



Electricity Generation Through Speed Breakers.

¹Varun Kumar, ²Shivendra Prakash Verma

¹Masters Student, ²Assistant Professor

¹Department of Electrical Engineering,

¹Rayat Bahra University, Kharar, Punjab, INDIA

Abstract: Throughout his lifetime, man makes use of energy in one way or another. Power now plays a significant role in our day-to-day lives. A country's development greatly benefits from having power. The majority of energy is currently being produced using conventional energy sources. The conventional energy resources, in addition to polluting the environment and contributing to global warming, are unable to meet the needs of the population due to the rising rate of population growth. As a result, non-conventional energy sources are being developed to meet the requirements and cut down on pollution in the environment. In that sense a few creations are found in light of speed breakers by accepting those as reference we fostered a component by utilizing chain and sprocket. By arranging gear and making use of electronic devices, this project develops power generation through speed breaker. The vehicle generates various forms of energy when it is moving, such as heat energy and friction between the wheels and the road, also known as rough surface energy. The power generation setup enables us to use the energy produced by moving vehicles to generate power. In this cycle we convert the possible energy to mechanical energy through chain and sprocket component and afterward this energy is changed over into electrical energy utilizing generator. The standard included is Likely Energy to Electrical Energy Transformation. One might conclude that a person needs to use more and more energy in order to be materially successful and wealthy. Additionally, the best source of daily energy for us is this project.

Index Terms – Power Generation, Rack & Pinion, Energy.

I. INTRODUCTION

This project aims to demonstrate how energy can be harnessed and utilized at a system that is frequently used, the road speed breakers. On roads, the number of vehicles exceeding the speed limit is rising daily. Every time a vehicle passes over the speed breakers, a significant amount of energy is lost through heat loss and friction. By using the speed breaker as a power generation unit, there is a good chance that this energy could be tapped and power generated. The lamps near the speed breakers can benefit from the generated power. In this model we demonstrate the way that how might we create a voltage from the speed breaker. The idea of converting mechanical energy is widely used. By converting the potential energy produced by a vehicle ascending a speed break into rotational energy, it is a power generation mechanism. We have applied that straightforward idea to the project.

A nation's growth is reflected in its energy consumption. For instance, the average annual consumption of electricity per person worldwide is 2664 KWH. In contrast to India's 2014 electricity consumption of 805.60 KW/H per person, India is the third-largest electricity producer and third-largest electricity consumer in the world. As of December 31, 2019, India's national electric grid had an installed capacity of 368.69 GW. One might conclude that in order for a person to be materially wealthy and successful, they need to use more and more energy. A lot of energy can be tapped by simply placing a unit like the "Power generation unit from speed breakers." This energy can be used to power the lights on either side of the roads, which in turn can use a lot of power to send power to these villages.

II. WORKING PRINCIPLE OF PROJECT

The goal of the project is to generate electricity using a setup similar to speed breakers. Due to their weight, the vehicles lose some of their potential energy as they move. Using a special arrangement known as POWER HUMPS, this kinetic energy can be used to generate power. This unit is electromechanical. For power generation and storage, it makes use of both mechanical and electrical technologies. Power Humps are dome-shaped devices that are likely to slow down vehicles. The springs that are attached to the dome are compressed whenever the vehicle passes over the dome, and the rack that is attached to the bottom of the dome moves downward in a reciprocating motion. Because the rack has teeth that are connected to gears, the rack's reciprocating motion is converted into the rotary motion of the gears, but the two gears rotate in opposite directions. In order for the shafts to rotate at a certain RPM, these shafts are connected to the dynamos through a set of gears, which turns mechanical energy into electrical energy. Traffic density will have an effect on the conversion.

These POWER HUMPS can be arranged in series to increase the electrical output. Various electrical devices can be used to increase and store this generated power. The goal of the project is to generate electricity using a setup similar to speed breakers. Rack and pinion arrangements receive the load that is exerted on the speed breaker setup. Using a rack and pinion arrangement, the speed breaker's reciprocating motion is transformed into rotary motion here. A gear connects the pinion's axis to the wheel.

A pinion is meshed with this gear. The speed available at the gear is roughly multiplied as the pinion rotates as power is transferred from the gear to the pinion. A gear arrangement is connected to the pinion's axis. There are two gears here, each with a different diameter. The gear, which has a larger dimension, is connected to the pinion's axis. As a result, the gear with a larger dimension receives the speed that was increased at the smaller sprocket wheel. The pinion is fit to the stuff. Therefore, the pinion still multiplies the speed to a greater intensity as the gear rotates at the multiplied speed of the pinion. As a result, although the first gear's rotary motion results in a slower speed, the speed increases as power is transferred to subsequent gears. A generator's rotor can be rotated at this speed.

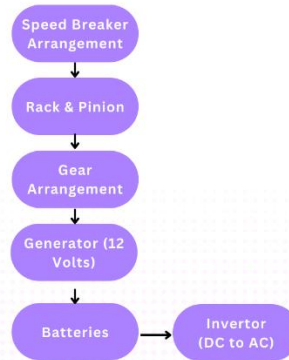


Fig. 1: Flow Chart of Process

The electric motive force (emf) is produced when the rotor in a static magnetic stator cuts through the surrounding magnetic flux. After that, the emf that is produced is sent to a bridge rectifier, where the AC current that is produced is transformed into DC. The lead-acid battery now receives this regulated emf.

III. FABRICATION SUMMARY

Frame:

L-Angle frames and standard frames are used to construct the unit's frame structure. Mild steel is used to construct these frames. They are welded together to form a unit and are held to the right dimensions.

Bearing:

Then, at that point, the direction which are of standard make are kept set up with their particular shafts through them and are welded to the edge structure.

Shaft:

Mild steel is also used to make the shafts. By welding the speed breaker arrangement to the frame structure, hinges are used to move it. The speed breaker moves in an upward and downward direction thanks to these hinges.

Setup of the rack & pinion:

The speed breaker arrangement is joined by a mild steel rack with 38 pieces that is welded to it. The shaft is initially fitted with a welded pinion, which is also made of mild steel and has 36 teeth. This pinion tooth is precisely designed to match the rack's teeth.

The flywheel:

A cast iron fly wheel is welded to a shaft with its axis aligned with the shaft's axis after being machined precisely to the required dimensions in a lathe.

The Generator:

Frames are used to create a unique stand arrangement for the 12v DC generator. Bolts and nuts are used to secure a 12v DC generator inside the seat. A small gear made of cast iron is fastened to the generator's shaft. The shaft is fitted with a well-machined, larger cast iron gear. The larger gear's teeth are designed to properly mate with the generator shaft's smaller gear.

IV. RESULTS AND CALCULATIONS

Energy is significant part to hold the modern creation rate and furthermore the advancement of any Country. We will have to rely on non-conventional energy sources by the turn of the century because conventional sources are becoming less and less abundant. Renewable sources like biogas, wind energy, and solar power, among others)

We can also help the country grow by installing speed bumps on roads with a lot of traffic and at toll plazas. We can use the weight of the vehicles to produce mechanical power in the shafts using the rack and pinion mechanism to generate electricity almost continuously. These speed breakers are more dependable and have a longer lifespan because this method does not require an external power source and the traffic never slows down.

4.1 Calculations

Generated output voltage in one pushing force of speed breaker = 6.8v

Current in the circuit in one pushing force of speed breaker = 0.31 amps

As per ohm's law

Power developed for one push = $V \cdot I = 6.8 \cdot 0.31$

$P = 2.1 \text{ w}$

Power developed for one hour = $60 \cdot 2.1 = 144.6 \text{ watts}$

Power developed for one day = $24 \cdot 146.4 = 3.47 \text{ kw}$

Power developed for one month = $30 \cdot 3513.1 = 104.118 \text{ kw}$

Power developed for one year = $12 \cdot 105.408 = 1249.3 \text{ kw}$

V. CONCLUSION

"Our lives are greatly impacted by electricity. "The current generation of power is no longer sufficient to meet our needs because of the rapid growth of the population. In this project, we discover a method for generating electricity from speed breakers that uses a dependable system and will aid in resource conservation. Before long, this will demonstrate an extraordinary help to the world, since it will save a ton of power of force establishes that gets squandered in enlightening the streetlamps. It's time to look into other options given the rapid depletion of conventional sources. We were able to conserve the conventional sources' power for effective use. Nowadays, there is more vehicle traffic in big cities, which is bad for people.

However, a novel technique known as a "power hump" can be used to generate electricity from this vehicle traffic. It has the advantage of not relying on any external resources. The development of this technology is still in its early stages. In the future, it will be used to generate power year-round. The conditions of the environment have no effect on the production of power. It is an environmentally friendly method for producing electricity. Suitable for parking in malls, multiplexes, toll booths, signals, and other locations. These speed breakers can be made to fit heavy vehicles, increasing the generator's input torque and, ultimately, output. More efficient mechanisms that are suitable and compact.

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