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ENERGY GENERATION BY USING WIND TURBINE AND SPEED BRAKERS

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KEYWORDS

WIND ENERGY
PRESSURE ENERGY

ABSTRACT

This work has focused on the wastage wind energy and pressure energy is applied on speed braker will convert into electrical energy with help of advance technological mechanisms as like power hump, rack pinion mechanism, wind turbine, generator, alternator, batteries, etc. The main purpose of this project to electrical energy generation and stored in batteries and also it is used to discharge electric vehicle through the charging station. In these conditions the other so many Gadgets like drone, but in some cases, we need to high electricity in now technical word so it is stored high energy and used to so many uses full work.

1. Introduction

Brief overview of renewable energy and its importance in sustainable development. Introduction to wind-driven charging stations as a potential solution for clean energy transportation. Provide an overview of the global energy crisis and the need for sustainable energy sources. Introduce wind energy and kinetic energy harvesting from speed breakers as potential solutions. An innovative and useful concept of Generating Electricity from Wind Turbine Speed breakers 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, Wind force, 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 Faraday's 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 wind turbine & 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. There is roughly 12 per cent power deficit in the peak hours. Tariffs are set by the state governments so power firms are not allowed to pass on rising fuel costs to consumers. Banks are burdened with loans to loss-making state-run electricity distribution firms and are unwilling to lend to new projects that do not have assured fuel supply. 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.

Hardware Description

The following shown in figure 1.1 of the project and design aspect of independent modules are considered. Block diagram is shown in fig

Highway Windmills & Speed brakers

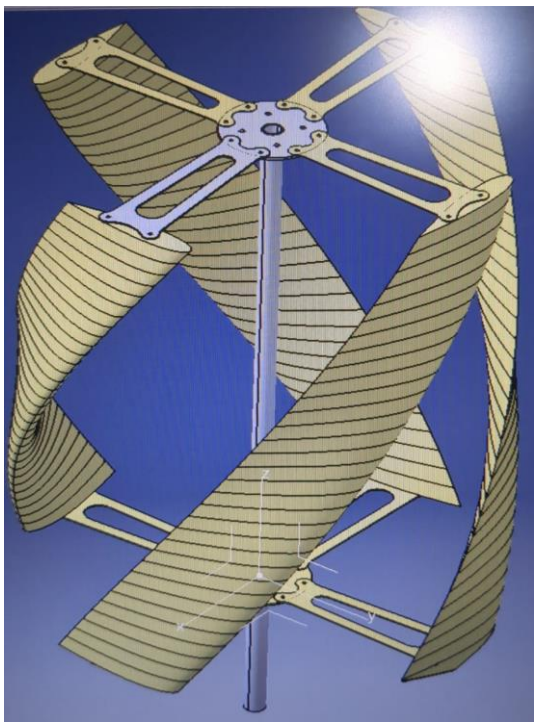

Figure 1.1 Wind turbine

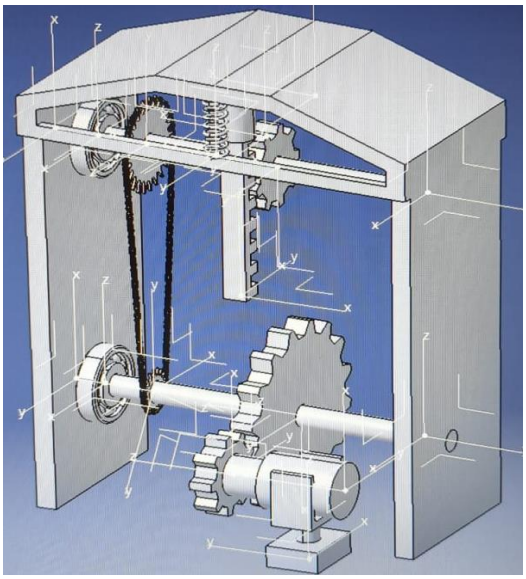

Figure 1.2 Speed barkers

2. Literature Review

Summarize existing research on wind energy generation, including types of wind turbines and their efficiency. Review studies on kinetic energy recovery systems (KERS) from speed breakers and their implementation in different regions.

Er. Vijay Kumar Yadav1, Durgesh2 Power [01] is everything in this recent world, from the beginning of the science still people try to discover the source, modify and develop many concepts and method for better future. The efficiency of power generation is the key to making a country economically enriched. This project includes how to utilize the energy which is wasted from the vehicle which is passes every minute over a speed breaker. There are four mechanisms to generate electricity through the speed breaker like, Rack and pinion mechanisms, gear and flywheel mechanisms and spring coil mechanisms. We can tap the energy generated and produce power by using the speed breaker as power generating unit. The kinetic energy of the moving vehicles can be converted into mechanical energy through the rack and pinion mechanisms or some other mechanisms. Then, this mechanical energy will be converted into electrical energy using generator which will be saved with the use of a battery.

M.L.S Deva Kumar [02] Energy is an important aspect in our every day's life. The resources we use are limited whereas the population consuming the same is increasing day by day. Therefore, there is a need of finding a way to establish a relationship between a natural resources and growing population. In this context wind energy play the vital role in maintaining the relationship between human being and an energy requirement. Wind energy is free of cost and available with ease. Tapping of wind energy is essential for the conservation of other non-renewable resources. Wind energy has been harnessed for centuries but it has only emerged as a major part of our energy solution quite recently and this project focus on utilizing wind energy by using vertical axis wind turbine. This energy is available in highways, this highway can provide a considerable amount of wind energy to recapture this wind from vehicles while in moving. In the objective

of the project, in the present work, vertical axis wind turbine (VAWT) is designed and fabricated as per the specification, the VAWT blades are designed with aero foil shape, with less weight and more stiffness, the assembled VAWT is mounted on the highways of a divider, so that the air velocity obtained from the moving vehicle is sufficient enough to cut the turbine blades, VAWT is a special purpose wind mill, this are designed in such a way that the vehicle moving on both the sides of highway are capable to cut the blades of VAWT, the blades are connected to the shaft intern connected to the generator, it generates the power maximum speed of the generator is 500 rpm, if the generator rotates with full speed it gives an output of 14.5 volts. To generated power, this power developed by the VAWT is stored in battery, the power is used for road lamps and many different applications some useful application.

3. Methodology

Describe the experimental setup for harnessing wind energy, including the type and size of wind turbines used, location selection, and data collection methods. Explain the process of implementing kinetic energy recovery systems in speed breakers, detailing the design and installation procedures.

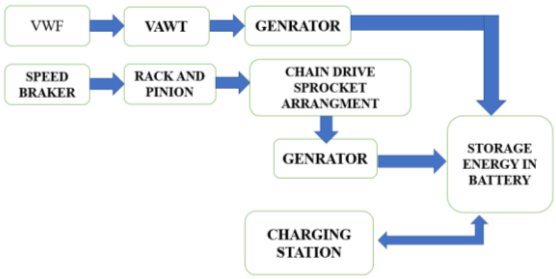

Figure 3.2 Flow chart

4. Result And Discussion

Present the data collected from both wind-driven systems and speed breaker installations. Analyse the efficiency of energy generation, considering factors such as wind speed, traffic volume, and geographical location. Compare the performance of different types of wind turbines and speed breaker systems. Interpret the results in the context of existing literature and theoretical expectations. Discuss the feasibility and scalability of wind and kinetic energy generation in various environments. Address potential challenges and limitations encountered during the research.

5. DESIGN AND CALCULATIONS

Description of the components of a wind-driven charging station, including wind turbines, energy storage systems, and charging outlets. Discussion on the different designs and configurations of wind-driven charging stations. Overview of the latest technological advancements in wind turbine technology. Discussion on innovative designs and materials for efficient energy conversion and storage.

5.1 Rack and Pinion Calculations

Module = Pitch Circle Diameter/ Number of teeth = 36/18 = 2 mm

Pitch Circle Radius(r) = 36/2 = 18 mm

Addendum(a) = module = 2 mm

Addendum Circle Radius (ra) = r + addendum = 18 + 2 = 20mm

Pressure angle of pinion (Φ) = 14.5° involute

Length of path of contact = (a/sin Φ) + {[ra^2 – (r sin Φ) ^2]} ^0.5 - r sin Φ = 13.29 mm

Length of arc of contact = Length of path of contact / sin Φ = 13.75 mm

Minimum number of teeth in contact = Length of arc of contact / πm = 2

Angle turned by the pinion = Length of arc of contact x 360 / 2πra = 39.39°

Minimum Length of rack = 2πra = 125.66 mm

5.2 Design of Shaft:

In our project We apply the force on speed braker is 100N and the crank length is 100 mm

We Know That,

T = F X R

= 100 X 110

=11000 N mm

Shear stress t= ultimate strength / factor of safety FOS= 4.

t =700 / 4 = 175 N/mm^2

T = π/16 x d^3 x t

11000 = π/16 x d^3x 175

d = 6.85mm

Normally we use shaft of diameter 20 mm. Hence our design is safe.

6. Conclusion

This day, vehicle traffic is a major issue in most big cities. This can be used to our advantage by installing these speed breakers in heavy traffic roads and toll booths we can generate electricity almost continuously by using the weight of the vehicles to produce mechanical power in the shafts by using the rack and pinion mechanism. As this method does not require any external power source and the traffic never reduces, these speed breakers are more reliable and have a greater life span. Summarize the findings and their implications for renewable energy generation. suggest areas for future research and development to improve the efficiency and reliability of wind and kinetic energy systems.

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