

# Road Power Generation by Speed Breaker

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**Abstract**— Energy is one of the basic quantitative properties describing a physical system or object's state. Energy can be transformed among a number of forms that may each manifest and be measurable in differing ways. The total energy of a system can be calculated by simple addition when it is composed of multiple non-interacting parts or has multiple distinct forms of energy. Common energy forms include the kinetic energy of a moving object. In the earlier attempt we required suspension system for links getting back to the original position here the other joint does the return stroke steadily thus overcoming the limitations of the suspension effect .

In this present paper an attempt has been made to tap the energy and generate the power by the road power generating system. This is done by introducing the powered bearing which rotates the shaft in one direction and moves freely over rollers in other direction. The return stroke is operated by the other joint, where as earlier the same return stroke was operated by the suspension system. The powered bearing is similar to the small toothed wheel in the rear tires of the normal bicycles. When the vehicle wheel passes over the third joint the first joint returns to the original position. Similarly when a vehicle passes over the first joint, the third joint returns to the original position.

By introducing this mechanism, we could operate 12 volts DC Motor at 30 RPM generating 70 watts electric power.

**Keywords**—powered bearing, suspension, System, rollers, toothed wheel.

## I. INTRODUCTION

Electricity is one of the most widely used forms of energy. Today also there is great scarcity of electricity. In this study an innovative concept of Generating Electricity from moving vehicles is presented i.e. Road power generation system is a new concept that is undergoing research. The number of vehicles on road is increasing rapidly and if we convert some of the kinetic 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.

Today our whole life style is dependent on electricity. With the increasing population the use of electric power is also increasing. But we know that the resources to generate electricity are limited, and this has lead to the energy crisis. During this scenario we need to generate electricity from the things used in day-to-day life. In this project the speed breakers present on roads are used to generate electricity. As we know that vehicles on road are increasing day by day which will help us to generate electricity as these vehicles pass through the speed breakers? This electricity generated can be used for different purpose such as lighting of signals and streetlights on road etc.

This is the study of Electricity generation from speed breakers by using RPGS mechanism. For obtaining the electricity through the speed breaker a prototype model is developed and studied. Findings from this research work is discussed in this paper, the generator used here is permanent magnet D.C. generator. The Generator voltage is 12 Volt D.C. With this a light glows. The electricity readings were taken using a Multi-meter.

We live in an electric world. With almost everything today running on electricity, it is easy to forget our dependence on that power source, and the reliability of its production. It is only when we have a power failure – as happened during the writing of this because of a thunder storm – that we become aware of the utmost importance of having electricity whenever needed

## II. EASE OF USE

The demand for electricity is growing faster than the current supply. The development of Wind/Solar/Biomass/etc... is not keeping up with current demands. Additional avenues of generation is needed besides hydro, coal, geothermal, wind, solar, etc... all have downsides. That is no sun, water; wind etc... This form of energy would be a base load provider.

## III. WORKING PRINCIPLE

This paper works over RPGS mechanism the moving vehicles pass over the 4 plates and 3 joints (2 rotary, 1 sliding cum rotary). A connecting rod is pin jointed in between a joint and an eccentric. There are 2 such joints with connecting rod and eccentric. These eccentrics rotate the shafts. A big sized toothed wheel is mounted on these shafts. There are 2 other shafts with small toothed wheels mounted on them. A chain link is provided between the big and small toothed wheels. Two such systems are done. A dynamo is belted with a pulley (on small toothed wheel shaft). Thus electricity is generated at two points in the mechanism.

Road Power Generation System (RPGS) is a system design to capture waste and kinetic energy from all vehicles. This device converts the kinetic energy of the vehicles into electric energy. This is done by moving plate installed on the road, this plate captured very small movement from the road surfaces and it transferred to a key way flywheel system. From hundreds of wheel lies a single flywheel having used to driving machinery. The RPGs included the method of driving one flywheel to another, once it reached predetermining velocity. The RPGs flywheel system has been developed to achieve large amount of moment of inertia in relatively small space. The captured energy is converted into electricity which is fed into power grid.

**A. Components required**

S. no	Components	Specifications	Usage	Quantity
1	Dynamo	6Poles 12 Volts	Usha Table Fan DC Motor	1
2	Chain	Cms	Cycle Chain	2
3	Sprocket wheels	Cms Dia	Cycle Sprocket Wheels	2+2=4
4	Connecting rod	Mild Steel	MS Plate	2
5	Bearings	1Cm Dia	CeilingFan Bearings	8
6	Shaft	6mm Dia Mild Steel Rod	MS Rod	4
7	Light	2.5 Watt	Torch Light	1

**B. List of components**

*(i) Frame*

For the construction of frame we used L - shaped mild steel rods. With the help of these rods we constructed the rectangular Frame of 30\*80 Dimensions. The height of the Frame when placed on the floor will be 45 Cms. The whole mechanism is placed on this frame and after this frame is placed to the road.



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*(ii) Plates*

Plates are placed on the top of the rectangular frame. Here we took four plates of 25\*29 Cms Dimensions. Two plates are connected to each other with the help of door couplings. After these two sets of plates placed side by side on the 30\*80 Cms length Rectangular frame, by doing the a certain height is obtained due to increase in the length of the plates these form two triangular shape on the top. These two triangular shaped wooden plates acts as speed breaker.



*(iii) Plate's assembly*



*(iv) Connecting rod*

The connecting rods are used to connect the plates and the spur gear wheels. One end of the connecting rod is connected to the plates and the other end of the connecting rod is connected to the spur gear wheels. Here the connecting rods convert one form of energy to rotational energy.



*(v) Sprocket wheels*

Sprocket wheel we used is nothing but the toothed gear wheels of the bicycle. In cycle there will be two toothed wheels one is big one which is near the pedalling and the other is the small one which is near the rear wheel. These two are used because one half rotation of the big toothed wheel will rotate the small toothed wheel 2 times and then the shaft rotates more than big toothed wheel.



*(vi) Chains*

The chains are used to connect the two spur gear wheels at certain distance. With the help of the chains only the generation of electricity is done. The Chain length is as required to connect the two spur gear wheels.



(vii) *Dynamo*

The dynamo used is 6 poles 12 volts dynamo which is taken from an Usha fan DC motor. The dynamo is a machine for converting mechanical energy into electrical energy, typically by means of rotating coils of copper wire in a magnetic field. The rpm of the dynamo is 30- 40.



(viii) *Bearings*

The bearings we used are from the ceiling fan. They are used for the support and the free rotation of the spur Gear wheels by the means of rod placed for the big spur gear wheel here. Totally we used 8 bearings in the prototype model for the support and free rotation of the wheel. In the below fig we can clearly see the bearings supported for the toothed wheels.

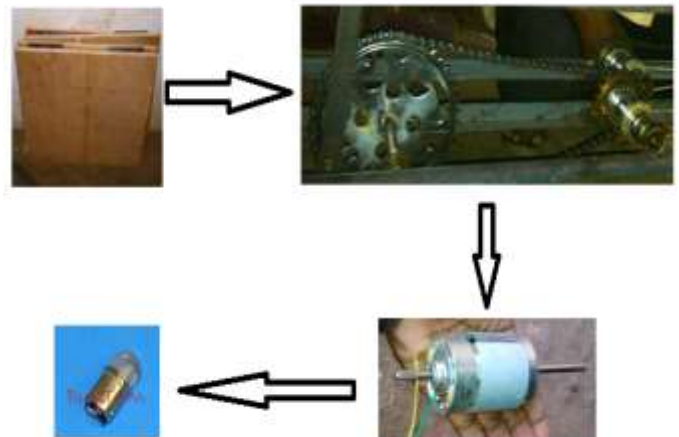


(ix) *Light*

The bulb we used is 2.5 watt capacity one which is taken from a touch light the light is connected to the Dynamo by means of Wires.



IV. LINE DIAGRAM



A line diagram is a drawing that is used to represent steps in a process. It involves the use of flow charts, oval shapes, diamond shapes, and square shapes or the real components without showing details. It is also known as a ladder diagram and can be used to show the logic of an electrical circuit.

Here this diagram symbolizes that the four plates on the frame rest in a particular order. When vehicle passes by this they alter their positions and come back to the original position. This movement in the plates is caught by the mechanism beneath. The connecting link absorbs the energy from the four plates, this is absorbed by the connecting rod, and this connecting rod operated the sprocket wheel to move by a certain angle. This sprocket wheel allows other sprocket wheel to take more turn via a chain link. The small sprocket wheel is connected to a dynamo, which when operated in certain Speed (rpm), the bulb glows. The glowing bulb indicates generation of power.

V. MODEL CALCULATIONS

The Velocity of moving vehicle is 5.4 Kilometre/hour  
The weight of the load acting is 10 Kg.

$$\text{Power (P)} = \text{Work Done (W)} / \text{Time (T)}$$

$$\text{Force} = mg = 10 \times 9.81 = 98.1\text{N}$$

$$\text{Distance(s)} = 10 \text{ Centimetre} = 0.1\text{m}$$

$$\text{Time} = \text{Distance (d)} / \text{Speed(s)}$$

$$\text{Speed} = 3.7 \text{ Km/h}$$

$$\text{Time (t)} = 1 \text{ sec}$$

$$\text{Power} = 9.81/1 = 9.81 \text{ watts}$$

$$\text{Power} = QV / t = IV$$

Where

Q = electric charge in coulombs

t =time in seconds

I = electric current in amperes

V= electric potential or voltage in volts

$$\text{Voltage Generated} = 2\text{v}$$

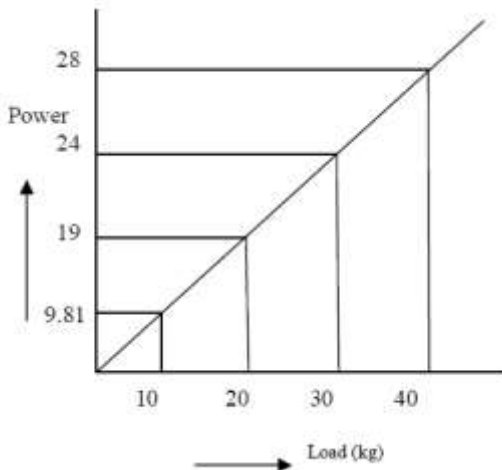
$$\text{Current generated} = 2 \text{ amps}$$

$$\text{Electric Power} = 2 \times 2 = 4 \text{ watts}$$

Efficiency = Electric Output / Mechanical Input  
 = 4/10  
 = 40% efficient.

**VI. RESULTS**

S.no	load (kg)	Power generated (watts)
1	10	9.81
2	20kg	19 Watts
3	30kg	24 Watts
4	40kg	28 Watts



**VII. COST OF RPGS**

S.no	Components	Quantity	Cost	Total cost
1	Plates	4	Rs.50/-	Rs.200/-
2	Frame	1	Rs.2000/-	Rs.2000/-
3	Connecting Link	2	Rs.20/-	Rs.40/-
4	Connecting Rod	2	Rs.50/-	Rs.100
5	Sprocket Wheels	4	Rs.100/-	Rs.400/-
6	Chain	2	Rs.100/-	Rs.200/-
7	Bearing	8	Rs.20/-	Rs.160/-
8	Pulley	2	Rs.30/-	Rs.60/-
9	DC Fan Motor	1	Rs.600/-	Rs.600/-
10	Bulb	1	Rs.20/-	Rs.20/-
11	Wiring Charge	-	Rs.20/-	Rs.20/-
	Total			Rs.3800/-

**VIII. CONCLUSION**

- ❖ Upcoming days, it will prove a great boom to the world, since it will save a lot of electricity of power plants that gets wasted in illuminating the street lights.
- ❖ As the conventional source are depleting very fast, then it's time to think of alternatives. We got to save the power gained from the conventional sources for efficient use. So this idea not only provides

alternative but also adds to the economy of the country.

- ❖ Now vehicular traffic in big cities is more, causing a problem to human being. But this vehicular traffic can be utilized for proper generation by means of a new technique called "power hump".
- ❖ It has advantages that it does not utilize any external source .Now the time has come to put forte this type of innovative ideas, and also researches should be done to upgrade its implication.
- ❖ In future, if the flywheel speed control device and voltage protection devices are added with large generation process, it would be a model all over the world.
- ❖ After some modification of the designed project, the efficiency of the whole system can be increased by increasing the capacity of the generator and applying more weight.

**REFERENCES**

- [1] Mukherjee.D Chakrabarti.S, 2005, Fundamentals of renewable energy systems,New Age international limited publishers, NewDelhi.
- [2] Sharma.P.C,2003,Non-conventional power plants,Public printingservice, New Delhi.
- [3] "Production of electricity by the method of road power generation", IJAEEE, 2010.
- [4] "Every speed breaker is now a source of power", IPCBEE vol.1, 2011.
- [5] Ankita, Meenu Bala, *Power Generation From Speed Breakers*, International Journal Of Advance Research In Science and Engineering, 2(2), 2013.