

Electricity Generation using Speed Breaker

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Abstract— Electricity now has arguably become a basic need. Energy in the form of Electricity is the most widely used. Electricity generated from primary nonrenewable sources such as coal and oil are used, contributing to almost 80% of the total electricity generated. With the depleting natural resources, there is a need for search of alternative sources to meet the present electricity demands. In this paper we will discuss about one of the available conventional method for the generation of electricity. All vehicles moving possess kinetic energy, we will use this kinetic energy for the generation of electricity. The entire model is based on a speed breaker which displaces downwards and generates electricity when a vehicle passes over it.

Key words: Nonrenewable, Depleting, Conventional, Displaces

I. INTRODUCTION

Energy conservation is the cheapest form of energy available. This paper show the attempt made in the direction of conservation of energy by converting the ‘waste’ kinetic energy into electric energy which would either be converted into non-desired sound and heat energy. There is a possible way to tapping this energy and converting into electric energy which can then be used to power street lights, signals, signs etc.

Energy in the form of electricity plays a very important role in the life of a normal man. Electricity is one of the greatest wonders of science. There is not phase in human life that is not in debt to electricity for its progress. The modern age is therefore being truly called as “age of electricity.”

We use electricity for a variety of applications We warm our homes, drive machines in factories, modern gigantic tools are worked overnight. Electricity has completely revolutionized the methods of travel and transport

This paper illustrates model and the review of technology used in the generation of energy with the speed breaker.

II. WORKING PRINCIPLE

The principle of the electric power generation using speed breaker mechanism is based on following law of physics.

- Flemings right hand rule.
- Law of conservation of energy.

Load moving over the speed breaker causes it to move vertically downwards moving the rack. The axis of the pinion is connected to a larger gear. The larger gear is in constant mesh with a small gear which is connected to the motor. As the larger sprocket is mesh with the smaller sprocket the speed of the smaller gear is relatively multiplied by the larger gear.

Though the speed of the larger gear due to the rotary motion is less, as the power is transmitted to gears, the final speed is high. This speed is enough to rotate the rotor of a generator The rotor surrounded by magnetic flux rotates within a static magnetic stator cutting it, thus producing the

electric motive force (emf). This generated emf then can be used to power lights, signals or can be stored in battery.

III. BLOCK DIAGRAM

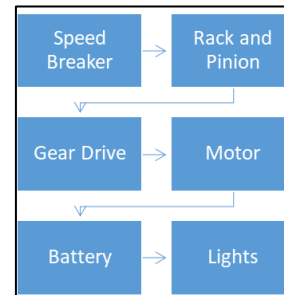


Fig. 1: Block diagram of procedure

IV. EXPERIMENT SETUP

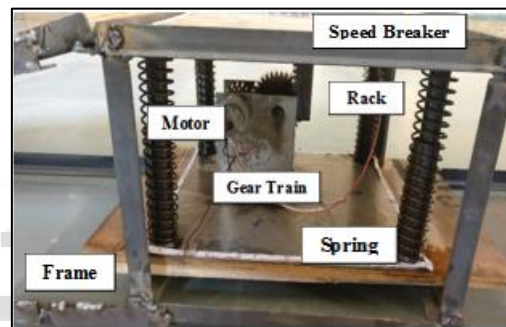


Fig. 2: Actual Experiment Picture Side view

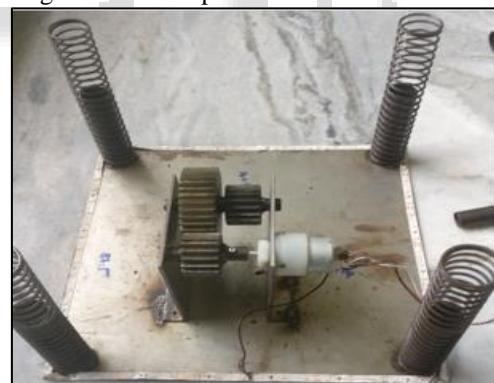


Fig. 3: Actual Experiment Picture Top view

V. COMPONENTS USED

Components required	Its use	Specification
Motor	To generate emf	Dc motor 12V 500 rpm
Gear train	To increase rotation speed	Material used: Mild Steel A36 No of teeth: 34 Big gear No of teeth: 17 Small Gear No of gears: 2 Gear type: Spur Gear

Spring	To allow vertical movement	(i) Load bearing capacity :6- 7kg (ii)Material: Mild Steel (iii)Total displacement: 2 inch
Plywood	To provide ramp for vehicles	5 ply

Table 1: Component used

VI. READINGS

Load in Kg	Current Generated in Ampere	Voltage Generated in Volt	Power (IxV) in Watt
20	4.2	2.78	11.676
40	8.36	4.36	36.44
60	11.2	5.93	66.41
80	13.89	6.89	95.70
100	15.96	7.98	127.36

Table 2: Experiment reading obtained

A. Graph between Current I Vs Load Kg

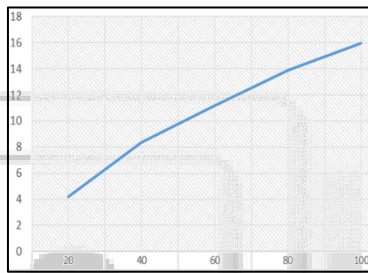


Fig. 4: Current vs Load

B. Graph between Voltage V Vs Load Kg

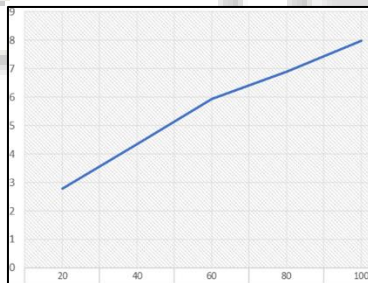


Fig. 5: Voltage vs Load

C. Graph between Power Generated Vs Load Kg

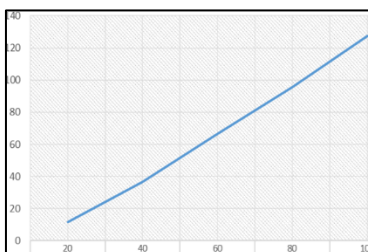


Fig. 6: Power vs Load

VII. CALCULATIONS

For a Mass of 100kg crossing over the Speed Breaker in 1 second.

- Height of the Speed Breaker = 12cm~.012m

- Force= Mass of the body x acceleration due to gravity = $100 \times 9.82 = 982 \text{ N}$
- Work done = Force x distance moved = $982 \times .12 = 117.84 \text{ Joule}$

Power reading obtained from experiment for 100 Kg load is 127.36 Watt

Efficiency = Electrical Energy Output / Mechanical Energy Input = $117.84/127.36 = 92.5\%$ Efficiency

VIII. IMPLICATION OF SPEED BREAKER

A. Advantages

- Pollution free power generation.
- Simple construction, less moving parts, mature technology
- No maintenance required less moving parts.
- No consumption of fossil fuel.
- No need of manpower during power generation.

B. Application

The power generated by the speed breaker can be stored in a battery and be used later to power street lights, traffic signal and signs

The experiment setup can be on staircases in public places such as railways bridges, airport, where there is lot of public movement.

It can be used a switch to trigger the functioning of street lights at night when the traffic is scarce , partially or completely street light could be dimmed or turned off completely when there is less or no vehicle movement on the road.

IX. CONCLUSION

With the second highest growth rate of vehicle and 57000 vehicles registered every day. The no of vehicles on road are increasing every day and so is the need of the fossil required to power them. With limited quantity of non-renewable fuel the need to preserve them for future generation has been top concern of the world.

Various methods of energy conservation have been developed to the same. Our experiments helps to do the same by saving the energy which would have been lost by the impact of vehicle on speed breaker in the form of heat and sound. Improvement to this setup are been worked upon to further increase the efficiency.

The aim of generating electricity from kinetic energy of the moving vehicles has successfully completed. If this concept is further developed and is implemented successfully it would prove to be high efficient, ecofriendly energy source at no running cost.

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