

Generation of Electricity Through Speed Breakers by Using Roller Mechanism

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Abstract-The generation of electricity through speed breakers using a roller mechanism involves harnessing the kinetic energy of vehicles passing over speed breakers. Cylindrical rollers embedded in the speed breaker rotate as vehicles pass, converting mechanical energy into electrical energy through a connected generator. This system can generate electricity, which is stored in batteries or fed into the grid, offering a sustainable and innovative way to capture wasted energy from traffic. It provides an eco-friendly solution for urban areas, contributing to renewable energy generation.

Key words - Generating Electricity, Speed Breakers, Roller Mechanism, Kinetic Energy Mechanical Energy, Generator/Dynamo, Renewable Energy

1. INTRODUCTION

In today's life power has become the basic need for human life. Everywhere energy is important in all the sectors of any country's economy. We are using conventional sources of energy like fossil fuels which are on stage of finishing, but there is a fear that they will get exhausted eventually by the next few decades. Therefore, we have to find some other types of renewable sources to rely on. The increase in population and decrease in conventional sources for power generation, makes us think of non-conventional energy resources. Pollution is another major problem, which is becoming an exciting topic for today. Power stations and automobiles are the major pollution-producing places. So nonconventional power source is needed to reduce this prob

An innovative and useful concept of **Generating Electricity** from a **Speed breaker** is our step to improve the situation of electricity. First of all what is electricity means to us? Electricity is the form of energy. It is the flow of electrical Power. Electricity is a basic part of nature and it is one of our most widely used forms of energy. We get electricity, which is a secondary energy source, from the conversion of other sources of energy, like coal, natural gas, oil, nuclear power and other natural sources, which are called primary sources.

Many cities and towns were built alongside waterfalls that turned water wheels to perform work. Before electricity generation began slightly over 100 years ago, houses were lit with kerosene lamps, food was cooled in iceboxes, and rooms were warmed by wood-burning or coal- burning stoves. Direct current (DC) electricity had been used in arc lights for outdoor lighting. In the late-1800s, Nikola Tesla pioneered the generation, transmission, and use of alternating current (AC) electricity, which can be transmitted over much greater distances than direct current.

The availability of regular conventional fossil fuels will be the main sources for power generation, but there is a fear that they will get exhausted eventually by the next few decades. Therefore, we have to investigate some approximate, alternative, new sources for the power generation, which is not depleted by the very few years. Another major problem, which is becoming the exiting topic for today is the pollution.

It suffers all the living organisms of all kinds as on the land, in aqua and in air. Tesla's inventions used electricity to bring indoor lighting to our homes and to power industrial machines. Power stations and automobiles are the major pollution producing places. Therefore, we have to investigate other types of renewable sources, which produce electricity without using any commercial fossil fuels, which is not producing any harmful products. There are already

existing such systems using renewable energy such as solar wind), OTEC (ocean thermal energy conversions) etc...for power generation. The latest technology which is used to generate the power by such renewable energy is the "POWER HUMP"

The number of vehicles on road is increasing rapidly and if we convert some of the Potential energy of these vehicle into the rotational motion of generator then we can produce considerable amount of electricity, this is the main concept of this project. At present we are facing shortage of electricity.

Electricity generation was first developed in the 1800's using Faradays **dynamo generator**. Almost 200 years later we are still using the same basic principles to generate electricity, only on a much larger scale. Now we are throwing some light on the very new and innovative concept i.e. GENERATING ELECTRICITY FROM A SPEED BREAKER. Producing electricity from a speed breaker is a new concept that is undergoing research.

2. BODY OF PAPER

In this Mechanism, a roller is fitted in between a speed breaker and some kind of a grip is provided on the speed breaker so that when a vehicle passes over speed breaker it rotates the roller. This movement of roller is used to rotate the shaft of D.C. generator by the help of chain drive which is there to provide different speed ratios. As the shaft of D.C. generator rotates, it produces electricity. This electricity is stored in a battery. Then the output of the battery is used to lighten the street lamps on the road. Now during daytime we don't need electricity for lightening the street lamps so we are using a control switch which is manually operated .The control switch is connected by wire to the output of the battery. The control switch has ON/OFF mechanism which allows the current to flow when needed.

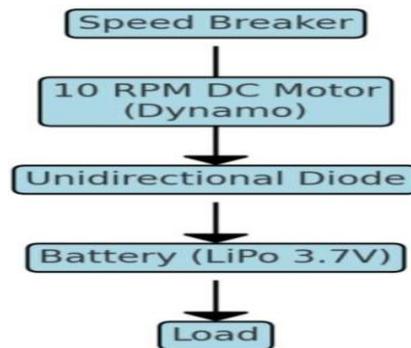


Fig-1

2.1. MANUFACTURING

Manufacturing processes are the steps through which raw materials are transformed into a final product. The manufacturing process begins with the creation of the materials from which the design is made. These materials are then modified through manufacturing processes to become the required part. Manufacturing processes can include treating (such as heat treating or coating), machining, or reshaping the material. The manufacturing process also includes tests and checks for quality assurance during or after the manufacturing, and planning the production process prior to manufacturing

MANUFACTURING PARTS

A) Base Assembly:

- The base assembly is a structural component in a speed breaker-based on the electricity generation system. It provides support, ensure, stability and integrates mechanical and electrical components for efficient power generation.

- Structural support holds the entire system, including rollers, gears, shafts and dynamo.
- The base frame made up of wooden material fabricated with black coated paint to stabilize the entire equipments.



before

Base

after Fig-2

Wooden

B) Ramp Assembly:

- The ramp made up of wooden fabricated material ensured the ramp angle is optimal for vehicle pressure.
- The ramp is supported with wooden blocks which is used for making the angle for a ramp and support.



- It is clamped with an half inch screws.

Ramp Fig-3

C) Roller shaft installation:

- The installation of a **roller shaft** in a speed breaker electricity generation project is a key component for converting the kinetic energy from vehicles into mechanical energy, which is then used to generate electricity.
- Insert the roller shaft beneath the surface of the ramp which is freely attached to a rotating mechanism with bearing on both sides.
- The surface of the roller shaft coated with yellow material is a plastic for a grip.



Roller speed breaker Fig-4

D) Dynamo Installation:

- A dynamo is a type of **generator** that converts **kinetic energy into electrical energy**. It works by rotating a coil of wire within a magnetic field, generating an electric current.
- Dynamos are used for power generation, especially in applications where small amounts of electricity are needed.
- The dynamo installed with shaft.



Dynamo (DC Genarater)

Fig-5

E) Diode Arrangement :

- Diode arrangement is use to converts AC to DC
- It is an unidirectional diode stops current from flowing back into the generator.
- Ensures a stable output for storage



Diode Fig-6

F) Digital Multimeter :

- It is a measuring instrument used to measure electrical properties like voltage, current , amperes, and resistance.
- It is an essential tool for electrical and electronic troubleshooting.



Multimeter Fig-7

F) Electronics and Storage Units:

• **Rechargeable batteries**

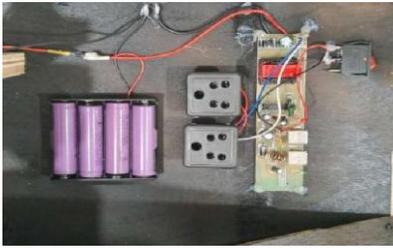
Batteries store the electrical energy generated by the speed breaker system for later use. The most commonly used batteries for such projects are **lithium-ion batteries** (3.7V cells)

• **Circuit board**

Power management circuit includes voltage regulator, rectifier and storage unit.

• **Sockets and outlets**

AC/DC output ports for testing generated power.

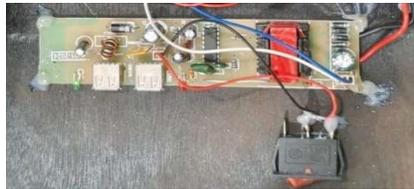


Storage unit & Electronics

Fig-8

G) Wiring and Connections:

- Use installation copper wires
- Proper soldering for circuit stability



- Switch and indicator for controlling the power output

Circuit Fig-9

All the different parts shown above were assembled to make a complete speed breaker which and generate power as a vehicle passes over it.



GENERATION OF ELECTRICITY THROUGH SPEED BRAKERS

Fig-10

2.2 Specifications :

Generator 12 RPM DYAMO Battery Lead- LIPO 3.7V (4Cells)

2.3 Power Output :

S.No	SPEED OF THE VECHILE PASS OVER THE SPEED BREAKER (KM)	NUNBER OF ROTATIONS OF DINAMO (RPM)	OUTPUT (W/h)
1	20	80	10.05
2	30	120	12.32
3	35	140	15.64

CONCLUSION

With the rising demand for electricity, speed breaker power generation presents an innovative green energy solution. This method converts kinetic energy from vehicles into electrical power, offering a sustainable way to utilize road traffic for energy production.

It is particularly beneficial for developing countries like Nigeria, where stable electricity is crucial for growth. Implementing such systems can help reduce power shortages and enhance energy availability.

Future improvements, such as replacing gears with camshaft-pulley mechanisms or fluid mechanics, can enhance efficiency and minimize friction. Further research and development will be essential to optimize performance and reduce operational challenges.

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