

Production of Electricity by the Method of Road Power Generation

¹Harish Kumar Patel; ²Sumit Kumar Dutta; ³Praveen Sahu & ⁴Keshav Das

¹Lecturer & HOD Mechanical Department, Government Polytechnic Jashpur(c.g.) E-Mail-
harish.patelhydra@gmail.com

²Department of Mechanical Engg. (Diploma), Government Polytechnic Jashpur(c.g.)
E-mail-sumit.dutta39@gmail.com

³ Department of Mechanical Engg. (Diploma), Government Polytechnic Jashpur(c.g.)
E-mail-praveenkumarsahu14@gmail.com

⁴Department of Mechanical Engg(Diploma), Government Polytechnic Jashpur(c.g.)
E-mail-kesavkumar187@gmail.com

ABSTRACT

This paper presents advantageous concept of the present day situation, energy is a foremost necessity for human life. Here we study of electricity generation through the speed breaker mechanism. There is a must to cultivate non- conventional bases for power generation due to the purpose that our conventional sources of power are attainment scarcer by the day. This paper highlights on the knowledge that the kinetic energy receiving wasted while vehicles move can be used to produce power by using a special planning of Gear, chain, sprocket, shaft and bearings. This engendered power can be used for general purpose uses like street lights, traffic signals etc. For obtaining the electricity through the speed breaker mechanism 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. This D.C. voltage is stored to the lead 12-volt battery. The battery is connected to the inverter which is use to light a bulb and run fan

Key words- :-

Road Power Generation (RPG); simple drives

mechanism, vehicles weight (potential energy) & motion (kinetic energy), road-speed breakers.

1. INTRODUCTION

Country like India there is a greater need of sources but the system is not capable, this project can be a great achievement for undeveloped population of India. In our project we are working on a mechanical system which can convert road vehicle energy into a shaft energy which could be further converted to the electric energy by means of dynamo or other electrical device [1][2].

Today world use energy in many form whatever its nature, but consumption of energy is a big crises now a days there are many form of energy and its conversion of energy in one form or the other the development of the clouds, the motion of the air and the kinetic energy of water are a few instances that stand testimony to this fact? The extensive tradition of energy has motivated in an energy crisis, and there is a need to advance approaches of optimal consumption, which will not only ease the crisis but also reserve the environment. Energy conservation is the inexpensive new source of energy.

Generation of power on road is one of the most current power generation ideas. RPG device

converts the kinetic energy of the vehicles into electric energy by installing mechanism on the road, it takes the pressure motion of the vehicles and converts it to the rotary motion by crank mechanism including gear and chains and it generates the electricity.

This Project is executed by using simple drive machinery such as Roller, some interfaced Electrical apparatuses and chain drive Mechanism. The basic principle is simple energy conversion form mechanical to electrical energy by means of the vehicles weight (potential energy) & motion (kinetic energy). Here the procedure of Electric Power Generation comes under the Mechanism of Electro-Kinetic power Generator. The electro-kinetic power generator is a technique of producing electricity by harnessing the kinetic energy of automobiles that energies over the track. The track operates by virtue of a number of specifically designed rollers placed on it. When the vehicles pass on the rollers, pressure is exerted on them, which advances the mechanical energy and by means of a specially designed mechanism, a generator is driven, which is accomplished of producing AC/DC current.

2. LITERATURE SURVEY

Watts,G, [3] this paper deals with the crises of energy resources to an economy. The studies to leads towards shortcoming of energy crises by the idea of generating power using speed breaker. Firstly, South African electrical crisis has made them executed this method to light up small villages of the highway. The idea is basic physics, to transform the kinetic energy into electrical energy that departed wasted when the vehicle runs over speed-breaker.

Piyush et al. [4] In this study a novel technique has been projected to gate electricity from speed breakers. This method will help to preserve our natural resources. For a vehicular flow of 40400 per day, which includes 2/3/4/6/8 wheelers, the

energy formed will be much more significant related to the experimental results obtained, thus making it a good energy creating setup as energy of vehicles on impact with the speed breakers is nevertheless lost. This is lost to heat and sound. This energy can be tapped, stored and used as back up or for small tenders.

Priyadharshini.M [5] the application of energy is a sign of the development of a nation. For example, the per capita energy partaking in USA is 9000 KWh (Kilo Watt hour) per year, while the consumption in India is 1200 KWh (Kilo Watt hour). One might accomplish that to be substantially rich and prosperous; a human being needs to ingest more and more energy. A recent survey on the energy depletion in India had published a pathetic report that 85,000 villages in India do not still have electricity. Supply of power in most part of the country is poor according to the study by Priyadharshini.M in “Every Speed Breaker Is Now a Source of Power”

Totaram [6] this paper says about uses a platform plate which is kept persuaded on a raised base level to permit vehicles to pass over the raised surface. This system will not work till a vehicle passes on road way and by Ankit Gupta, Kuldeep Chaudhary & B.N Agrawal and slider crank by Noor Fatima and Jiyaul Mustafa in “Production of electricity by the method of road power generation” [8] in “An Experimental study of Generation of Electricity using Speed Breaker”[7] have been suggested for producing electricity.

3. METHODOLOGY

The methodology used in project work is similar to prototype modeling. In this project we are constructing a prototype of our project. We will use a 1/10th scaled mechanical arrangement and for applying conditions of trigger or actuation we will use artificial mechanical arrangement which could be actuated by ourselves. We will use the smaller scaled model of road power generation system.

3.1 Materials: there are several basic materials required to generate electricity by the road speed breakers. The main material were used as wooden frame with metal parts and chain system, and sensing element.

3.2 Name of the component & its specification:

1. Springs:
 - (i) Load bearing capacity: 6- 7kg
 - (ii) Material: Mild Steel
 - (iii) Total displacement: 2 inch
2. Chain drive:
 - (i) No. of teeth on big sprocket: 48
 - (ii) No. of teeth on small sprocket: 19
 - (iii) Distance between the center: 16 cms
3. Gears:
 - (i) Material: Mild Steel
 - (ii) No. of teeth: 56 (big gear)
 - (iii) No. of teeth: 48 (small gear)
 - (iv) Type: Spur gear: It is a non slip power transmission device with fixed velocity ratio. It is desired for adjusting some linear imposition. It should have high wear and tear, shock-absorbing capability.
 - (v) No. of gear used: 2
4. shaft:
 - (i) Diameter : 8mm
 - (ii) Material: Mild steel
 - (iii) Length: 381mm
5. bearing :
 - (i) Type: Rolling contact bearing: it has rolling element fixed on outer cages that provide line contact with surface it Carries a load by placing round elements between the two pieces. The relative motion causes the round basics to roll (tumble) with slight sliding. They decrease the friction and transmit the motion efficiently.
 - (ii) Bearing no. N40
6. D.C. generator: It is a device, which converts mechanical energy into electrical energy. The dynamo customs rotating coils of wire and magnetic fields to convert mechanical rotation into a pulsing DC by virtue of "Faraday"s law of electromagnetic induction". A dynamo machine consists of a motionless structure, called stator, which provides a constant magnetic field, and a set of rotating winding called the armature which

turns inside that field.

7. Battery

8. Inverter

Once this component is arrange it looks like following figure:

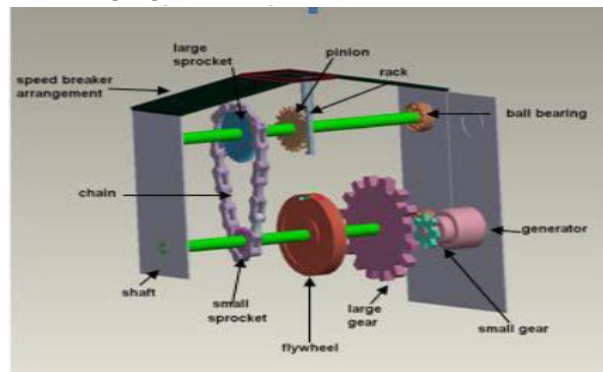


FIG 1 Schematic diagram for the road power generation

4. WORKING

Road Power Generation (RPG) is a system design to capture waste and kinetic energy from all vehicles. It is a device use to converts the kinetic energy of the vehicles into electric energy. This is done by poignant plate installed on the road, this plate captured very small movement from the road surfaces and it shifted to a key way flywheel system. From hundreds of wheel lies a single flywheel having used to driving machinery. The RPG comprised the method of driving one flywheel to alternative, once it reached setting velocity. The RPG flywheel system has been established to achieve large amount of moment of inertia in relatively small space. The apprehended energy is converted into electricity which is served into power grid.

In this project the two flip plates are mounted on the road surface and these plates are followed by the rack and pinion arrangement. Pinion is mounted on the shaft which is attached to the frame via bearing. Frame is installed under the road. The flywheel with pulley is mounted on the shaft and second pulley is mounted on the D.C. Generator and these two pulleys are connected with the help of v belt. As wheel of the vehicle reaches upper most position of the plate, plates get slide through guide, simultaneously rack moves

downward provide torque to pinion. The pinion transmitted this torque to shaft. Shaft is supported by two bearings attached on wall of frame.

This arrangement functions to enhance rotation of flywheel for small motion of shaft.

5. ANALYSIS

- The calculation of the road power generation system will be made after the preparation of the prototype.
- The calculation part will contain the dimensional and specific details of parts of the system.
- The analysis will contain the practical data according to which the discussion of result will be made about its applicability in real life.
- The final decision will be made according to the efficiency and performance by supervisors for this project.

6. EXPECTED RESULTS AND

DISCUSSION

- The very first expectation from the project is its accuracy and safety parameters.
- The road power generation system is expected to be proven useful for daily life application.
- The prototype analysis will give some positive results so that further analysis could be done.
- The project work is expected to be done accurately for a good applicable improvement of mankind.

7. OUTPUT POWER ESTIMATION

Let it consider for RPG,

- The mass of a vehicle passed over the speed breaker= approx. 300Kg
- Height of speed breaker = 10 cm
- 3. Work done = Force x Distance
- Force = 300 Kg x 9.81 = 2943 N

- Distance traveled by the body = 10 cm
- Output power = $(2943 \times 0.10)/60 = 4.905$ Watts
(For One assertive force)
- Power developed for 1 vehicle fleeting over the speed breaker organization for One minute = 4.905 watts
- Power developed for 24 hours = 7063.2 KW

This power is sufficient to burn four street lights in the roads in the night time.

CONCLUSION

In this world of new technology and innovation point of view RPG is new kind of alternative source of energy. This is a type of vibration gathering. This used waste energy of vehicles and converts kinetic energy to electric energy. RPG probable answer for battery charging station and it may be possible the electric vehicle can be refreshing with green power and power coming from electric vehicles earned wasted kinetic energy. The higher occurrence of passing vehicles delivers higher capacity of electricity generated by road power generation. In coming days, this will demonstrate a great boon to the world, since it will save a portion of electricity of power plants that gets wasted in enlightening the street lights. We got to save the power gained from the conventional sources for well-organized 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 delinquent to human being. But this vehicular traffic can be utilized for power production by means of new technique called “power hump”.

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