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Fabrication of Vertical Axis wind Turbine and Application

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Abstract- Wind energy as a potency source is all alluring as an alternative to fossil fuels because it is plentiful, renewable, widely distributed, green, and engenders no greenhouse-gas emissions. A performance amelioration of the scoop-vane vertical axis wind turbine is described. To amend the performance of the potency generation system design of the special frame of vertical axis wind turbine which consists of four movable vanes, this utilized efficaciously the wind energy and depends only on the acting area of movable vanes. The new frame design makes using the kinetic energy of the wind to increase the positive torque of our model and tested it practically in the wind tunnel as well as tested by solid works software.

Keywords: Wind turbine, Green Energy, Energy Management, respect for the Environment, Vertical Axis Wind Turbine.

1. INTRODUCTION

Here we use Darrius type VAWT for the making of the model. It is distinguished by its simplicity, relatively low manufacturing cost, lightweight, easy handle, and ease of service because of the assembly of this model on the ground. Ability to install everywhere. This type of VAWT has a feature to function regardless of the wind direction. In the present work, we aim to use this model on highway roads. Wind turbines are classified into two types. The first one is a vertical axis wind turbine and the second one is a horizontal axis wind turbine. The VAWT is not fully developed because of the less efficiency and vibration issues of big structures, whereas HAWT is fully developed and they have high efficiency than VAWT. VAWT accepts the wind flow from any direction without orientation. The main rotor shaft is set to transfer to wind while the main components were located at the base of the turbine this arrangements allow the generators and gearbox to be located close to the ground, facilitating service and repair. VAWT is don't need to be pointed into the wind, which removes the need for wind sensing and orientation mechanism. Due to its compactness and lighter weight, the VAWT can be easily installed in domestic buildings and commercial places as a source of nonrenewable energy or electricity development.

2. DIFFERENCE BETWEEN VAWT AND HAWT

VAWT	HAWT
Tower Swey Small	Tower Swey Large
Yaw Mechanism Not Present	Yaw-Mechanism Present
Overall-Formation Simple	Overall-Formation Complex
Generator Location On Ground	Generator Location Not On Ground
Wind Direction Independent	Wind Direction Dependent
Less Noise Produce	Relatively High Noise Produce
Hight From Ground Small	Hight From Ground Large

3. COMPONENTS

i. Base
ii. Shaft
iii. Bearings iv. Center Mounts
v. Radial Connecting Arms
vi. Airfoils
vii. Blade Connecting Assembly
viii. storage battery ix. Dynamometer x. Gear

4. MAIN FEATURERS

i. The turbine is self-starting.
ii. VAWT are omnidirectional and do not require pointing in the direction of wind
iii. The lower blade rotation speed implies lower noise levels.
iv. Perceived as being more aesthetically pleasing.
v. The increased blade configuration solidity and torque assist the machine in self-starting
vi. Elimination the risk of the blade reaching equilibrium during start-up rotation. vii. Reduced cyclic loading and power pulsation and fluctuation by using more than two blades.
viii. Easy access to all mechanical and structural element of the machine.

5. MATERIAL SELECTION SMALL MODEL

Material is procured as per raw material specification and part quantity. Part process planning is done to decide the process of manufacture and appropriate machine for the same.

i. EN24- Alloy Steel
ii. EN9- Plane Carbon Steel
iii. MS- Mild Steel
iv. STD- Standard Part Selected from Data Manufacturer catalog.

6. CONSTRUCTION

The design consists of the application of scientific principles, technical information, and imagination for the development of an incipient or improvised machine or mechanism to perform a categorical function with maximum economy & efficiency.

Hence a meticulous design approach has to be adopted. The total design work has been split up into two components;

A) System design

B) Mechanical Design

System design mainly concerns the sundry physical constraints and ergonomics, space requisites, arrangement of sundry components on the mainframe at the system, manmachine interactions, No. of controls, the position of controls, working environment of the machine, chances of failure, safety measures to be provided, servicing avails, ease of maintenance, the scope of the amendment, weight of machine from ground level, the total weight of the machine and a lot more. In mechanical design, the components are listed down and stored on the substructure of their procurement, designed in two categories namely, Designed Components

Components to be purchased

For designed components, detached design is done & distinctions thus obtained are compared to the next highest dimensions which are rarely available in the market. This amplifies the assembly as well as postproduction servicing work. The sundry tolerances on the works are designated. The process charts are yare and passed on to the manufacturing stage. The components which are to be purchased directly are culled from sundry catalogs & designated so that anybody can purchase the same from the retail shop with given designations.

7. OBJECTIVES

To economically design, analyze and fabricate a vertical axis wind turbine.

To design and build a self-starting vertical axis wind turbine to operate in low wind speed conditions.

8. SCOPE

Unidirectional, low wind condition, and small torque. More drag

on the blades when they rotate

9. CONCLUSION

Testing will be a major part of the design selection, as blade profile selection will occur. The test should provide inside as to which blade profile provides the most torque and show the most significant effects due to blade pitching. The blade connector and pitching system design will also be finalized. A device used to couple torque transducer and generator to the shaft will be designed as well this will occur in conjunction with the selection of a generator and design of a device that would couple the generator to the turbine after it reaches a certain rotational speed.

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