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FABRICATION VERTICAL AXIS WIND TURBINE

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ABSTRACT - Wind energy is one of the non-conventional forms of energy and it is available in affluence. Electricity can be generated with the help of vertical axis wind turbine. This projects aims of utilizing this wind energy in most effective manner to get the maximum electric output, and therefore we selected highway as our installation site where we can take the advantage of the moving vehicles on both the sides of the road. In the present work, turbine is design and fabricated as per the specifications, the blades used are semi-circular shape and are connected to the disc which is connected to shaft. Shaft is then coupled with pulley with the help of bearing, and then pulley is connected to the alternator, which generates the power. The power developed is stored in battery and then can be used for street light, signal or toll. In this project a small model has been created for testing purpose. This project also aims for maximum output with minimum cost indulges, so that the government can think over this project and can implement this type of vertical axis wind turbine on highways at low cost.

Keywords: [cooling tower, industrial, fan arrangement.]

1. INTRODUCTION

In our project we have focused on producing electricity from wind and so we have fabricated a wind mill. A windmill is a machine that is powered by the energy of the wind. It is designed to convert the energy of the wind into more useful forms using rotating blades or sails. The term also refers to the structure it is commonly built on. In much of Europe, windmills served originally to grind grain, though later applications included pumping water and, more recently, generation of electricity. Recent electricity-generating versions are referred to as wind turbines.

Since India is a country having huge demand of power due to the size of the population, however this demand is not met due to lack of sufficient power infrastructure of our country, this can be easily inferred from the statistical data of number of villages that have still not been electrified even to the minimum requirement level. Wind energy and solar energy can be a boon for India, but unfortunately we are not able to utilize them in accordance with our potential.

2. LITERATURE SURVEY

Mohammed Hadi Ali [1]:Has carried out experimental comparison and investigation of performance between two and three blades Savonius wind turbine. Due to this purpose, two models of two and three semi-cylindrical blades were designed and fabricated from Aluminum sheet, with having an Aspect ratio of (As = H/D =1), the dimension is (H = 200 mm height and diameter D = 200 mm). These two models were assembled to have overlap zero (e = 0) and a separation gap zero (e' = 0). Subsonic wind tunnel is used to investigate these two models under low wind speed condition, which shows that maximum performance at (λ = TSR = 1) and a high starting torque at low wind speed, and also gives reason for three bladed rotors is more efficient than the two blades, that by increasing the number of blades will increase the drag surfaces against the wind air flow and causes to increase the reverse torque and leads to decrease the net torque working on the blades of Savonius wind turbine.

N.H. Mahmoud [2]: Has conducted an experimental analysis by using, wind tunnel experimental setup, the experimental results shows that -Three bladed Savonius rotors are more efficient than the three and four bladed Savonius rotors. The rotor with end plates gives higher efficiency than the without end plates. Blades having overlap ratios are better than the blades with without overlap ratios. By increasing Aspect Ratio Coefficient of performance (Cp) will also increase.

Javier Castillo [3]:Has carried out that, three-bladed design is more efficient than a four-bladed rotor; a low solidity ($\sigma \geq 4$)wind turbine may present self-starting problems as rotor efficiency. CP also decrease at low tip speed ratio, so optimum tip speed ratio is 2.5-3 for H-rotor. He also conclude that Larger radius turbines are more efficient than small turbines at same rotational speed as the tangential airspeed increase leads to smaller angles of attack, bigger Reynolds numbers and thus bigger blade lift coefficients.

U.K.Saha,S.Thotla, D.Maity [4]:Has conducted that, power coefficient Cp of Savonius rotor depends on number of stages. When number of stages increased from one to two, the rotor shows better performance characteristics, however the performance get degraded when the number of stages become three. These may be increased in inertia of rotor. So the optimum number of stages for Savonius rotor is two. It also concludes from the experimental

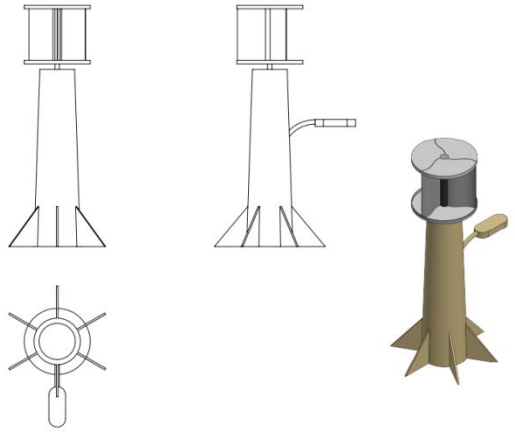
evidence that a twoblade system gives optimum performance. For two blade two stage Cpis about 30%, V=6-8 m/s.

T.Letcher[5]: Has carried out experiment in three separate directions Computation Fluid Dynamics (CFD) modelling, generator design and materials/manufacturing process. With the experimental data collected during this project, It was concluded that the power output of combined setup is higher than the single Savonius and Darrieus rotor.

3. WORKING PRINCIPLE

Wind mill arrangement is the mechanical arrangements which are easily rotated. The rotating speed is depends upon the wind strength. The wind mill arrangement is coupled with the dynamo. So whenever the wind mill is rotated due to wind, the dynamo also rotated. The electric power is generated in the dynamo. The generated electric power is given to battery through the charging circuit.

DRAWING FOR TEMPERATURE CONTROLLER WITH COOLING SYSTEM



MERITS

Use of renewable energy
Maintenance cost is less
Non polluting
Occupying very little space
Easy to implement and low maintain
Power generate by the wind force

4. APPLICATIONS

Vertical axis windmills, also known as vertical axis wind turbines (VAWTs), have some unique applications compared to traditional horizontal axis wind turbines (HAWTs). Here are some potential applications for VAWTs:

1.Urban areas: VAWTs can be used in urban areas where the wind direction is variable and unpredictable. Their vertical orientation allows them to capture wind from any direction, making them more efficient in urban environments where wind patterns are disrupted by buildings and other obstacles.

2.Residential areas: VAWTs can be installed in residential areas, such as on rooftops, to generate renewable energy for individual homes. Their compact design makes them suitable for small spaces, and they can operate quietly, making them less disruptive to neighbors.

3.Off-grid applications: VAWTs can be used in remote areas where there is no access to the power grid. They can be combined with solar panels and batteries to create a reliable off-grid power system.

4.Water pumping: VAWTs can be used to pump water from wells or other sources, making them useful in rural areas where access to water is limited. They can be used to power pumps directly or to charge batteries that power pumps.

5.Recreational use: VAWTs can be used in recreational areas, such as parks and campgrounds, to provide lighting or power for small devices like phones or laptops.

Overall, VAWTs have some unique advantages that make them suitable for certain applications. However, they are generally less efficient than HAWTs, so their use is limited in large-scale wind power projects.

CONCLUSION

Vertical axis wind turbine offer economically viable energy solution for remote areas away from the integrated electricity grid systems. Blade design plays critical role for performance and energy extraction from turbine. In order to spread the use of VAWT, the problems associated with various configurations, i.e. poor selfstarting and low initial torque, low coefficient of power, poor building integration should be overcome. With the assumption of placing the turbine in a location with moderate wind availability with optimized blade parameters and design specifications, high power generation is achieved with vertical axis wind turbine and can be serving as energy generation unit for remote areas.

REFERENCES

[1]. Mohammad Hadi Ali, ‘‘Experimental Comparison Study For Savonius Wind Turbine of Two & Three Blades At Low Wind Speed”, International Journal Of Modern Engineering Research(IJMER) Vol.3,Issue.5, Sep-Oct .2013 PP -2978-2986.

[2]. N.H.Mahmoud, A.A El-Haroun, E.Wahba,M.H.Nasef‘‘AnExperimental Study on improvement of Savonius rotor performance”, Alexandria Engineering Journal (2012)51, 19-25.

[3]. Javier Castillo, ‘‘Small-Scale Vertical Axis Wind Turbine Design”,December2011.

[4]. U.K. Saha,S.Thotl, D.Maity, ‘‘Optimum Design Configuration Of Savonius rotor Through Wind Tunnel Experiments”, Journal of Wind Engineering and Industrial Aerodynamics 96 (2008) 1359– 1375.

[5]. T. Letcher, ‘‘Small Scale Wind Turbines Optimized for Low Wind Speeds”, The Ohio State University, Columbus, OH.

[6]. M.Abid,K.S.Karimov,H.A.Wajid,F.Farooq,H.Ahmad,O.H. Khan, ‘‘Design, ‘Development and Testing of a Combined Savonius and Darrieus Vertical Axis Wind

Turbine",Iranica Journal of Energy& Environment,ISSN:20792115.
[7]. S.M.Rassoulinejad-Mousavi, M.Jamil, M.Layeghi, ''Experimental Study of a Combined Three Bucket H-Rotor With Savonius Wind Turbine",World Applied Sciences Journal 28(2):205-211, 2013,ISSN 1818-4952.
[8]. Shrikant G. Gavde, Prof. D.S.Patil,''Comparative Study Of A Single Stage Savonius With A Combined Savonius-Three Bladed Darrieus",International Journal For Technological Research In Engineering Volume 2,Issue 6,February-2015 ISSN(online): 2347-4718.
[9]. R.R.Gupta,R.Das&K.K.Sharma,''Experimental Study of A Savonius –Darrieus Wind Machine",International Conference On Renewable Energy For Developing Countries-2006.
[10]. S.Brusca, R.Lanzafame, M.Messina ''Design of a Vertical-Axis Wind Turbine: How The Aspect Ratio Affects The Turbine'sPerformance",International Journal Energy Environment Engineering (2014)5:333-340.