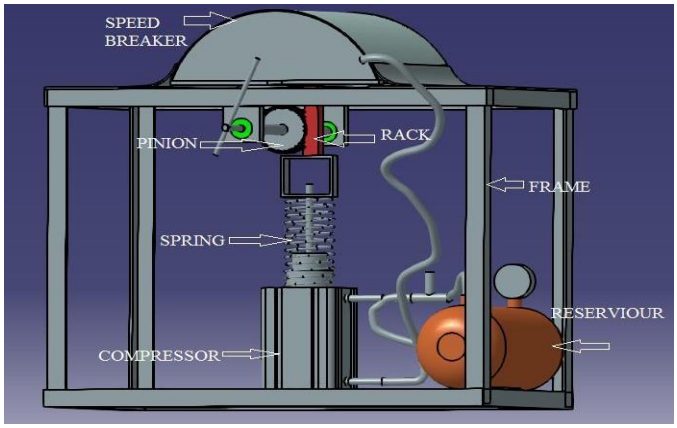


Fig. 3 Cad design

3.1 REQUIREMENTS SOFTWARE AND HARDWARE:

Hardware Requirements Specification:

- speed breaker
- rack and pinion
- spring
- frame
- compressor
- Pneumatic cylinder

Software Requirements Specification:

- Arduino Ide

3.2 HARDWARE REQUIREMENT

A. BASE FRAME

L Channel- MS Angles are L-shaped structural steel represented by dimension of sides & thickness. For e.g. 25x25x3 means, both the sides of angles are 25 mm & thickness is of 3 mm. There are various sizes of angles which are as follows :-(there are also equal & unequal angles). Equal angles: - They are angles having both the sides of equal dimensions.

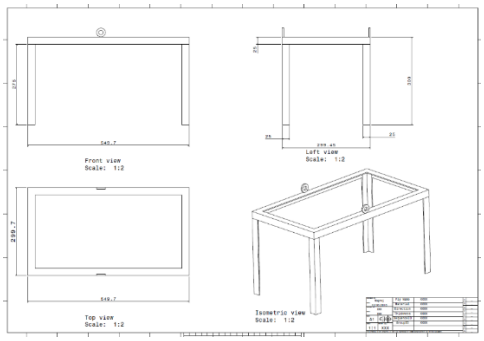


Fig. 4 Base Frame

B. LCD DISPLAY

LCD stands for Liquid Crystal Display. LCD is finding wide spread use replacing LEDs (seven segment LEDs or other multi segment LEDs) because of the following reasons:

1. The declining prices of LCDs.

2. The ability to display numbers, characters and graphics. This is in contrast to LEDs, which are limited to numbers and a few characters.
3. Incorporation of a refreshing controller into the LCD, thereby relieving the CPU of the task of refreshing the LCD. In contrast, the LED must be refreshed by the CPU to keep displaying the data.
4. Ease of programming for characters and graphics.

These components are "specialized" for being used with the microcontrollers, which means that they cannot be activated by standard IC circuits. They are used for writing different messages on a miniature LCD.

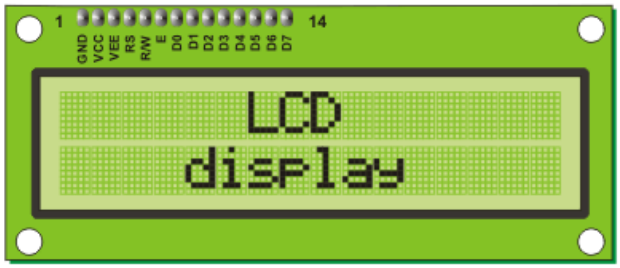


Fig.5 LCD Display

MANUFACTURING AND SELECTION OF MATERIAL

The proper selection of material for the different part of a machine is the main objective in the fabrication of machine. For a design engineer it is must that he be familiar with the effect which the manufacturing process and heat treatment have on the properties of materials. The choice of material for engineering purpose depends upon the following factors.

1. Availability of the materials.
2. Suitability of materials for the working condition in service.
3. The cost of materials.
4. Physical and chemical properties of material.
5. Mechanical properties of material.

The mechanical properties of the metals are those, which are associated with the ability of the material to resist mechanical forces and load. We shall now discuss these prosperities as follows. Required properties for the selection of material are Strength, stress, stiffness, elasticity, plasticity, ductility, brittleness, toughness, resilience, creep, hardness. The science of the metal is a specialized and although it overflows in to realms of knowledge it tends to shut away from the general reader. The knowledge of material and their properties is of great significance for a design engineer. The machine elements should be a material which has properties suitable for the conditions of operations. In addition to this a design engineer must be familiar with the manufacturing processes and the heat treatments have on the properties of the materials. In designing the various part of the machine it is necessary to know how the material will function in service. For this certain characteristics or mechanical properties mostly used in mechanical engineering practice are commonly determined from standard tensile tests. In engineering practice, the machine parts are subjected to various forces which may be due to either one or more of the following.

1. Energy transmitted
2. Weight of machine
3. Frictional resistance
4. Inertia of reciprocating parts
5. Change of temperature
6. Lack of balance of moving parts

The selection of the materials depends upon the various types of stresses that are set up during operation. The material selected should with stand it. Another criterion for selection of metal depends upon the type of load because a machine part resist load more easily than a live load and live more easily than a shock load. Selection of the material depends upon factor of safety which in turn depends upon the following factors.

1. Reliabilities of properties.
2. Reliability of applied load.
3. The certainly as to exact mode of failure.
4. The extent of simplifying assumptions.
5. The extent of localized.
6. The extent of initial stresses set up during manufacturing.
7. The extent loss of life if failure occurs.
8. The extent of loss of property if failure occurs.
9. Materials selected in machine.

3.3 APPLICATIONS AND ADVANTAGES

APPLICATIONS

Our project has wide range of applications like:

- All Road ways.

ADVANTAGES

- Easy for maintenance.
- Non polluting energy sources.
- Multipurpose.

VII. CONCLUSION AND FUTURE WORK

- The bearings can be replaced with more durable plumber bearings reducing the chance of failure.
- The material of the rollers can be made lighter so as to increase the efficiency. The mild steel used in this model can be replaced by aluminium alloy 6063 or 6061.
- Such speed breakers can be designed for heavy vehicles.
- More suitable and compact mechanisms to enhance efficiency.

VIII. ACKNOWLEDGMENT

Development and commercialization of technologies are needed in this field. India, unlike the top developed countries has very poor roads. Talking about a particular road itself includes a number of speed breakers. By just placing a unit like the Pneumatic speed Breaker with day night controller", so much of energy can be tapped. This energy can be used for the lights on the either sides of the roads and thus much power that is consumed by these lights can be utilized to send power to these villages.

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