Design and Fabrication of Mini Windmill

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Abstract :- Renewable energy has been on an increasing demand in the recent due to over stress on non-renewable resources and their increasing cost. Thus, producing electricity with the use of renewable resource Wind energy has been taken up in this project. A Windmill, which rotates when there is enough wind, generates electricity owing to magnetic coupling between the rotating and stationary coil. A horizontally rotating prototype of Windmill is being used in this project. Mini Windmill Power Generation Project harnesses the Windmill i.e., Wind Turbine Generator to charge a 12V Battery. The System is based on Atmega328 microcontroller which smartly senses and charges the battery while displaying the voltage on the LCD. The Windmill, when in enough wind to drive it, generates power enough to charge a battery. Since it can work in favourable natural conditions by itself without consuming fossil fuel, it can charge the battery automatically and that too without any harmful emissions. Thus, this project is an example how natural resources like the wind energy can be efficiently harnessed to produce electricity in harmony with nature

1.INTRODUCTION

In recent decades, the prospect of the depletion of fossil fuels has directed attention toward renewable energy sources. Among the renewable energy sources, onshore wind power is one of the most attractive because of its low cost of maintenance of installed systems. Although the concept of vertical axis wind turbines (VAWTs) was proposed by Darrieus [1] as early as 1931, the research and development in this area are still of interest and in progress nowadays. Among the several categories of wind generators, small wind turbines have gained increased interest for their excellent adaptability to the urban environment in terms of visual impact and noise pollution. Being axisymmetric, they are omnidirectional turbines, which respond well to changes in wind direction. To determine the performance of the VAWT, analytical and numerical approaches, as well as experimental tests are generally used [2–11]. Among others, Sutherland et al. [2] report on the stream tube model and vortex models that allow one to analyse the aerodynamic response of VAWTs. Islam et al. [3] analysed three aerodynamic models used for the performance prediction and design of a straight blade Darrieus turbine. These three models are the double-multiple stream tube model, free vortex model and cascade model, and we highlight their strengths and weaknesses utilized to speed up the manual cleaning exercise including handpicking, racking, and cut stamp control with the utilization of engine driven hardware.

2. PROBLEM STATEMENT

A Savonius vertical-axis wind turbine is a slow rotating, high Thrust force machine with two or more scoops and are used in high-reliability low-efficiency power turbines. Most wind turbines use lift generated by air foil-shaped blades to drive a rotor, the Savonius uses drag and therefore cannot rotate faster than the approaching wind speed. Now let us look at the second type, which is also the most popular of the two. The Savonius wind turbine is the most popular of the two types. Let us go ahead and look at some of the features these VAWT offer to the homeowner

3. LITERATURE SURVEY

Over the last thirty years composite materials, plastics and ceramics have been the dominant emerging materials. The volume and number of applications of composite materials have grown steadily, penetrating, and conquering new markets relentlessly. Modern composite materials constitute a considerable proportion of the engineered materials market ranging from everyday products to sophisticated niche applications. While composites have already proven their worth as weight-saving materials, the current challenge is to make them cost effective. The efforts to produce economically attractive composite components have resulted in several innovative manufacturing techniques currently being used in the composites industry.

4. DESIGN OF MECHANICAL CLEANING SYSTEM

The most widely used meaning is the following one, which has been stated by Jarti “Composites are multifunctional material systems that provide characteristics not obtainable from any discrete material. They are cohesive structures made by physically combining two or more compatible materials, different in composition and characteristics and sometimes in form”. The weakness of this definition resided in the fact that it allows one to classify among the composites any mixture of materials without indicating either its specificity or the laws which should give it which distinguishes it from other very banal, meaningless mixtures.

5. SYSTEM DESIGN INPUTS

COMPONENT	QUANTITY	MEASUREMENT
shaft	2	diameter= 23 mm
chain	2	length=1430 mm
collecting jaw	2	length=330mm
collecting bin	1	length= 450 mm breadth=430 mm height=110 mm

6. FABRICATION OF MODEL

Fig 1 Fabrication of the model

During fabrication of the model, the basement part is prepared by welding the metal bars by electric welding. Then the supporting rods are welded at an angle of 90 degree from the basement, the pillow block bearings are fixed to the supporting rod and the front part of the basement. Hollow cylindrical shafts are fixed to the bearings and chain drive is also fixed to the shaft to fix the shafts the factor of safety of the chain is calculated. The lifters are fixed to the chain by gas welding at an equal distance from each.

7. WORKING PRINCIPLE

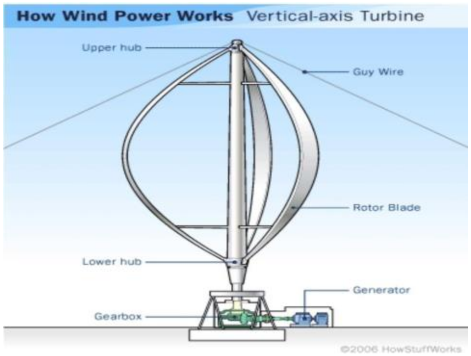

Fig 2 Working principle of mini windmill

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8. CONCLUSION

In this paper the manufacturing process of the blades for a 100W vAWT using composite materials was described. And it can be achieved by the installation and use of mini wind turbines, to be placed in wind parks and home roof. The basic requirements to the performances of such wind turbine can be satisfied only by using advanced, lightweight, exceptionally durable, fatigue resistant and damage tolerant and stiff composite materials. The most important parts of the turbines, produced from composites, wind turbine blades, are subject to complex, combined impact, static and random cyclic loading. To resist these loading over many years and hundreds of millions of loading cycles (on the one side) and to reduce the loads (like gravity, on the other side), the wind blades are built from fibre reinforced polymer composites. While the currently available solutions (in the simplest case, E-glass/epoxy composite) satisfy most of these conditions partially, the necessity for new, better solutions leading to the increased reliability and reduced costs for wind turbines, The selected materials for this application were fiberglass and coir fibre and. The adopted technologies comprise of the hand layup method and vacuum infusion process. In the end, this paper provides insightful information for future research papers on the matter, regarding manufacturing technologies. Furthermore, the resulted blades will be tested in relevant conditions in the aerodynamic tunnel.

9. REFERENCE

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