

Study on Generation of Electricity using Power Humps

^[1] Maheshwari G.Bisanal, ^[2] S.M.Chandrakanth, ^[3] Anish A Borgaonkar, ^[4] Ameet A Patil

^[1] Assistant Professor Department of Civil Engineering, K.L.E Society's KLE College of Engineering and Technology, Chikodi, Belgaum (KA), India

^[2] Asst.Prof & H.O.D (Diploma) VSM Institute of Technology

^{[3][4]} U.G. Students, Department of Civil Engineering, K.L.E Society's KLE College of Engineering and Technology, Chikodi, Belgaum (KA), India.

Abstract:- Energy is the basic need for the development of the modern world. For meeting up the regular demand of energy we need to design system that will produce electricity without destroying the nature. Researches show that world has its enough shares of its energy resources. Fossil fuels pollute the environment. Nuclear energy requires careful handling of both raw as well as waste material. The focus now is shifting more and more towards the renewable sources of energy, which is essential and nonpolluting. The number of vehicles passing in road is increasing day by day. In this project an attempt has been made to generate electricity from speed breakers are called as POWER HUMPS. The generated power can be utilized for illumination of street lights, sign boards and for other purposes and this will be one of the great renewable sources of energy produced from power humps without causing environmental pollution.

Keywords:- Energy, Non-Conventional Energy, Power humps, Street lights, Speed breaker.

I. INTRODUCTION

Man has needed and used energy at an increasing rate for his sustenance and well being ever since he came on the earth a few million years ago. Primitive man required energy primarily in the form of food. He derived this by eating plants or animals, which he hunted. Subsequently he discovered fire and his energy needs increased as he started to make use of wood and other bio mass to supply the energy needs for cooking as well as for keeping himself warm. With the passage of time, man started to cultivate land for agriculture. He added a new dimension to the use of energy by domesticating and training animals to work for him. With further demand for energy, man began to use the wind for sailing ships and for driving windmills, and the force of falling water to turn water wheels. Till this time, it would not be wrong to say that the sun was supplying all the energy needs of man either directly or indirectly and that man was using only renewable sources of energy.

In the present scenario power becomes the major need for human life. The availability and its per capita consumptions are regarded as the index of national standard of living in the present day civilization. Energy is an important input in all the sectors of any countries economy. Energy crisis is due to two reasons, firstly the population of the world has been increased rapidly and secondly standard of living of human beings has increased.

The availability of regular conventional fossil fuels will be the main sources for power generation, but there is a fear that they will get exhausted eventually by the next few decades. Therefore, we have to investigate some approximate, alternative, new sources for the power generation, which is not depleted by the very few years. Another major problem, which is becoming the exiting topic for today is the pollution. It suffers all the living organisms of all kinds as on the land, in aqua and in air. Power stations and automobiles are the major pollution producing places. This project highlights to produce energy by non conventional method. By using simple chain drive mechanism such as rack and pinion assemblies has been used to generate electricity. The generated power can be used for the general purposes like streetlights, traffic signals and other purposes. To Calculate amount of current generated traffic survey has been made for 1week. Based on traffic survey current generated in watts is calculated.

II. NEED FOR NON-CONVENTIONAL ENERGY

Fuel deposit will soon deplete by the end of 2022 Fuel scarcity will be maximum. Country like India may not have the chance to use petroleum products. Keeping this dangerous situation in mind we tried to make use of non-pollutant natural resource of petrol energy. The creation of new source of perennial environmentally acceptable, low

cost electrical energy as a replacement for energy from rapidly depleting resources of fossil fuels is the fundamental need for the survival of mankind. We have only about 25 years of oil reserves and 75 10years of coal reserves. Resort to measure beginning of coal in thermal electric stations to serve the population would result in global elementic change in leading to worldwide drought and decertification.

The buzzards of nuclear electric-stations are only too will. Now electric power beamed directly by micro-wave for orbiting satellite. Solar power stations (s.p.s) provide a cost-effective solution even though work on solar photo voltaic and solar thermo electric energy sources has been extensively pursued by many countries. Earth based solar stations suffer certain basic limitations.

It is not possible to consider such systems and meeting continuous uninterrupted concentrated base load electric power requirements. Energy plays an important role in the material, social and cultural life of mankind. The energy needs are increasing day by day. This is the result of population growth and increase in the standard of living which is directly proportional to energy consumption.

As we know that mankind will be never lacking in energy. Today, it is liquid fluid, tomorrow it may be uranium with an element of risk. Risk exists where ever there is human activity and production of energy. Just as the supply of fossil fuel is finite thus there will be the supply of uranium. Perhaps, uranium would be exhausted quickly if it is used on a large scale.

It is therefore, harnessing the gigantic inexhaustible solar energy source reduces the dependence on fossil fuels. For the environmental concerned, the solar energy harnessing system offers advantages in that, it emits no pollutants in to the atmosphere as they are with the combustion of fossil fuels. Thus, as a long term option solar energy system can be considered as an alternate to all the finite fuel system. Therefore, there is no energy shortage today nor will there be in the near future?

The lifting of water for drinking or irrigation purposes is of great importance in widely distributed villages with little or no rural electrification and where underground water is available. Solar energy is converted to mechanical energy to drive small water pumps it would be of great help to the rural inhibitions. In our project we use solar photo voltaic cells for pumping water. The photo

voltaic modules convert sunlight direct to electricity which is used to run a dc motor pump for bailing of water. It consists of solar photo voltaic modules, power conditioner to protect storage batteries from over charging during non-sun shine and a dc water pump.

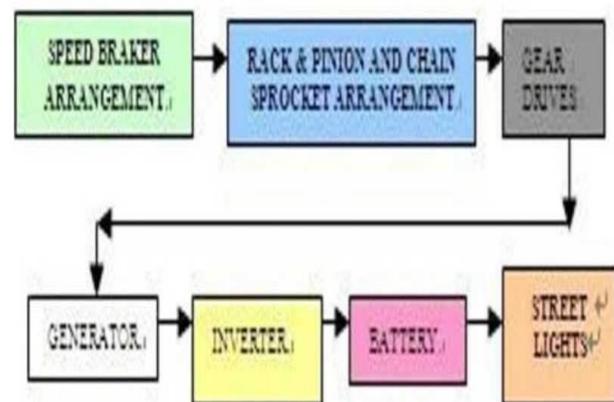
III. COMPONENTS AND DESCRIPTION

The block diagram of the speed brake power generation is shown in figure. The main components of this project are,

- Speed Brake arrangement
- Rack and pinion arrangement
- Sprocket and chain Drive
- Fly wheel
- D.C generator
- Battery
- Inverter Circuit
- Light Arrangement

IV. SPEED BRAKE ARRANGEMENT:

This is made up of mild steel. The complete set up is fixed in a box. The two L- angles frame is fixed in the above two ends of the box. Bellow this l-angle window, the actual speed brake arrangement is constructed. This L-angle window pushes the speed brake when the time of vehicle moving on these arrangement.



V. RACK AND PINION ARRANGEMENT:

The block is the important part of the unit as it houses the rack and pinion. This rack and pinion attachment gives the rotary motion to the chain sprocket. This block converts linear motion into rotary motion.

Rack and pinion gear system is used to transmit rotary motion into linear motion. The rack is a portion of a gear having an infinite pitch diameter and the line of action is tangent to the pinion.

Pinion:

This is a gear wheel which is provided to get mesh with rack to convert the linear motion into rotary motion. They are made up of Cast iron.

Rack:

Rack teeth are cut horizontally about the required length. This is made up of Cast Iron.

VI. SPROCKET AND CHAIN DRIVE:

This is a cycle chain sprocket. The chain sprocket is coupled with another generator shaft. The chain converts rotational power to pulling power, or pulling power to rotational power, by engaging with the sprocket.

The sprocket looks like a gear but differs in three important ways

1. Sprockets have many engaging teeth; gears usually have only one or two.
2. The teeth of a gear touch and slip against each other; there is basically no slippage in a sprocket.

The shape of the teeth is different in gears and sprockets, which is shown in Fig.1



Fig. 1 Chain Sprocket Arrangement

VII. WORKING PRINCIPLE

The complete diagram of the power generation using speed brake is given below. L-angle window is inclined in certain small angle which is used to generate the power. The pushing power is converted into electrical energy by proper driving arrangement.

The rack pinion, spring arrangement is fixed at the speed brake which is mounded bellow the L-angle window. The spring is used to return the inclined L-angle window in same position by releasing the load. The pinion shaft is connected to the supporter by end bearings as shown in fig. The larger sprocket also coupled with the pinion shaft, so that it is running the same speed of pinion. The larger sprocket is coupled to the small cycle sprocket with the help of chain (cycle).

This larger sprocket is used to transfer the rotation force to the smaller sprocket. The smaller sprocket is running same direction for the forward and reverse direction of rotational movement of the larger sprocket. This action locks like a cycle pedaling action.

The fly wheel and gear wheel is also coupled to the smaller sprocket shaft. The flywheel is used to increase the rpm of the smaller sprocket shaft. The gear wheel is coupled to the generator shaft with the help of another gear wheel. The generator is used here, is permanent magnet D.C generator. The generated voltage is 12Volt D.C. This D.C voltage is stored to the Lead-acid 12 Volt battery. The battery is connected to the inverter. This inverter is used to convert the 12 Volt D.C to the 23Volt A.C. This working principle is already explained the above chapter. This 23Volt A.C voltage is used to activate the light, fan and etc. By increasing the capacity of battery and inverter circuit, the power rating is increased. This arrangement is fitted in highways; the complete arrangement is kept inside the floor level except the speed brake arrangement.

VIII. POWER CALCULATION

Output Power Calculation:

Let us consider,

The mass of a body = 60 Kg (Approximately)

Height of speed brake = 10 cm

Work done = Force x Distance

Here,

Force = Weight of the Body

= 60 Kg x 9.81

$$= 588.6 \text{ N}$$

Distance travelled by the body = Height of the speed brake

$$= 10 \text{ cm}$$

$$= 0.10 \text{ m}$$

Output power = Work done/Sec

$$= (588.6 \times 0.10)/60$$

$$= 0.98 \text{ Watts (For One pushing force)}$$

However, this much power produced, it cannot be tapped fully. From the above purpose we have select to generate electricity by permanent magnet type D.C generator and store it by 12V lead-acid battery cell.

IX. CONCLUSION

current generated is 0.98 Watts for one pushing force. As the traffic rate increases the current generation will be more and it can be stored in a battery. So the same generated current can be used for illuminating street lights, signals etc It is able to extend this project by using same arrangement and construct in the steps so that increase the power production rate by fixing near school and colleges, etc.

In concluding the words of our project

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