

Electricity Generation Using Speed Breaker

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Abstract :

-Electricity is generated by replacing the traditional speed breakers with some simple mechanism. As vehicles pass over the speed breakers, rack & pinion mechanism works which in turn generate electricity. This method is an effective way to produce electricity as the numbers of vehicles on the road are ever increasing. It can be effectively placed near traffic lights, at the entrance of parking lots and any other place where the traffic density is high. [1][2] A Rack & pinion, spring assembly mechanism is provided which transfer the motion to a DC motor/generator for electricity generation. This method provides an efficient way to generate electricity from the kinetic energy of moving vehicles in roads, highways, parking lots etc.

Key Words: Speed breaker, Dynamometer, Energy generation, Energy Transfer.

1. INTRODUCTION

In the present scenario electricity becomes the major need for human life. The availability and its per capita consumptions are regarded as the index of national standard of living in the present day civilization. Energy is an important input in all the sectors of any countries economy. Energy crisis is due to two reasons, firstly the population of the world has been increased rapidly and secondly standard of living of human beings has increased. India is the country, which

majorly suffers with lack of sufficient electricity generation.

Here in this project we are looking forward to conserve the kinetic energy that gone wasted, while vehicles move. The number of vehicles passing over speed breaker on road is increasing day by day. So we use that energy of vehicles to generate an electricity. [5] Beneath speed breaker, setting up an electro-mechanical unit known to be power hump, could help us conserving this energy and use it for electricity generation.

The entire model is built under the speed breaker and when vehicle passes through speed breaker it generates electricity. [7] This set up requires very basic mechanical components. The electricity thus generated is stored in rechargeable device such as battery (conservation) for future use (conversion). The electrical output can be improved by arranging these power humps in series. We can supply this energy to street lights, traffic lights, and nearby areas, and thus helps in country's economy. We could make it more efficient, by also having solar panels that provides for power needs while the vehicles were not moving.

2. Proposed Work

2.1 Block diagram

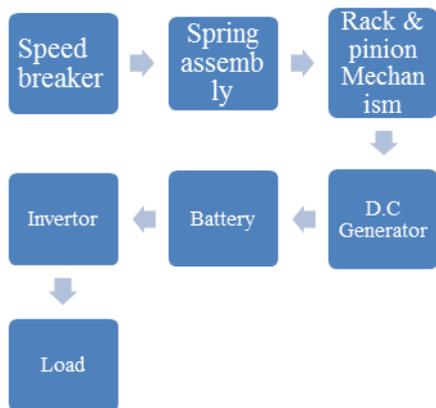


Fig.2.1. Block Diagram of system

This project explains the mechanism of electricity generation from speed breakers. [1][2]The vehicle load acted upon the speed breaker system is transmitted to rack and pinion arrangements.[1][2]Then, reciprocating motion is converted into rotary motion using the rack and pinion arrangement. The vehicles possess some kinetic energy and it is being wasted. This can be utilized to produce power by using POWER HUMP. It is an Electro-Mechanical unit.[2]POWER HUMP is a dome like device likely to be speed breaker. When vehicle is passed, spring gets compressed and rack & pinion mechanism is followed. Conversion of reciprocating motion into rotary motion. This is given to dynamo. [8]Dynamo, which converts mechanical energy into electrical energy.[6]The generator uses rotating coils of wire and magnetic fields to convert mechanical rotation into a pulsating direct electric current [8]It is a device, which converts mechanical energy into electrical energy. That energy is stored into battery. [5]And the inverter is used to convert DC to AC which is providing to street light.

2.2 Flow chart

By using the algorithm user can easily understand the flow of power generation using speed breaker. The working is start

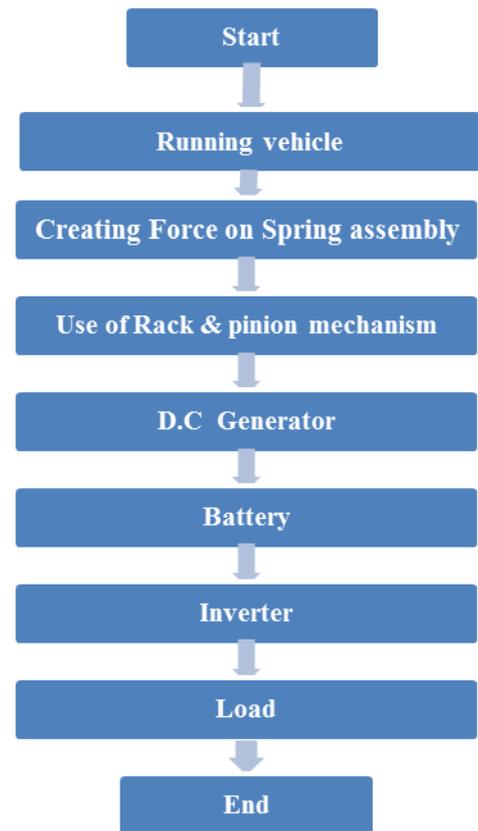


Fig.2.2. Flow Chart of electricity generation on using speed breaker

From the speed breaker, when the vehicle passing over the dome like structure that create the force on the on the spring assembly. Because of that rack and pinion mechanism work i.e. conversion of linear motion to rotary and vice versa. [8]After that the D.C generator is used for conversion of mechanical energy to electrical energy. Battery is used for storing the energy.

3.Result& Analysis

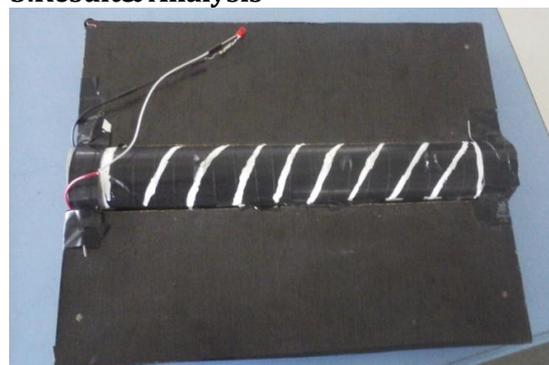


Fig.3.1.project model

3.1 Spring Design

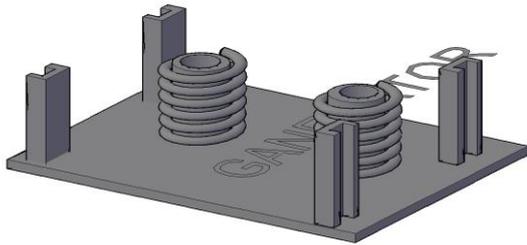


Fig 3.2. Spring Assembly

3.1.1 Spring design for 200 kg weight:-

Weight of vehicle = 200Kg * 9.81

$$= 1962.00 \text{ N}$$

Therefore $P=1.962 \text{ KN}=2\text{KN}$

Permissible shear stress is taken as 0.5 of τ_{ut}

$$\tau = 0.5 * \tau_{\text{ut}} (\text{ultimate tensile strength})$$

$$\tau = 0.5 * 1050 = 525 \text{ N/mm}^2$$

3.1.2 The spring stiffness k,

$K = (4c - 1/4c - 4) + (0.615/c)$std formula

$$K = (4*8 - 1/4*8 - 4) + (0.615/8)$$

$$K = 1.184$$

3.1.3 Calculation of wire diameter d,

$$\tau = k * (8pc / \pi d^2)$$

$$525 = 1.184 (8 * 2000 * 8 / \pi * d^2)$$

$$D = 11 \text{ mm}$$

Free length of spring = 230mm

3.1.4 Obtained Result

Voltage (D.C) = 1.5V

Current (D.C) = 3.55 miliampere

4. CONCLUSIONS & FUTURE SCOPE

Looking at the recent conditions of the electricity crisis in India, government focuses on utilizing the non-conventional energy sources for electricity generation and reducing the share of global warming. So, the techniques which are described above will also contribute to the power generation. It will provide electricity to villages without any extra efforts throughout year.

4.1 Future Scope

This technology is still in the stage of development. In future it is used to generate the power throughout the year. Power generation is not affected by environmental conditions. It is pollution free technique for generation of electricity. Suitable at parking of multiplexes, malls, toll booths, signals, etc. Used charging batteries and using them to light up the streets, etc. Such speed breakers can be designed for heavy vehicles, thus increasing input torque and ultimately output of generator. More suitable and compact mechanisms to enhance efficiency.

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