

“Literature Review on Electricity Generation using Speed Breaker”

**Akash Liladhar Gorle¹, Akash Narendra Patil², Akshay Vilasrao Thawale³, Shridhar Vinod Giri⁴,
Brinda Darjee⁵, Leena . H. Patil⁶**

Student, Department of CSE, P.I.E.T, Nagpur, India¹⁻⁵

Associate Professor, Department of CSE, P.I.E.T, Nagpur, India⁶

Abstract: In the current situation power has become a basic need for human life. The extensive usage of power has resulted in power crisis, and there is a need to develop methods of optimal utilization, which will not only ease the crisis but also preserve the environment. This paper attempts to show how the power can be generated through the speed breaker. Speed breaker plays very important role in slowing down the traffic and the idea we have come up with the speed breakers is that we can generate power through these speed breakers.

Keywords: Conventional Energy; Electricity; Kinetic energy; Speed breaker

I. INTRODUCTION

Modernization is the key of development for any country and as India is in the phase of development, a lot of things need to be changed, modified or developed. These changes and modifications of things to their newer versions is known as modernization. This modernization requires the use of various different machineries and technologies to get the work done and by mentioning the use of machines it is clear that electrical energy will be the backbone of this whole process. This is because; all the machineries and systems require electricity to operate. Due to this, electricity has become a very crucial resource and it is on a decrease day by day. The electricity currently being produced is not enough for the current pace of development and to cope up with it, the generation of electricity must be increased. At the same time, the resources which are used for generating electricity are also on a decrease. So, it is the need of the hour to save the conventional resources and also to increase generation of electricity.

II. LITERATURE REVIEW

The thought of generating electricity basically started from South Africa, where, a businessman felt the need for a generation of electricity without compromising on any resources. For this purpose, he thought of an idea and also brought into existence, the working model of this idea. His idea was to generate electricity using speed breakers. These speed breakers use the concepts of physics to convert the kinetic energy possessed by the vehicles running on the road into electrical energy, eventually generating electricity. This is where the plot for energy generating speed breakers was laid, later on, IIT Guwahati took over this project to overcome its limitations. The practical implementation of the electricity generating speed breaker has been very less and the result of the few places where it is implemented is still not known. Although, there have been many surveys to support the implementation of this idea.

One such survey was done by the Tamil Nadu electricity board. According to this survey, the electricity consumed by a remote village for 45 days is equal to the electricity consumed by all the street lights in one night in Chennai city. By this scenario, we can get an idea of the rate by which electricity is being consumed in India, also, this consumption rate is increasing day by day. Electricity and power can be called as the backbone for development and modernization of the country and therefore, the rapid speed of development has lead to a constant increase in the rate of electricity consumption. The figures also show a rapid increase in the electricity consumption in India from the year 2014 to 2017, the electricity consumption per capita of India in the year 2014 was 805.60kwh, whereas it was 1149kwh in the year 2017. Taking into consideration this situation, it is mandatory that either consumption of electricity must be reduced or the generation of electricity must be increased. The consumption of electricity can be reduced only to a certain limit, beyond this limit the development can be hampered. But, by conservation, the amount of electricity conserved will be in very small amount, hence, increasing the generation of electricity is the right option. Now, this increase in generation of electricity would result in more and more use of conventional resources, which are also on decrease, this creates a need to generate electricity without using conventional resources or at least using conventional resources in very small amount. Here the Electricity generating speed breaker would be perfect to apply as it can generate electricity without using any of the conventional resources.

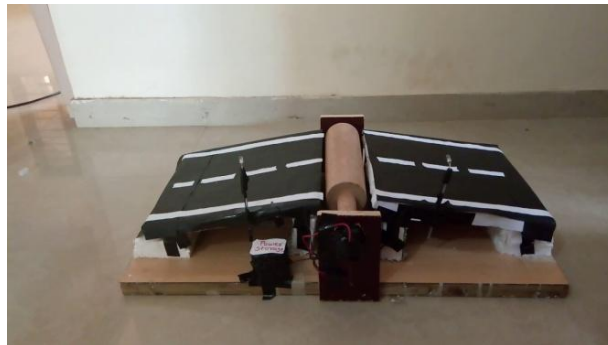
III. TYPES OF MECHANISM**1. Roller Mechanism:**

Fig 1. Roller Mechanism

In a roller mechanism, a roller is placed in between a speed breaker (rotational bump shaft) which is connected to a DC motor shaft. The Speed breakers provides some kind of grip so that whenever the vehicle passes over a speed breaker it rotates the roller. This movement of roller is used to rotate the shaft of D.C motor. Rotating bump rotates Dc motor (which is used as a generator). As the roller rotates the shaft of D.C motor, it produces electricity. Hence, kinetic energy through a rotation of a motor gets converted into its equivalent electrical energy. The electricity generated is then stored in a battery. The electricity which is stored in a battery can be used to lighten the street lamps on the road.

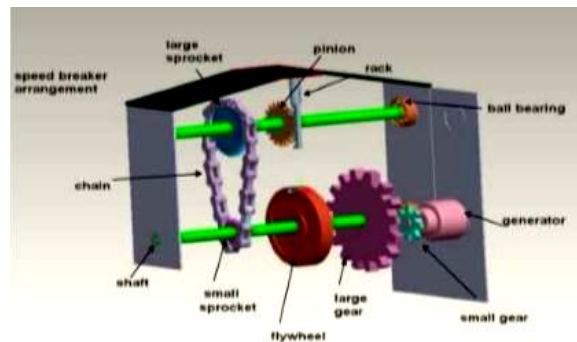
2. Rack and Pinion Mechanism:

Fig 2. Basic Rack and Pinion Mechanism

Rack and pinion Mechanism is an improvement in the speed breaker, generating system unit After Roller mechanism. This is the major improvement in speed breaker. The rack and pinion Mechanism uses gear that converts a rotational motion into a linear motion. The circular gear is the pinion which is connected to the lower part and the linear gear is the rack which is connected to the speed breaker. They interact through teeth in both the gears, when vehicle passes over the speed breaker the linear gear i.e. rack moves towards downward direction and give movement to the circular gear i.e. pinion. A circular gear rotates in clockwise direction. The axis of pinion is attached to the sprocket Mechanism arrangement that is made by using two sprockets, one is in larger size and other is in smaller size. When vehicle passes over the breaker, rack is pushed in downward direction which Gives Rotation to pinion which is connected with sprocket arrangement which is connected via chain, which transmits energy from the larger sprocket to the smaller sprocket. Energy from the larger sprocket transmitted to the smaller sprocket is the speed that is available at the larger one which is relatively multiplied at the rotation of the smaller sprocket. The smaller sprocket shaft is connected to the shaft of DC motor, when smaller sprocket rotates, it rotates DC motor shaft via gear assembly. Flywheel is connected to smaller sprocket which keeps DC motor in continuous Rotation. When circular gear i.e. pinion rotates in clockwise direction an electricity is produced, but when the linear gear i.e. rack moves upward, it slow down the speed of rotators or stop the Rotation of pinion that causes overall decreasing in system efficiency.

3. Spring coil mechanism:

The working principle of Spring coil mechanism is Simple energy conversion from Mechanical to Electrical. For generating the electricity using the vehicle weight (potential energy) as input while crossing the speed breaker.

Design of the speed breaker:

The material used in construction of speed breakers steel. The speed breakers shape is trapezoidal or parabolic the specification for Road Humps . As per Indian Road Congress are - . Height: 10-12 cm; Width: 3.5 meters;and the Length is same as the road width.



Fig: 3 Spring coil mechanism

Design of the spring:

The deflection of the spring is given by $\delta = \frac{64 w * n * N * R^3}{Gd^4}$ where δ -deflection (in our case maximum $\delta = 0.1m$) w -designed load R = means the diameter of coil, d is diameter of wire, n is number of spring turns, G is Modulus of rigidity = $8 * 10^4$ N/mm² and N is Number of springs The number of turns in the spring to get the diversion of 0.1m is given by $n = \frac{\delta Gd^4}{64 w * N * R^3}$. When vehicle passes over speed breaker, it moves downward due to the vehicles weight. The downward motion of speed breaker makes the shaft to rotate in dynamo and hence electric is power generated. The Working of Electric Dynamo is as. The magnetic lines of force are cut by the rotating wire coil, which makes a current to flow through the wire. In the armature The mechanical energy of rotation is thus converted into an electric current. Sprocket mechanism is used to Transfer the rotary motion between two shafts. In Gear mechanism, the input gear is used to transfers power to the output gear.

CONCLUSION

The existing source of energy such as coal, oil, etc may not be adequate to meet the ever increasing energy demands. These conventional sources of energy are also depleting and may be exhausted. These are some non-conventional methods of producing energy. This paper is a one step to path of exploring the possibilities of energy from several non-conventional energy sources.

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BIOGRAPHIES

Mr. Akash L. Gorle, perceiving BE in Computer Science and Engineering at Priyadarshini Institute of Engineering and Technology Nagpur, Maharashtra, India. He Received Diploma in Computer Technology from Maharashtra State Board of Technical Education Mumbai India. Currently he is working on Electricity Generation From Speed Breaker.



Mr. Akash N. Patil, perceiving BE in Computer Science and Engineering at Priyadarshini Institute of Engineering and Technology Nagpur, Maharashtra, India. He Received Diploma in Computer Technology from Maharashtra State Board of Technical Education Mumbai India. Currently he is working on Electricity Generation From Speed Breaker.



Mr. Akshay V. Thawale, perceiving BE in Computer Science and Engineering at Priyadarshini Institute of Engineering and Technology Nagpur, Maharashtra, India. He Received Diploma in Computer Technology from Maharashtra State Board of Technical Education Mumbai India. Currently he is working on Electricity Generation From Speed Breaker.



Mr. Shridhar V. Giri, perceiving BE in Computer Science and Engineering at Priyadarshini Institute of Engineering and Technology Nagpur, Maharashtra, India. He Received Diploma in Computer Technology from Maharashtra State Board of Technical Education Mumbai India. Currently he is working on Electricity Generation From Speed Breaker.



Miss. Brinda Darjee, perceiving BE in Computer Science and Engineering at Priyadarshini Institute of Engineering and Technology Nagpur, Maharashtra, India. Currently she is working on Electricity Generation From Speed Breaker.