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Generating Energy from Omnidirectional Winds

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ABSTRACT

With the depletion of fossil fuel energy, renewable energy has become the most popular field of research interest. Wind turbines are considered as one of the most commonly used energy sources (turbo-machines) for power generation. Therefore it has been increasingly investigated. In this, we are presenting a design of vertical axis wind turbines which can respond to wind coming from any direction.

Keywords : Wind Turbine, Typhoon Turbine, Omnidirectional Winds

I. INTRODUCTION

In this proposal, we are presenting a design of wind turbines for the generation of clean and renewable forms of energy. Its production has no direct carbon emission or air pollution against the environment; moreover, it does not consume water for generations, seeking lower maintenance costs. The energy generation carried out by this wind turbine is explained below:-

II. DESIGN

This vertical axis wind turbine can respond to wind coming from any direction (omnidirectional wind). In vertical axis design, the curved blades on top of the turbine rotate to generate a Magnus effect, which then starts the rotation of the entire system. Its shape is like an egg-beater, having 3 curved blades attached to the central rod.

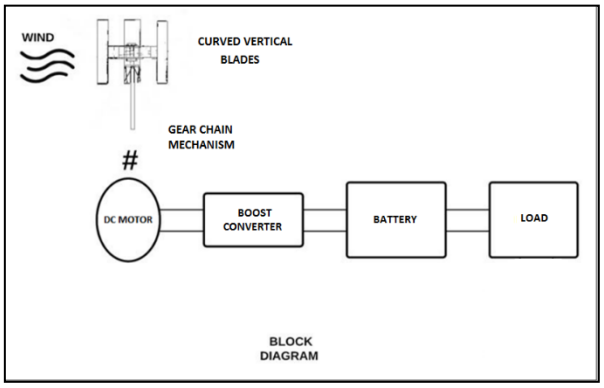
A G.I. pipe is used for coupling of bearing and gear. Gear chain mechanism is used to couple the turbine and the motor. The timing chain is used to increase rotational speed from a low-speed turbine to a higher speed dc motor. A permanent magnet moving coil motor is used. It is a dc motor which has permanent magnets on the rotor. A timing chain is used for the transmission system. A 0-48V dc, 0-3A dc boost converter is used to step up the dc voltage obtained from the motor. Further, a lead-acid battery is used to store the dc voltage obtained from the boost converter.

III. WORKING

A vertical metal post is placed at a certain height when the motor is welded to the top of the column. The motor shaft is connected to the Y-shaped frame with the help of the timing chain, at the end of each arm of the frame to which the blades are attached. These curved blades are connected in such a fashion as to move in one direction only. It responds to wind incoming from all directions to move the turbine

more efficiently. The speed of the turbine is matched with the speed of the dc motor with the help of chain mechanism. The motor shaft begins to rotate and the generated power is transferred to the boost converter, which steps up the voltage from its input to its output. Thus, the output of the boost converter, which is stepped up DC voltage, is transmitted to the lead-acid battery to store the energy harvested by the wind. Further, it can be used to supply various loads.

IV. BLOCK DIAGRAM



V. MODEL DESCRIPTION

SR. NO.	COMPONENTS	HEIGHT	THICKNESS	WIDTH	RADIUS	WEIGHT
1.	Central Rod	60 inches	2.5 mm	-	30 mm	4.3 kg
2.	PVC Frame with Acrylic Blade	24 inches	3 mm	1 inch	2 inches	310 gm
3.	Metal Sheet (Base)	24 inches	5 mm	17.5 inches	-	9.6 kg
4.	Tetra pod (4 legs)	16 inches *4	4 mm	-	-	246*4 gm

- PMMC Motor- 24V, 100W
- Gearbox (Gear ratio= 6:1)
- Timing chain (used for transmission system)
- Boost converter- 0-48V dc, 0-3A dc
- Expected Load- 1 LED Bulb

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VI. CONCLUSION

A. We aim to generate electricity in a normal/low wind area. The design of the blades will help them to move in any direction, hence making it efficient to generate a satisfactory amount of energy.

B. We can implement this design of vertical axis wind turbines at every possible place and generate electricity while contributing to the reduction of CO2 production.

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