

Road Power Generation

Jaiprakash

Electrical Engineering, Bhartiya Institute of Engineering and Technology, Sikar, Rajasthan, India

Abstracts: *This paper presents the overall concept of Road Power Generator (RPG) that deals with the mechanism to generate electricity from the wasted kinetic energy of vehicles. It contains a flip-plate, gear mechanism, flywheel, and finally a generator is coupled at the end so that the rotational motion of the flywheel is used to rotate the shaft of the generator, thus producing electricity. RPG does not require any piezoelectric material. It is novel concept based on flip-plate mechanism. The project can be installed at highways where a huge number of vehicles pass daily, thus resulting in more amount of electricity generated. This generated electricity can be utilized for different types of applications and mainly for street lighting, on road battery charging units and many domestic applications like air conditioning, lighting, heating, etc.*

Keywords: Flip-Plate, Flywheel, Lead Acid Battery, Permanent Magnet D.C. Generator, Flywheel

1. Introduction

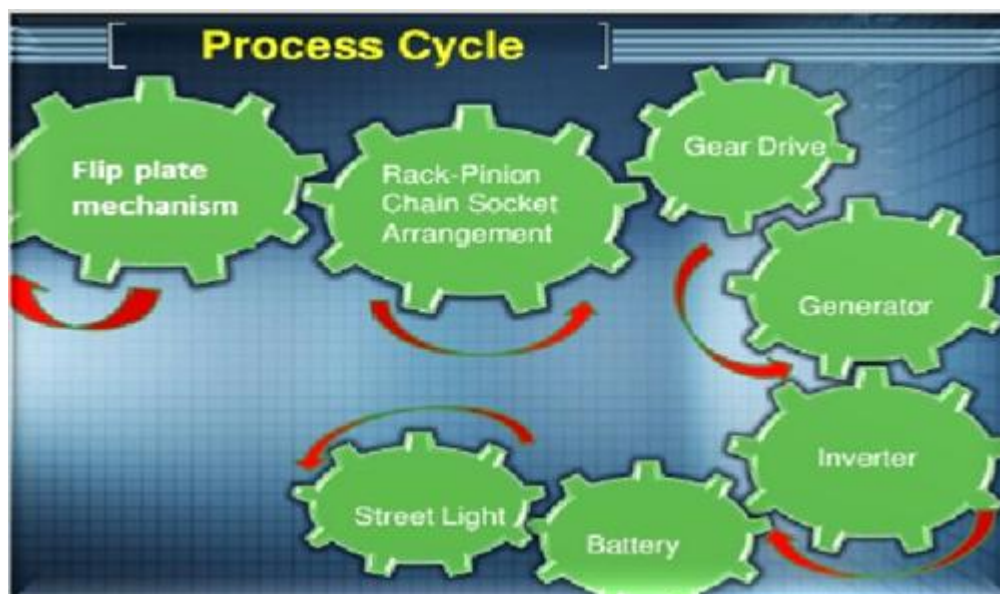
The automotive industry in India is one of the largest in the world and one of the fastest growing globally. In 2017, a total of 97.3 million cars and commercial vehicles were built worldwide. We every day mesh up with these vehicles give us headache. But this mesh up could be answer of new type power generation. Road Power Generation (RGP) is one of the most recent power generation concepts. This device is engineered as a practical and useful alternative energy technology for generating clean electricity from the millions of vehicles on our roadways. We every day mesh up with these vehicles give us headache. But this mesh up could be answer of new type power generation. Road Power Generation (RGP) is one of the most recent power generation concepts. This device is engineered as a practical and useful alternative energy technology for generating clean electricity from the millions of vehicles on our roadways.

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 street lights on road etc.

2. Working Principle

Road Power Generation (RPG) 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 RPG included the method of driving one flywheel to another, once it reached predetermined velocity. The RPG 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.



Volume 8 Issue 8, August 2019

www.ijsr.net

Licensed Under Creative Commons Attribution CC BY

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. The shaft having pulley and flywheel arrangement on shaft through one way bearing. This arrangement functions to enhance rotation of flywheel for small motion of shaft. The bigger pulley has 2 belts coupled with smaller pulley mounted on the D.C. generator shaft. The d. c. Generator converts the rotation of smaller pulley into electricity.

3. Calculation

Assuming the weight of the two wheeler = 270Kg.

Assuming the location as toll booth

Assume Average speed of the vehicle = 20km/hr

Maximum height of the plate = 10cm

We know that, For mechanical system the power is the combination of force and movement. Therefore power is the product of a force on an object and its velocity

Output Power calculations:

Let us consider

The mass of a vehicle moving over the flip plate = 270 Kg

Height of the plate from surface = 10 cm

Work done = Force x Distance

But, Force = mass x acceleration due to gravity

=270x10

=2700N

Therefore,

Work done/sec = (2700x 0.10/60)

= 4.5 watt (for one pushing force)

Therefore, power developed for 1 vehicle passing over the flip plate for one minute = 4.5 watt

Power developed for 60 min (1 hr) = 270 watt/hr

Power developed for 24 hrs = 6048 KW/day

4. Application

Power generation using speed breaker system can be used in most of the places such as:

- 1) This technique can be used in all highways.
- 2) This technique can be used in all roadways Speed brake.
- 3) This mechanism of generating of electricity can be placed on the actual speed breaker of the roads.
- 4) The power is Generated when the vehicles pass through it. Which in can be stored in the battery.
- 5) This power can be used in many Places after using the inverter, which enhances in the voltage from 12 volts to 230 volts.
- 6) This power can be used in the following:
 - Street Lights
 - Road Signals

- Sign boards on the roads
- Lighting Of the bus stops
- Lighting of the check post on the highways etc

5. Conclusion

Road Power Generation is a new type of unconventional source of energy. This uses wasted energy of moving vehicles. It converts kinetic energy developed from moving vehicles to electric energy. RPG is possible answer for battery charging station and also for the lightning of the street light. The higher frequency of passing vehicles provides higher capacity of the power.

References

- [1] <https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=6&cad=rja&uact=8&ved=2ahUKEwjrp9yD7NbfAhXOfSsKHRSGAiMQFjAFegQICRAC&url=http%3A%2F%2Fciteseerx.ist.psu.edu%2Fviewdoc%2Fdownload%3Fdoi%3D10.1.1.645.9199%26rep%3Drep1%26type%3Dpdf&usg=AOvVaw3nxP8L5WyklrNRxmbLpInp>
- [2] https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKEwjrp9yD7NbfAhXOfSsKHRSGAiMQFjAAegQICrAB&url=https%3A%2F%2Fwww.researchgate.net%2Fpublication%2F317330491_Design_of_Road_Power_Generator_RPGan_Alternate_Energy_Source_for_Sustainability&usg=AOvVaw2BOuxFfDGxn8BIYh_lpOye
- [3] <https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&cad=rja&uact=8&ved=2ahUKEwjrp9yD7NbfAhXOfSsKHRSGAiMQFjACegQICBAC&url=http%3A%2F%2Fijsetr.org%2Fwp-content%2Fuploads%2F2014%2F03%2FIJSETR-VOL-3-ISSUE-3-560-562.pdf&usg=AOvVaw3bd0-cmizszjYjzjTunvIP>
- [4] https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=2ahUKEwjrp9yD7NbfAhXOfSsKHRSGAiMQFjABegQIBBAB&url=https%3A%2F%2Fwww.researchgate.net%2Fpublication%2F266484527_Production_of_electricity_by_the_method_of_road_power_generation&usg=AOvVaw37pIs p22MsfxRA4qWALIy8
- [5] https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=5&cad=rja&uact=8&ved=2ahUKEwjrp9yD7NbfAhXOfSsKHRSGAiMQFjAEegQIBRAB&url=http%3A%2F%2Fwww.engpaper.com%2Fspeed-breaker-energy.html&usg=AOvVaw0AwE_PBWUJ9jSaETXhfm9J