

Generation of Electricity with the Use of Speed Breakers

Abstract: In this study an attempt is made to generate electricity using speed breaker. Electricity is generated by replacing the traditional speed breakers with a conveyor roller mechanism. As vehicles pass over the speed breaker, they spin the rollers which are connected to a DC generator which in turn generate electricity. This method is an effective way to produce electricity as the numbers of vehicles on the road are ever increasing. Also, the cost of fabrication of the model is low. It can be effectively placed near traffic lights, at the entrance of parking lots and any other place where the traffic density is high. Rollers are fixed on a mild steel ramp on which vehicle passes. As the vehicle passes over the breaker, rollers start rotating. A chain drive mechanism is provided which transfer the motion from the rollers to a DC generator for generation of electricity. This method provides an efficient way to generate electricity from the kinetic energy of moving vehicles on roads, highways, parking lots etc..

Keywords: Electricity, Speed breaker, Power source, Conventional, Non-conventional.

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I. INTRODUCTION

With rise in population the distribution of energy and power generation has become challenging daily, the transition from usage of conventional energy to non-conventional is highly required in current scenario. As the availability of the conventional energy sources such as fossil fuels are the main sources for power generation for current time period, new innovations would still be heavily required towards direction of green energy generation. The green energy utilization can change the recurrent impact on environment by the pollution levels while creating an un-biased distribution of electricity. (Shu)

In India, the environment is rapidly changing due to dependency towards fossil fuels and coal as the prime objects of power generation. Not only, the environment goes through a rapid change but humanity also compromises its health because of the air pollution that is also a part of the conventional process. Air pollution has emerged as one of the most serious threats to public health worldwide with 3.7 million deaths in 2012 from outdoor air pollution according to World Health Organization (WHO) and approximately 660,000 deaths

in India as estimated by Global Burden of Diseases (GBD) in 2013. (Lauri Myllyvirta, 2015)

With constant usage of the conventional based energy system environment has suffered and so has mankind. It is also clear that the technological advancement has also not yet reached to a stage where the non-conventional methods can replace the conventional. However, the positives about the non-conventional sources are: free of cost, pollution-free and inexhaustible. Man has used these sources for many centuries in propelling ships, driving windmills for grinding corn and pumping water, etc. Because of the poor technologies then existing, the cost of harnessing energy from these sources was quite high. (Non)

An attempt is done to show how energy can be tapped and use on a daily based system, the road speed breakers. As major portion of energy is wasted while crossing the speed breakers while dissipating heat and friction. Tapping this energy and generating power by making the speed-breaker as a power generation unit. The generated power can be used for the lamps, near the speed breakers. Also, in the project a self-designed comfortable ramp which can enhance the kinetic energy of vehicles in power generation. This type of ramp is

best suited for the places where the speed breaker is a necessary.

The work also discusses the shortcomings of existing methods.

II. LITERATURE REVIEW

Environment degradation due to consistent energy spending needs a rational and pragmatic approach, using non-conventional renewable methods for drawing energy can help sustain the environment while creating green energy.

In India, the power consumption has spurred so much that under the 12th Plan, the total capacity addition for power generation was 88537 MW, against this, the actual capacity added till December 2014 was 49058.22 MW. (Commission, 2012) This shows that a need to use other methods for power generation and distribution is required. Use of speed breakers so as to generate electricity is one of the techniques which can help curb the energy crises as well as pollution generated through fossil fuel based energy consumption.

Aniket Mishra (2013) invented a technique to create electricity in rural areas that lack sufficient distribution. A similar approach was started in South Africa as their current electrical crisis in opposition to their heavy demand made them to implement this method to light up small villages of the highway. Techniques that are used both in India and South Africa are Air Piston mechanism, Rack and Pinion mechanism, and Roller mechanism.

Kanak Gogoi (2012) project claims to generate sufficient energy which can be used for sustaining street lights. However, the only problem with the mechanism is that is workable and efficient for vehicles that are above 1000kgs, this raises the concern for the two-wheelers as well. The breakers are large in size which also creates a concern for installment and deep-excavation which makes it costly.

Piyush Bhagdikar (2012) proposed a model which is based on roller mechanism was developed by VIT

University Chennai Campus, uses rollers which generates electricity. The setup uses simple rollers that use the vehicular motion as a mechanism to spin off the rollers which in turn is transformed into energy. With a single run of 2 wheeler, 0.06W/tire is produced through the model.

However, the roller mechanism is not self-capable to generate electricity and the usage of rollers in the model are not optimum in size, which makes a concern for proper movement of the rollers in order to generate sufficient energy.

Therefore, the conveyer mechanism creates optimum grip within the roller mechanism in order to generate electricity, the purpose of the conveyer is not only to generate the sufficient electricity but also to create minimal friction which is also one of the functions of speed breakers. In the conveyer roller mechanism the rollers are also large in size which can hold the sufficient weight of the different type of vehicles.

III. METHODOLOGY

In conveyer roller mechanism the rollers are connected using a conveyer belt which enhances the setup providing more efficiency and low cost. In the setup, the mechanism is adopted in such a way that the motion of the car drives the rollers producing torque within these rollers which in turn drives timing belt that is attached to the setup. The motion from the rollers rotates the shafts of dynamos which is channeled to the capacitor bank while storing the current generated in small quantities. The capacitor bank transfers the stored current to a battery so that a continuous flow of current can be utilized for further use.

The dimensions of the constructed model is show in Fig. 1. The figure also shows the arrangement of different components used in the model.

A. Final Dimensions of the proposed model

The approximate dimensions for the setup which is specifically designed for two wheeler vehicles and other LMV's:

generated from the first roller transfers onto the second roller through the conveyor belt.

The conveyor is attached in such a way that it also creates motion between first and fourth roller. Now, considering that the vehicle's rear tire passes over the conveyor the torque produced within the rollers is then passed onto the dynamo. This makes a 100% complete rotation state. The torque is transferred from the rollers to a DC generator which generates current that can be stored in a battery for further use.

Fig. 3, shows the generation of electricity through the speed breaker using the aforementioned working procedure.



Fig. 3: Electricity generation through the model using a vehicle

IV. RESULT ANALYSIS AND DISCUSSION

As proposed, the model is able to produce following benchmarks:

Table 2: Voltage generated to the rotation of the rollers

Voltage (V)	Rotation of Rollers
3.2V	0.5 (half)
6.3V	1 (full)

The voltage is totally proportional to weight and rotation of the conveyer with the latest data in the mechanism, the standard LED cluster attached with the box which glows under minimum of 3V to 8V. Intensity

varies according to generation of the voltage. The carrier here has a standard battery of 6V 0.45Ah.

A. Result

The amount of voltage generated based on the intensity which depends on the following factors:

- Load
- Rotation Rollers

Table 3: Current Generated to the Voltage

VOLTAGE (V)	CURRENT (mA)
3.2V	24
6.3V	47
8V	59

B. Discussion

Conveyer roller mechanism can be a direction towards a sustainable means of energy production. It has certain advantages like simple construction, ease of installation and easy maintenance. No external source is required for power generation. Due to low investment in production, the project is highly economical than other research models. Power generation is simple and can use a battery to store generated power. Also, the capacity to generate electricity varies as different vehicles have different weight. Therefore, a heavy vehicle will generate more electricity. However, a difficulty is faced in achieving a proper balance of speed and torque.

V. CONCLUSION

The energy produced will be much more significant as compared to the experimental results obtained, making it a good energy production setup. In this study, a new technique has been proposed to produce electricity from speed breakers. This technique will help curb down pollution levels while generating optimum green energy.

The project can also be modified by using camshaft and pulley, gears instead of coupling which is used in the current model. The transformation will reduce the complexities and difficulties faced during the project.

The current model can be used in metropolitan cities and even in rural areas. This can also create better energy distribution to areas which have subsistence levels of electricity. Arrangement of the setup is comparatively easier. The stored electricity could satisfy the daily requirement of electricity.

This paper aims at gaining wide attention towards non-conventional energy sources that can someday hope to replace the existing power generation methods.

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