

HYDRAULIC SPEED BRAKER USING POWER GENERATION

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Abstract : In this model we exhibit that how we can generate a voltage from the busy traffic. Conversion of the mechanical power into electrical strength is extensively used concept. It's a mechanism to generate power by way of converting the possible power generated through a car going up on a speed breaker into rotational energy. We have used that simple notion to the project. We connect one mechanical rod with the dynamo and fit this rod on the surface of the road. When any vehicle moves from this roller then due to friction, automobile Rotate the rod or roller and roller then go the dynamo. When dynamo go then it generates a voltage and this voltage now connects to the bulbs. In proper exercise with the help of this voltage we will charge the battery and then we use this voltage to mild the small bulb.

Introduction

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. India is the country, which majorly suffers with lack of sufficient power generation.

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.

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 is 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” POWER HUMP”.

An energy crisis is any great bottleneck (or price rise) in the supply of energy resources to an economy. It usually refers to the shortage of oil and additionally to electricity or other natural resources. An energy crisis may be referred to as an oil crisis, petroleum crisis, energy shortage, electricity shortage electricity crisis. While not entering a full crisis, political riots that occurred during the 2007 Burmese antigovernment protests were initially sparked by rising energy prices. Likewise the Russia- Ukraine gas dispute and the Russia-Belarus energy dispute have been mostly resolved before entering a prolonged crisis stage. Market failure is possible when monopoly manipulation of markets occurs.

The kinetic energy can be calculated using the formula: In this project a mechanism to generate power by converting the potential energy generated by a vehicle going up on a speed breaker into kinetic energy. When the vehicle moves over the inclined plates, it gains height resulting in increase in potential energy, which is wasted in a conventional rumble strip When the breaker come down, they crank a lever fitted to a ratchet-wheel type mechanism (a angular motion converter). This in turn rotates a geared shaft loaded with recoil springs. The output of this shaft is coupled to a dynamo to convert kinetic energy into electricity. A vehicle weighing 1,000 kg going up a height of

10 cm on such a rumble strip produces approximately 0.98 kilowatt power. So one such speed-breaker on a busy highway, where about 100 vehicles pass every minute, about one kilo watt of electricity can be produced every single minute.

"A vehicle weighing 1,000 kg going up a height of 10 cm on such a rumble strip produces approximately 0.98 kilowatt power. So one such speed-breaker on a busy highway, where about 100 vehicles pass every minute, about one kilo watt of electricity can be produced every single minute. The figure will be huge at the end of the day," he said.

The Assam power ministry is expected to back the pilot project. Das says a storage module like an inverter will have to be fitted to each such rumble strip to store this electricity. The cost of electricity generation and storage per megawatt.

Literature Review

The energy crisis is any great bottleneck in the supply of energy resources to an economy. The studies to sort out the energy crisis led to the idea of generating power using speed breaker. Firstly, South African electrical crisis has made them implemented this method to light up small villages of the highway. The idea is basic physics, to convert the kinetic energy into electrical energy that gone wasted when the vehicle runs over speed-breaker. Since then, a lot has been done in this field. An amateur innovator, Kanak Gogoi in Guwahati has developed a similar contraption to generate power, when a vehicle passes over speed-breaker. The idea has caught the eye of IIT-Guwahati, which funded the pilot project related to generate electricity from speed-breakers. They has evaluated the machine and recommended to the Assam government. Their work has provided the need to think on this alternative to generate electricity on the large scale, as it proves to be a boon to the economy of the country.

A crisis can develop due to industrial actions like union organized strikes and government embargoes. The cause may be ageing over-consumption, infrastructure and sometimes bottlenecks at oil refineries and port facilities restrict fuel supply. An emergency may emerge during unusually cold winters. EMERGING SHORTAGES Crisis that currently exist include; • Oil price increases since 2003 - Cause: increasing demand from the U.S and China, the falling state of the U.S. dollar, and stagnation of production due to the U.S. occupation of Iraq. Iraq is #3 in the world (besides Saudi Arabia and Iran) for its oil reserves. However some observers have stated the global oil production peak occurred in December 2005. If this is correct it is also to blame. • 2008 Central Asia energy crisis, caused by abnormally cold temperatures and low water levels in an area dependent on hydroelectric power.

South African electrical crisis Solution for Energy Crisis NEXT time on the roads, don't scoff at the speed-breakers. They could actually light up small villages off the highway. This project is about GENERATION OF ELECTRICITY with the SPEED BREAKERS. 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. This energy can be released or converted into other forms of energy, including kinetic energy. It is called potential energy because it has the potential to change the states of objects in the system when the energy is released if h is the height above an arbitrarily assigned reference point, then Kinetic energy of an object is the extra energy which it possesses due to its motion. It is defined as the work needed to accelerate a body of a given mass from rest to its current velocity. Having gained this energy during its acceleration, the body maintains this kinetic energy unless its speed changes. Negative work of the same magnitude would be required to return the body to a state of rest from that velocity.

Working

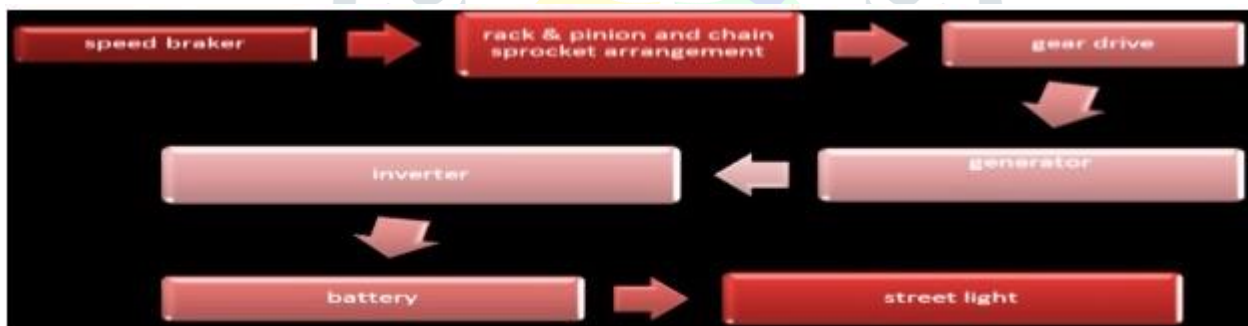
This project explains the mechanism of electricity generation from speed breakers. The vehicle load acted upon the speed breaker system is transmitted to rack and pinion arrangements. Then, reciprocating motion of the speed-breaker is converted into rotary motion using the rack and pinion arrangement where the axis of the pinion is coupled with the sprocket arrangement.

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.

BLOCK DIAGRAM:

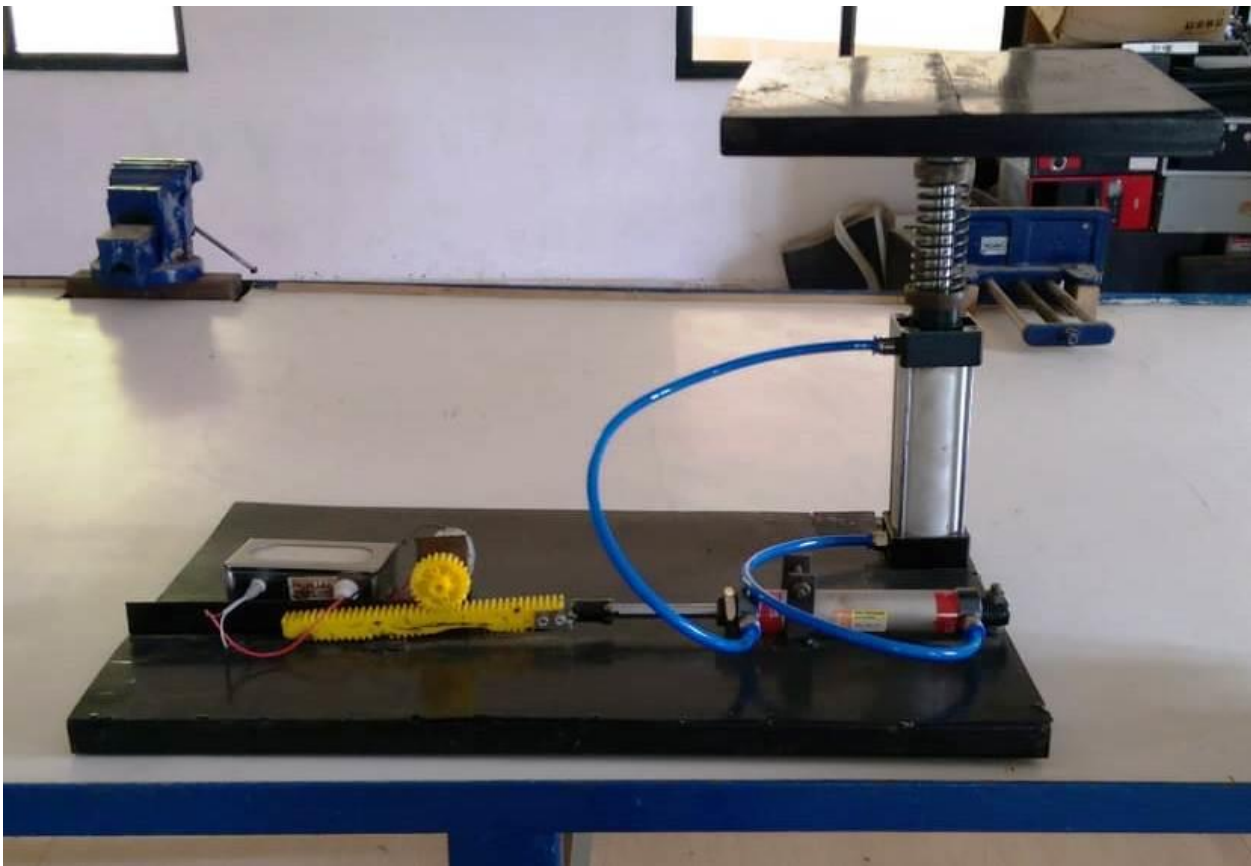


5.1 Block Diagram

A roller blind mechanism for winding and unwinding a rollable blind, the mechanism comprising a support element, a drive sprocket which is rotatably mounted on the support element for transmitting rotational movement to a blind supporting member, and a manually-movable elongate flexible drive element which includes a plurality of interlinked tooth-engaging elements, the drive sprocket including a plurality of flexible teeth engagable with the tooth-engaging elements of the flexible drive element.

A roller blind mechanism as claimed in claim 1, wherein a radial extent of the teeth of the drive sprocket is equal to or greater than a maximum dimension of the tooth-engaging elements of the flexible drive element.

A roller blind mechanism as claimed in claim 2, wherein the radial extent is equal to or greater than twice the maximum dimension of the tooth-engaging elements of the flexible drive element. A roller blind mechanism as claimed in claim 1, wherein the teeth of the drive sprocket flex in a circumferential direction of the sprocket.



(5.2 Actual Photo of Project)

Power Calculation

Let us consider,

The mass of any vehicle travelling over the speed breaker= 300Kg (Approximately)

Height of speed brake = 15 cm

Work done = weight of the body x distance travelled by the vehicle

Here, Weight of the Body = 300 Kg x 9.81 = 2943 N

Distance traveled by the body = Height of the speed breaker = 15cm

Power = Work done/Second = $(2943 \times 0.15)/60 = 7.3575$ Watts

Output Power developed for 1 vehicle passing over the speed

Breaker arrangement for one minute = 7.3575 watts

Power developed for 60 minutes (1 hr.) = 441.45 watts

Power developed for 24 hours = 10.5948 Kw

This power generated by vehicles is more than sufficient to run four street lights in the night time.

Energy is an important input to sustain industrial growth and standard of living of a country and can be directly related to per-capita energy consumption. The conventional sources energy like coal, oil, uranium etc... are depleting very fast and by the turn of the century man will have to depend upon non-conventional sources of energy for power generation.

The various types of non-conventional sources of energy are solar energy, wind energy, biogas etc... now by developing "POWER HUMPS" we can generate power without utilizing any external sources mentioned earlier. Now, vehicular traffic in big cities is more, causing a problem to human being. But this vehicular traffic can also be utilized for power generation by means of new technique called "POWER HUMPS". If it is placed in heavy traffic roads, the weight and kinetic energy of the vehicles can be used to produce mechanical power in shafts and this mechanical power is once again converted into electrical energy.

As it does not utilize any external source, and traffic will never be reduced, these power humps are more reliable, and have more life than any other power source. It is also feasible from the customer point of view as follows.

The total installation cost of the hump is 6000 rupees.

Total cost = 6000 rupees

Say with improvements in design it can glow 5 streetlights of 40-watt capacity, which will consume 2.7 K.W.H. per day.

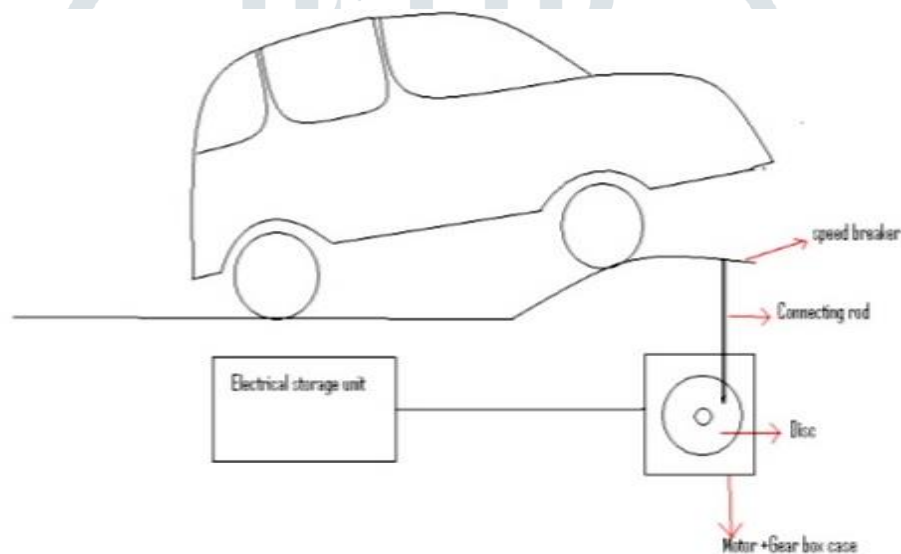
For t years electricity bill will be $2986.5 * t$

$T=2$ years

i.e. the consumer will be repaid his investment within 2 years period. From this onwards, there will be no investment and free of cost. The life of POWER HUMP is estimated to be 6 years. So the customer will get free power generation for 4 years period.

But the major drawback of this POWER HUMP is design of springs. When we have less traffic and there is difficulty in design of springs. When we have less traffic and there is difficulty in design of springs also the generation of power is intermittent, we have to smooth out this variations.

ELECTRICITY GENERATION FROM OF RACK AND PINION MECHANISM:



This mechanism is the third mechanism. It is the crank shaft mechanism. Whenever the vehicle going on the speed breaker, the speed breaker goes downwards .so, the potential energy is converted into kinetic energy. Here, we are used crank shaft mechanism for the development of the small amount of electricity. The electricity saves on the battery storage unit .the crank shaft mechanism is regained its previous position vice versa.

Advantages:

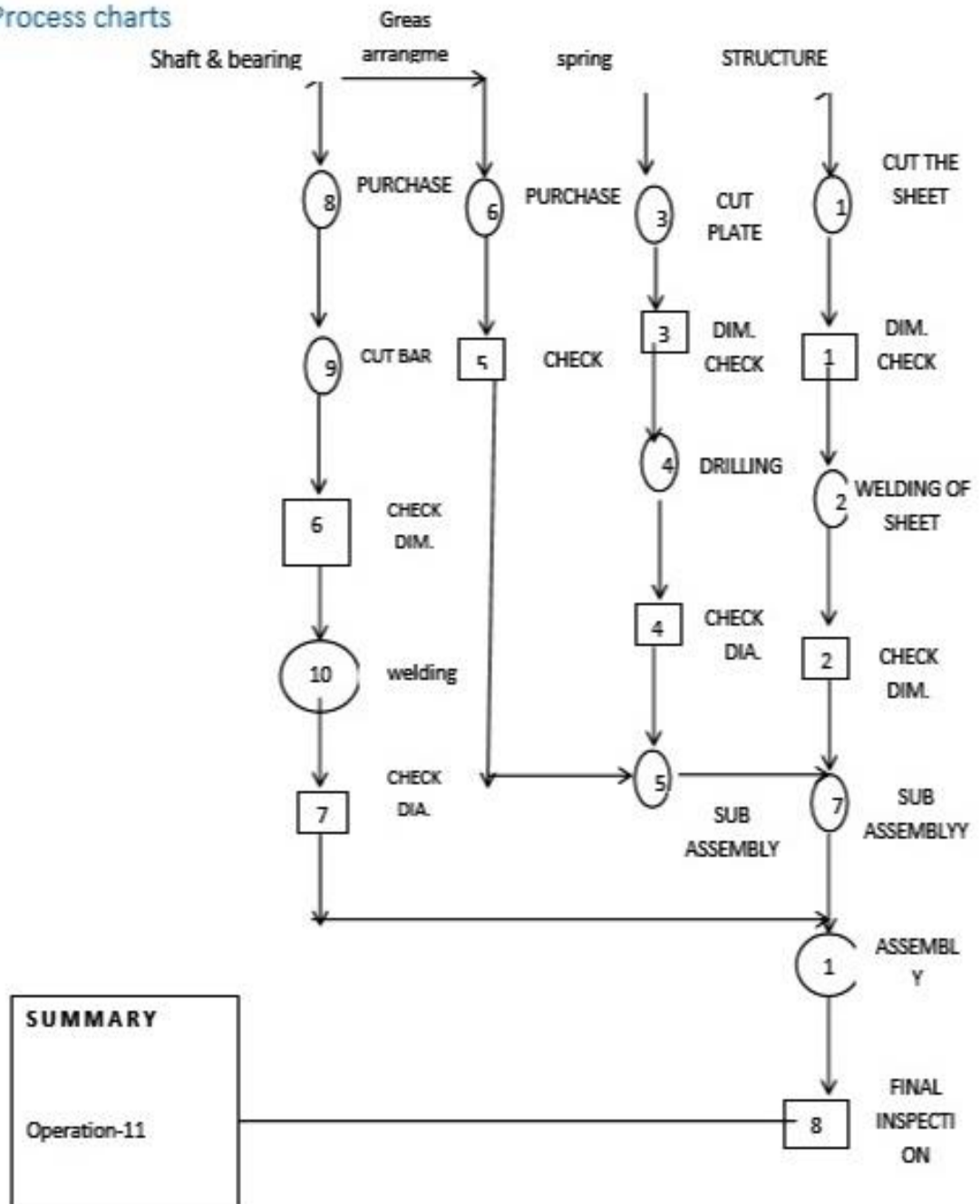
- Power generation with low cost and using non-conventional energy sources which will help us to conserve the conventional energy sources to meet the future demand.
- By using this method, electricity will be generated throughout the year without depending on other factors.
- Easy for maintenance and no fuel transportation problem.
- Pollution free power generation.
- Less floor area required and no obstruction to traffic.
- No need of manpower during power generation.
- Low budget electricity production
- Less floor area
- No obstruction to traffic

- Easy maintenance
- Suitable at parking of multiplexes, malls, toll booths, signals, etc.
- Uses: Charging batteries and using them to light up the streets, etc.

Disadvantages:

- Selecting suitable generator.
- Selection of springs.
- Achieving proper balance of speed and torque.
- It gives low electrical output.

9. Process charts



CONCLUSION

Electricity plays a very important role in our life". Due to population explosion, the current power generation has become insufficient to fulfill our requirements. In this project we discover technology to generate electricity from speed breakers in which the system used is reliable and this technique will help conserve our natural resources. In coming days, this will prove a great boon to the world, since it will save a lot of electricity of power plants that gets wasted in illuminating the street lights. As the conventional sources are depleting very fast, it's high time to think of alternative resources. We got to save the power gained from the conventional sources for efficient use. So this idea not only provides alternative but also adds to the economy of the country.

As day by day power consumption increases but electric crisis occur. So the minor needs of electricity such as street lights and traffic signals can be generated from speed breakers. Instead of wasting kinetic energy of vehicles at speed breakers the minor needs can be met bt converting kinetic energy to electrical energy.

