

Fabrication and Analysis of Roller Generator from Speed Breakers

U.Siddhartha Reddy

Student,

Dept of Mechanical Engineering,
VITS College of Engineering,
Sontyam, Anandapuram, Vizag.

S.Sandeep Kumar

Student,

Dept of Mechanical Engineering,
VITS College of Engineering,
Sontyam, Anandapuram, Vizag.

V.N.Mani Shankar

Student,

Dept of Mechanical Engineering,
VITS College of Engineering,
Sontyam, Anandapuram, Vizag.

Mr.P.V.S Murali Krishna

Associate professor,

Dept of Mechanical Engineering,
VITS College of Engineering,
Sontyam, Anandapuram, Vizag.

Introduction:

An innovative and useful concept of Generating Electricity from a Speed breaker is our step to improve the situation of electricity. First of all what is electricity means to us? Electricity is the form of energy. It is the flow of electrical Power. Electricity is a basic part of nature and it is one of our most widely used forms of energy. We get electricity, which is a secondary energy source, from the conversion of other sources of energy, like coal, natural gas, oil, nuclear power and other natural sources, which are called primary sources. Many cities and towns were built alongside waterfalls that turned water wheels to perform work.

Before electricity generation began slightly over 100 years ago, houses were lit with kerosene lamps, food was cooled in iceboxes, and rooms were warmed by wood-burning or coal-burning stoves. Direct current (DC) electricity had been used in arc lights for outdoor lighting. In the late-1800s, Nikola Tesla pioneered the generation, transmission, and use of alternating current (AC) electricity, which can be transmitted over much greater distances than direct current. Tesla's inventions used electricity to bring indoor lighting to our homes and to power industrial machines.

Electricity generation was first developed in the 1800's using Faradays dynamo generator. Almost 200 years later we are still using the same basic principles to generate electricity, only on a much larger scale. Now we are throwing some light on the very new and innovative concept i.e. GENERATING ELECTRICITY FROM A SPEED BREAKER.

Producing electricity from a speed breaker is a new concept that is undergoing research. India's installed capacity is nearly 20 per cent of China's capacity though both countries have billion plus people. India has nearly 10 per cent of the world's coal reserves but lack of environmental clearances and other disputes have hindered production. Shortage of domestic supply has resulted in costlier imports. Coal fired power plants account for more than half of India's power generation. From 2001 – 2004, India's oil demand has been growing by 2.68% but it will grow by 6.33% from 2003 – 2004 (projection from Qtr 1, IEA, 2004)

- Oil and gas represent 38% of India's energy consumption (IBEF, 2004)

- By 2010, India will be the fourth largest consumer of oil and gas in the world (IBEF, 2004)

- In fact, China's demand growth is even more - disastrously – rapid

Therefore, we have to investigate other types of renewable sources, which produce electricity without using any commercial fossil fuels, which is not producing any harmful products. There are already existing such systems using renewable energy such as solar wind), OTEC (ocean thermal energy conversions) etc...for power generation. The latest technology which is used to generate the power by such renewable energy is the "FABRICATION OF A ROLLER POWER GENERATOR FROM SPEED BREAKERS".

The number of vehicles on road is increasing rapidly and if we convert some of the Potential energy of these vehicle into the rotational motion of generator then we can produce considerable amount of electricity, this is the main concept of this project. At present we are facing shortage of electricity. Electricity can be generated using speed breakers, strange, isn't it? Generally when vehicle is in motion it produces various forms of energy like, due to friction between vehicle's wheel and road i.e. rough surface HEAT Energy is produced, also when vehicle traveling at high speed strikes the wind then also heat energy is produced which is always lost in environment and of which we can't make use of.... or directly we can say that all this energy that we can't make use of is just the WASTAGE OF ENERGY that is abundantly available around us. In this project we are just trying to make use of such energy in order to generate an ELECTRICAL ENERGY. This project will work on the principle of "POTENTIAL ENERGY TO ELECTRICAL ENERGY CONVERSION" Potential energy can be thought of as energy stored within a physical system.

WORKING PRINCIPLE :

This project explains the mechanism of electricity generation from speed breakers. The friction force due to vehicle movement acted upon the speed breaker system is transmitted to chain sprocket arrangements. The sprocket arrangement is made of two sprockets. One of the sprocket is larger in dimension than the other sprocket. Both the sprockets are connected with chain which transmits the power from the larger sprocket to the smaller sprocket. As the power is transmitted from the larger sprocket to the smaller sprocket, the speed that is available at the larger sprocket is relatively multiplied at the rotation of the smaller sprocket. The axis of the smaller sprocket is coupled to a gear arrangement. Here we have two gears with different dimensions. The gear wheel with the larger diameter is coupled to the axis of the smaller sprocket. Hence, the speed that has been increased at the smaller sprocket wheel is passed on to this gear wheel of larger diameter. The smaller gear is coupled to the larger gear. Therefore, as the larger gear rotates it increases the speed of the smaller gear which is following the larger gear and multiplies the speed to more intensity. Though the speed due to the rotary motion achieved at the larger sprocket wheel is less, as the power is transmitted to gears, the final speed achieved is high.

This speed is sufficient to rotate the rotor of a generator and is fed into the rotor of a generator. The rotor which rotates within a static magnetic stator cuts the magnetic flux surrounding it, thus producing the electric motive force (emf). This generated emf is then sent to an inverter, where the generated emf is regulated. This regulated emf is now sent to the storage battery where it is stored during the day time and can be used in night time for providing power to street lights.

COMPONENTS :

- 1.ROLLER ROD
- 2.GEAR
- 3.CHAIN DRIVE
- 4.DYNAMO
- 5.PLY WOOD
- 6.FOOT STEPS BEARINGS
- 7.BATTERY

Applications :

The four poles on the stator of a two-phase BLDC motor. This is part of a computer cooling fan; the rotor has been removed. BLDC motors fulfill many functions originally performed by brushed DC motors, but cost and control complexity prevents BLDC motors from replacing brushed motors completely in the lowest-cost areas. Nevertheless, BLDC motors have come to dominate many applications, particularly devices such as computer hard drives and CD/DVD players. Small cooling fans in electronic equipment are powered exclusively by BLDC motors. They can be found in cordless power tools where the increased efficiency of the motor leads to longer periods of use before the battery needs to be charged. Low speed, low power BLDC motors are used in direct-drive turntables for gramophone records.

Transport :

High power BLDC motors are found in electric vehicles and hybrid vehicles. These motors are essentially AC synchronous motors with permanent magnet rotors. The Segway Scooter and Vectrix Maxi-Scooter use BLDC technology. A number of electric bicycles use BLDC motors that are sometimes built into the wheel hub itself, with the stator fixed solidly to the axle and the magnets attached to and rotating with the wheel.

Heating and ventilation :

There is a trend in the HVAC and refrigeration industries to use BLDC motors instead of various types of AC motors. The most significant reason to switch to a BLDC motor is the dramatic reduction in power required to operate them versus a typical AC motor. While shaded-pole and permanent split capacitor motors once dominated as the fan motor of choice, many fans are now run using a BLDC motor. Some fans use BLDC motors also in order to increase overall system efficiency. In addition to the BLDC motor's higher efficiency, certain HVAC systems (especially those featuring variable-speed and/or load modulation) use BLDC motors because the built-in microprocessor allows for programmability, better control over airflow, and serial communication.

Industrial Engineering :

The application of brushless DC (BLDC) motors within industrial engineering primarily focuses on manufacturing engineering or industrial automation design. In manufacturing, BLDC motors are primarily used for motion control, positioning or actuation systems. BLDC motors are ideally suited for manufacturing applications because of their high power density, good speed-torque characteristics, high efficiency and wide speed ranges and low maintenance.

Motion control systems :

BLDC motors are commonly used as pump, fan and spindle drives in adjustable or variable speed applications. They can develop high torque with good speed response. In addition, they can be easily automated for remote control. Due to their construction, they have good thermal characteristics and high energy efficiency. To obtain a variable speed response, BLDC motors operate in an electromechanical system that includes an electronic motor controller and a rotor position feedback sensor.

Positioning and actuation systems :

BLDC motors are used in industrial positioning and actuation applications. For assembly robots, brushless stepper or servo motors are used to position a part for assembly or a tool for a manufacturing process, such as welding or painting. BLDC motors can also be used to drive linear actuators.

Basic operation :

According to the conventional model of current flow originally established by Benjamin Franklin and still followed by most engineers today, current is assumed to flow through electrical conductors from the positive to the negative pole. In actuality, free electrons in a conductor nearly always flow from the negative to the positive pole. In the vast majority of applications, however, the actual direction of current flow is irrelevant. Therefore, in the discussion below the conventional model is retained. In the diagrams below, when the input connected to the left corner of the diamond is positive, and the input connected to the right corner is negative, current flows from the upper supply terminal to the right along the red (positive) path to the output, and returns to the lower supply terminal via the blue (negative) path.

When the input connected to the left corner is negative, and the input connected to the right corner is positive, current flows from the lower supply terminal to the right along the red (positive) path to the output, and returns to the upper supply terminal via the blue (negative) path. In each case, the upper right output remains positive and lower right output negative. Since this is true whether the input is AC or DC, this circuit not only produces a DC output from an AC input, it can also provide what is sometimes called "reverse polarity protection". That is, it permits normal functioning of DC-powered equipment when batteries have been installed backwards, or when the leads (wires) from a DC power source have been reversed, and protects the equipment from potential damage caused by reverse polarity. Prior to the availability of integrated circuits, a bridge rectifier was constructed from "discrete components", i.e., separate diodes. Since about 1950, a single four-terminal component containing the four diodes connected in a bridge configuration became a standard commercial component and is now available with various voltage and current ratings.

SCOPE OF OPERATION :

The utilization of energy is an indication of the growth of a nation. For example, the per capita energy consumption in USA is 9000 KWh (Kilo Watt hour) per year, whereas the consumption in India is 1200 KWh (Kilo Watt hour).

One might conclude that to be materially rich and prosperous, a human being needs to consume more and more energy. A recent survey on the energy consumption in India had published a pathetic report that 85,000 villages in India do not still have electricity. Supply of International Journal of Advances in Engineering & Technology. 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”. Hence more research and development and commercialization of technologies are needed in this field. India, unlike the top developed countries has very poor roads. Talking about a particular road itself includes a number of speed breakers. By just placing a unit like the “Power Generation Unit from Speed Breakers”, so much of energy can be tapped. This energy can be used for the lights on the either sides of the roads and thus much power that is consumed by these lights can be utilized to send power to these villages.

CONSTRUCTION & OPERATION :

Construction model In this model we show that how we generate a voltage from the busy road traffic. In all the city's traffic is very much high and on some road, traffic move like a tortoise. If we employ a speed breaker type generator on the road then we utilize the friction of vehicle into mechanical energy and then this mechanical energy is further converted into electrical energy with the help of the powerful dynamo. So we install a one powerful dynamo on the road. Output of the dynamo is connected to the L.E.D. in this project. When we move the shaft of the dynamo then dynamo generate a voltage and this voltage is sufficient to drive the L.E.D. In actual practice we use this dynamo to generate a voltage and after generating a voltage we charge the battery.

When battery is fully charged then we use this battery as a storage device. We use this storage device to run the lights of the road. A rechargeable battery (also known as a storage battery) is a group of one or more electrochemical cells. They are known as secondary cells because their electrochemical reactions are electrically reversible. Rechargeable batteries come in many different sizes and use different combinations of chemicals; common types include: lead acid, nickel cadmium (NiCd), nickel metal hydride (NiMH), lithium ion (Li-ion), and lithium ion polymer (Li-ion polymer).

Rechargeable battery International Journal of Innovative Research in Mechanical and Civil Engineering (IJIRMECE) www.ioirp.com Volume – 1 . Operation In this project we show that how we use IC 555 as a automatic street light function. Here in this project IC 555 work as a monostable timer. Pin no 4 and 8 of the IC is connected to the positive supply. Pin no 1 of the IC is connected to the ground pin. Pin no 3 is the output pin. On this pin we connect a output L.E.D. LDR is connected to the pin no 2 of the IC via 100 k ohm resistor. When light fall on the LDR then LDR offers a low resistance. When LDR is in dark then LDR offers a high resistance. When we convert the LDR by hand then LDR resistance become high and so pin no 2 become more negative. When pin no 2 become negative then IC 555 triggers itself and output is on. This is the function of the monostable timer.

OPERATION OF EXPERIMENT :

This project explains the mechanism of electricity generation from speed breakers. The friction force due to vehicle movement acted upon the speed breaker system is transmitted to chain sprocket arrangements. The sprocket arrangement is made of two sprockets. One of the sprocket is larger in dimension than the other sprocket. Both the sprockets are connected with chain which transmits the power from the larger sprocket to the smaller sprocket. As the power is transmitted from the larger sprocket to the smaller sprocket, the speed that is available at the larger sprocket is relatively multiplied at the rotation of the smaller sprocket. The axis of the smaller sprocket is coupled to a gear arrangement. Here we have two gears with different dimensions. The gear wheel with the larger diameter is coupled to the axis of the smaller sprocket. Hence, the speed that has been increased at the smaller sprocket wheel is passed on to this gear wheel of larger diameter.

The smaller gear is coupled to the larger gear. Therefore, as the larger gear rotates it increases the speed of the smaller gear which is following the larger gear and multiplies the speed to more intensity. Though the speed due to the rotary motion achieved at the larger sprocket wheel is less, as the power is transmitted to gears, the final speed achieved is high. This speed is sufficient to rotate the rotor of a generator and is fed into the rotor of a generator.

ADVANTAGES :

- » Pollution free power generation.
- » Simple construction, mature technology, and easy maintenance .
- » No manual work necessary during generation.
- » Energy available all year round.
- » No fuel transportation problem.
- » No consumption of any fossile fuel which is non-renewable source of energy.
- » Uninterrupted power generation during day and night.
- » Maximum utilization of energy.
- » Load to the piston cylinder arrangement is freely got by movement of vechiles.
- » No fuel storage is required.
- » It will work with light weight and heavy vechiles.

DISADVANTAGES :

- » We have to check mechanism from time to time .
- » It can get rusted in rainy season.

Future scope of this project :

- Such speed breakers can be designed for heavy vehicles, thus increasing input torque and ultimately output of generator.
- More suitable and compact mechanisms to enhance efficiency.
- Various government departments can take up an initiative to implement these power humps on a large scale.
- These can be mainly used at toll booths , approaching traffic signals , highways where vehicles move 24 x 7 etc...

This has a huge scope everywhere provides the resources are channelled well.