

## GREEN ENERGY GENERATION FROM SPEED BREAKERS

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Power Generation,  
Speed Breaker,  
Rack and Pinion.

### ABSTRACT

In this technical research article, I am using a double sided rack and pinion arrangement to generate energy. Rack and Pinion arrangement is a mechanism which is used to convert the reciprocating motion to rotary motion. Whenever a vehicle would pass over the breaker, it would push it down. So rack will move downward and will rotate the gears. A gear train is used to increase the speed ratio at shaft of generator. Then the springs will push the breaker upside to its initial position and again it will rotate the gears. As the shaft of D.C. generator starts rotating, it produces electricity. This electricity is stored in a battery. This project will work on the principle of "Conversion of Mechanical Energy into Electrical Energy", Mechanical energy can be thought of as energy stored within a physical system. During daytime electricity is not needed for lightening the streets, so we are using a control switch which is manually operated. This control switch is connected by wire to the output of the battery. The control switching mechanism allows the current to flow when needed.

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## INTRODUCTION

The current demand of electricity is 13,750 MW, while hydro power production is 2920 MW; thermal resources produce 1900 MW; production through independent power producers (IIPs) is 6030 MW, which amounts total production of 10850 MW. Since this mechanism is convenient to produce considerable amount of energy with maximum efficiency, I have chosen this method of my project as a very simple and effective design for generating electricity using a double sided rack and pinion arrangement.

## OBJECT

The principal object of this system is to produce Green Energy from speed breakers. Another object of this system is to provide fuel less, cheapest electricity for our use and pollution free in all respect.

Also it would make the people aware of road safety & importance of breakers in human life & in nations progress.

## FIELD

The invention relates to the Rack and Pinion arrangement is a mechanism which is used to convert the reciprocating motion to rotary motion. In this project we are using a double sided rack and pinion arrangement to generate energy. It relates to the urban as well as rural development in the nation, being a social cause towards progress of country. It covers the area of mechanical & electrical engineering field.

## SUMMARY

The main goal of this project is to generate & promote the renewable energy. In this project we are converting the some portion of vehicle's kinetic energy into mechanical energy. Then this energy will be converted into electrical energy and we can use this energy for street lights and traffic signals.

The main concept I am using in this project is Double Sided Rack Pinion Mechanism. Rack pinion arrangement is used to convert the reciprocating motion into the rotary motion. Rack is connected to the speed breaker at surface. When breaker is pushed down by any vehicle crossing over it and it will transmit the motion to the rack so it will start reciprocating. A gear is in constant mesh with the rack which will convert the reciprocating motion of rack into rotary motion and will start to rotate. Here we are using a gear train which consists three gears of same module but different number of teeth. This gear train will help to increase the speed ratio by four times. The output shaft of this gear train is connected to the generator (dynamo). The dynamo will convert the mechanical energy (we are getting in the form of rotary motion) into electrical energy. After dynamo we are using an inverter which will transform the DC power into AC power and then we will store this energy into batteries. To increase the power generation capacity we are using double sided arrangement of this rack pinion mechanism. In the day time we can produce the energy by vehicles and can store it in batteries. In the time of night we can use this stored energy in all the street lights in nearby premises.

### Brief description of drawing

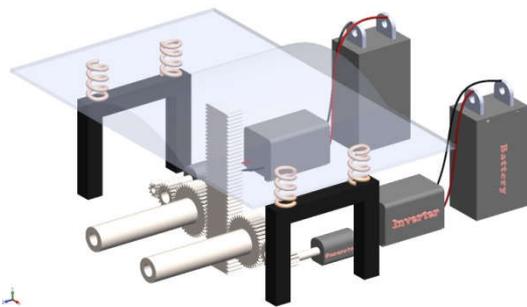


Fig 1. Complete Model of Project

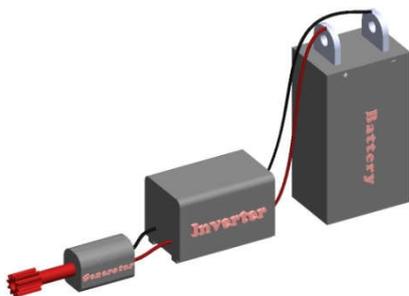


Fig 2. Power unit of model

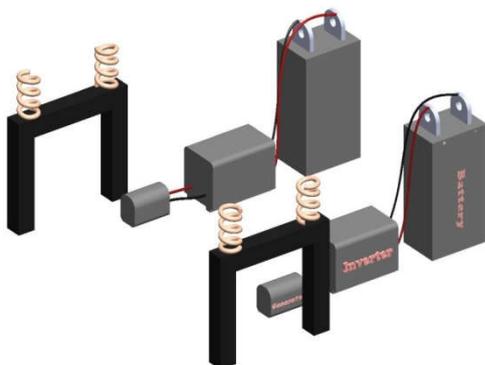


Fig 3. Spring arrangement under the breaker

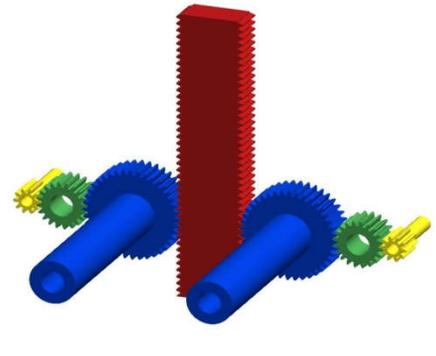


Fig 4. Double sided Rack and Pinion arrangement

### DESIGN WORK

Model calculation (160 kg)

The assumed mass of a vehicle = 160Kg

Height of speed brake = 10 cm

Work done = Force x Distance

Where, Force = Weight of the Body =  $160 \times 9.81 \text{ m/s} = 1569.6 \text{ N}$

Distance travelled by the body = Height of the speed brake = 10 cm

Output power =  $(1569.6 \times 0.1) / 60 = 2.616 \text{ Watts}$  (For One pushing force)

Power developed for 1 vehicle passing over the speed

Breaker arrangement for one minute = 2.616 watts

Power developed for one hour = 156.96 watts

Power developed for one day = 3.767 kW

Power developed for one month = 113 kW

Power developed for one year = 1356.2 kW

Model calculation (3000 kg):

The mass of a vehicle = 3000Kg

Height of speed brake = 12 cm

Work done = Force x Distance

Where, Force = Weight of the Body =  $3000 \times 9.81 \text{ m/s} = 29,400 \text{ N}$

Distance travelled by the body = Height of the speed brake = 12 cm

Output power =  $(29,400 \times 0.12) / 60 = 58.8 \text{ Watts}$  (For One pushing force)

Power developed for 1 vehicle passing over the speed

Breaker arrangement for one minute = 58.8 watts

Power developed for one hour =  $58.8 \times 60 = 3528 \text{ watts}$

Power developed for one day = 84.672 kW

Power developed for one month = 2540.16 kW

Power developed for one year = 30481.92 kW

### RESULTS AND CONCLUSION

During daytime electricity is not needed for lightening the street lights so we are using a control switch which is manually operated. This control switch is connected by wire to the output of the battery. The control switching mechanism which allows the current to flow when needed.

### ADVANTAGES

Using this technology one can get the following benefits:

- Maintenance cost is low.

- Less installation cost.
- Environment friendly and pollution free power generation.
- No manual work necessary during power generation.
- Simple initial construction and easy maintenance.
- Energy available all year round.
- No consumption of fuel.

## APPLICATIONS

- For home applications.
- For street lighting.
- For signal lighting.
- For small industry applications.
- For other application on the roads like loud speaker, signal light, road indicator, direction indicator etc.

The generated power is stored in the battery; one can use this charge to various purposes. Mainly the generated power is used in two aspects. During daytime electricity is not needed for lightening the street lights so we are using a control switch which is manually operated. This control switch is connected by wire to the output of the battery. The control switching mechanism which allows the current to flow when needed.

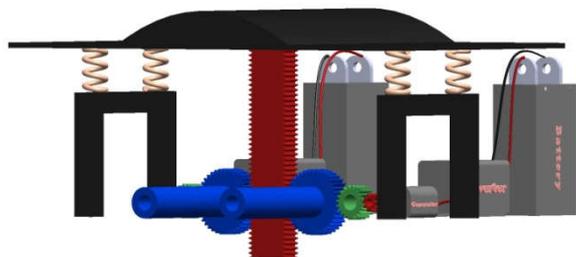


Fig. 5. Complete Model of Project

## Acknowledgement

I take this opportunity to express my deep sense of gratitude & whole hearted thanks to my teachers & elders for inspiring and encouraging me to explore myself.

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Under the effective guidance of my ideals, I have completed the final draft on Electricity Generation from Speed Breaker. My teachers has always focused on providing me a framework for better future for mankind & myself too. Also in shaping me to become an effective, skilled professional in coming future. I am very thankful to my parents for their kindness, constant encouragement, influential leadership & for the valuable time which they devoted to me. Also, thanks to my family & friends who directly & indirectly helped, supported & motivated me along the due course of completion of this research paper.

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