

POWER GENERATION BY A SPEED BREAKER

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Abstract - The idea of this project comes from when we were on the trip. In this trip we pass through many speed breakers. We reduced the speed of the vehicle. At that time I saw that when the vehicle pass through the speed breaker a lot of energy is generated. By speed breaker we can convert the generated energy into electrical energy. The kinetic energy of our vehicles can convert into mechanical energy. With the help of rack and pinion mechanism this energy again converts into to electrical energy. This energy is stored in batteries. This stored energy is will be us in street lights and for the mobile charging. It will fulfill the public need of electrical energy. By this system we can save the energy and fulfill demand. This system will not work properly no rainy season because it gets rusted. Energy will produce only by heavy vehicles light vehicles are not good for this system

Key Words: Speed breaker, Rack and pinion mechanism, Power Hump.

1. INTRODUCTION

In present times, energy has become an essential and fundamental need for human life. As human life is advancing, so the demand for energy resources is increasing. In the present scenario, we are most dependent on conventional energy sources, the mean of conventional energy sources are that the energy that is generated from coal, oil, natural gas, nuclear power. Natural resources are available in limited quantities. Due to their increasing usage, the crisis of their end is looming. It has become necessary that we pay more attention to the use of non-conventional resources, which reduces the dependence on conventional energy sources. In our paper, we will discuss the new technology of energy production. So here we will discuss how to produce energy from a speed breaker.

The rate of development of any developed country can be measured on the basis of consumption energy per capita. In terms of energy consumption in developed countries like America, the total consumption of energy in 2016 was 12071 kWh while in our country India's energy consumption was only 1181 kWh in 2016. There are no electricity resources available in 80000 villages in India even today. This clearly shows how important the contribution of energy is to the economic progress of any country. Energy plays an important role in the development of human life.

We can produce energy using a speed breaker. When a vehicle passes through any speed breaker it produces kinetic energy. This kinetic energy is wasted on the speed breaker itself. We change this kinetic energy into mechanical energy by converting it into electrical energy.

Market failure is possible when monopolistic manipulation of markets occurs. Industrial operations such as strikes organized by the union government embargo can cause a crisis. The reason may restrict fuel supplies from developing at oil refineries and port facilities, developing at infrastructure, sometimes bottleneck. Abnormally cold weather causes an emergency. EMERGING SHORTAGES crisis that currently exists includes. The availability of regular conventional fossil fuels will be the main source for electricity generation, but there is a fear that they will run out for the next few decades. Therefore, we have to examine some anticipated, alternative, new sources for electricity generation, which are not less than a few years from some major problems, which is becoming the existing topic for today is the pollution, it suffers all the having organisms of all kinds as on the land, in aqua and in the air. Power stations and automobiles are the major polluting places. We have to investigate other types of renewable energy sources that produce electricity without using commercial fossil fuels which are not producing a harmful product. There are already is existing such systems using a renewable energy source such as wind energy, ocean thermal energy conversion for power generating. The latest technology which is used to generate power by such renewable energy POWER HUMP.

1.1 Rack and pinion mechanism

The rack and pinion mechanism in AutoCAD is illustrated in figure shows that when a car reaches on the speed breaker it applies weight on the speed breaker. The rack is connected with the speed breaker and two pinions mesh across the rack. Due to the weight on the speed breaker, rack moves downward and linear motion is obtained. It rotates the pinions which are attached on the both sides of the rack. At this point, linear motion of rack converts into angular motion. Only right sided pinion transfer power and pinion meshed on left side keep rotating without transfer of power. Figure 1 represent that four springs help the speed breaker to move upward and thus. Only left sided pinion transfer power and pinion meshed on right side keep rotating without transfer of power a complete cycle of linear to rotary motion and s obtained. The pinions were designed to work as a sprocket of

the bicycle. At load, one side of pinion engages and another side of pinion disengages. The transfer power in forward as well as the reverse stroke of speed breaker respectively and provide continuous angular motion.

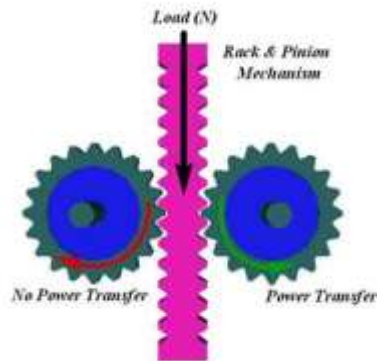


Fig 2 display working principle of rack and pinion mechanism internal mechanism of Speed breaker power generation in AutoCAD. Different teeth and diameter of gear are mounted on both pinion's shaft to maximize the number of revolutions. The gear mounted on the common shaft is placed between both pinion's shafts. Flywheel is mounted on the common shaft. It keeps the rotation of the shaft of the generator through a belt. The shaft of maximum RPM is coupled with DC generator. According to Faraday's law of induction when coil moves inside the magnetic field, it generates electric current. It rotates the rotor of the generator and in this way, the electricity is generated

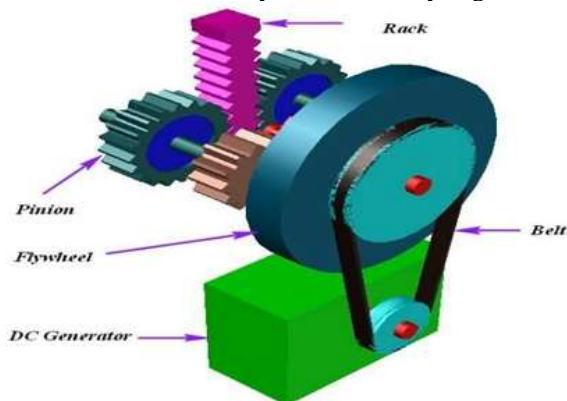
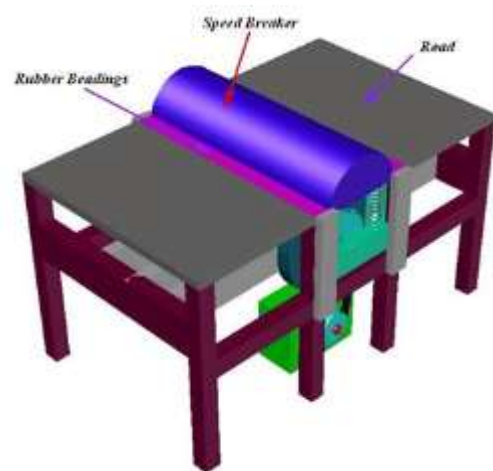


Figure represents the 3D model of Speed breaker power generation mechanism in AutoCAD. Figure 3a identify 3D model by offing road and breaker. Four springs are used to provide the upwards motion utilizing energy (under the application of restoring force when the load is removed) rack moves upward and regain its original position. Two supports whole mechanism. Guide slots lead speed breaker is line to save it from trouble. Rubber beading are used around the edge of power generation speed breaker to prevent water and dust from entering into figure 3(b) illustrate the complete 3D model of speed breakers power generation mechanism.



3. Design concept

Our design was based on the idea of providing a way to generate electricity from kinetic energy of the vehicle. The basic idea is to make use of a turbine Dynamo system to generate electricity by energy conversion from kinetic energy from the vehicle into electricity by the means of electromagnetic induction.

This electric energy is generated is the rectified and regulated for protection against fluctuation in energy generated and hence voltage fluctuation. The electric circuit provides the current inconvenience. This can be used to power the streets light, traffic signal either directly or by storage in a power bank (battery) which can be used later.

3.1 Electric power generation

It is process of generation of electricity by convention from sources like heat, wind power, hydro power, and geothermal energy. There are several methods of conversion of the energy of various forms into electricity exit which included.

3.2 Using magnetic induction motors or Dynamo

The mechanical energy of rotation is used to rotate turbines which can in turn rotate the coils in motors; these are surrounded by magnetic fields. This includes an electric potential within the coil and a current passed when the load is connected to it.

4. Working:

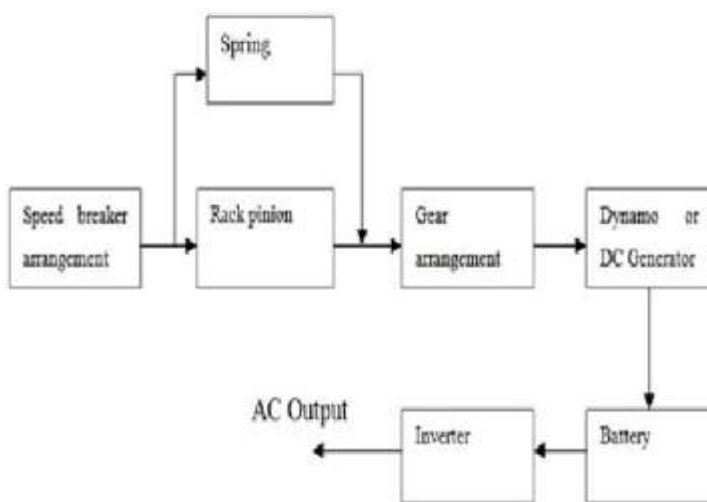
While moving, the vehicle possesses some kinetic energy which is being wasted. This kinetic energy can be utilized to produce power by using special arrangements Called POWER HUMP. It is an electromechanical unit. It utilized both mechanical technologies and electrical technologies for power generation it's storage. Power Hump is a dome-like device likely to speed breaker. The vehicle is permitted to pass over the dome structure. It gets pressed downward then the spring that is attached to the dome is compressed

and the rack which is attached to the bottom of the dome moves downward in a reciprocating motion.

Since the rack has teeth connected to a gear, there exists the reciprocating motion of rack into rotary motion of gears the two gears are rotating in opposite direction. A flywheel is mounted and on the shaft whose function is regulates the fluctuation in the energy make energy uniform. So that the shaft will be rotating with certain RPM this shaft is connected throughout the belt drive to the Dynamo, which converted the mechanical energy into electrical energy. The energy conversion will be proportional to the density of traffic. When an armature rotate in the magnetic field of south and North poles an emf (electromagnetic force) is induced in it, so for inducing the emf armature coil rotate, for rotating this armature it is connected to the shaft.

By rotating the same emf is induced for this rotation kinetic energy of moving vehicle is utilized. The power is generated in both directions, to convert this power into one way to a special component called diode for a continuous supply. All this mechanism can be housed under the dome, like a speed breaker which is called hump. The electric output can be improved by arranging this power Hump in a series. This generated power can be amplified and stored by using the different electric devices.

5. Block diagram:



6. Construction detailed

Various machine elements used in the construction of power hump are

- Rack
- Spur gear
- Flywheel
- Bearing
- Shaft
- Spring Electric dynamo

6.1 Rack and pinion:

A rack and pinion is a type of linear actuator that comprises a circular gear (the pinion) engaging a linear gear (the rack), which operates to translate rotational motion into linear motion. Driving rack linearly will cause the pinion to be driven into the rotation. A rack and pinion drive can use both straight and helical gears.

6.2 Spur gear:

The two parallel shafts connected to the gears. These gears are called spur gears and an arrangement is known as spur gearing. These gears have teeth same line to axis of the wheel.

6.3 Flywheel:

The net torque imparted to the crankshaft during one complete cycle of operation of the engine fluctuates causing a change in the angular velocity of the shaft. To achieve a uniform torque, an inertia mass in the form of a wheel is attached to the output shaft and this wheel is called the flywheel.

6.4 Bearing:

A bearing is a machine element that constraint relative motion to only the desired motion and reduces friction between moving parts. The design of the bearing may be provided for free linear movement of moving part or for free rotation around a field axis or it may present motion.

6.5 Shaft:

A shaft is rotating machine element usually circular in cross-section which is used to transmit power from one part to another or from a machine which produces power to a machine which absorbs power.

6.7 Spring:

A spring is defined as an elastic member, whose main function is to select under the action of load and recover it original shape when the load is removed.

6.8 Electric Dynamo: This electricity generating device that produces principle of electromagnetic induction. The coils of conductor wires are rotated in magnetic fields which cause a potential difference across its two ends by induction Electricity is produced when a conductor goes through a caring field.

6.9 Battery:

It is a device used to store energies. This store energy can then be used to light the street light. Conclusions a major role in human's life. Due to population explosion, the current generation has become insufficient to fulfill requirements. In this project, we discover technology to generate electricity from speed breakers in which the system used reliable and this technique will help conserve our natural resources. In coming days this will prove w great boon to the world since it will save a lot of electricity of power that gets wasted in illuminating the street lights. As the conventional sources are exhausted very fast, it's very important time to think of alternative resources. We have to save the power gained from the conventional sources for future use. So this idea not provides alternative but also adds to the economy of the country.

Conclusion:

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