A CRITICAL REVIEW OF FABRICATION OF MAG-LEV WIND TURBINE

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Abstract— The prototype model namely 'A VERTICAL AXIS MAGNETIC LEVITATION WIND TURBINE' works on the repulsion principle of magnets . Using the effects of magnetic repulsion, spiral shaped wind turbine blades will be fitted on a rod for stability during rotation and suspended on magnets as a replacement for ball bearings which are normally used on conventional wind turbines. Power will then be generated with an axial flux generator, which incorporates the use of permanent magnets and a set of coils. The aim of this major qualifying project is to design and implement a magnetically levitated vertical axis wind turbine system that has the ability to operate in both high and low wind speed conditions. Our choice for this model is to showcase its efficiency in varying wind conditions as compared to the traditional horizontal axis wind turbine and contribute to its steady growing popularity for the purpose of mass utilization in the near future as a reliable source of power generation.

IndexTerms— Magnetic Levitation, Wind Turbine'

I. INTRODUCTION

Wind is a non-conventional source of energy, by which the electricity can be obtained by converting kinetic energy of wind into electrical energy by using wind turbine. The wind turns the blades, which spin a shaft, which connects to a generator and makes electricity. A wind turbine is used to generate electricity in bulk. Several wind turbines, grouped together, form a wind farm. The electrical power that is generated from the turbines is distributed to customers from a utility grid. The utility grid works much in the same way as a conventional power plant. The cost of generating wind power comes from the cost of machinery, installation and site preparation. These three factors make up over eighty percent of the initial start up cost. The cost of wind energy used over the course of a lifetime though, is lower than using fossil-fueled systems. This is because there are minimum operating expenses and there is no fuel to purchase. So in the long run wind power is cheaper than other forms of energy. The renewable energy produced from wind has garnered much attention in recent years but is often criticized for its low output and lack of reliability. The maglev wind turbine is expected take wind power technology to the next level with magnetic levitation. The magnetic levitation is an extremely efficient system for wind.

II. LITERATURE REVIEW

Our MAGLEV WIND TURBINE is inspired by the following inventions as follows;

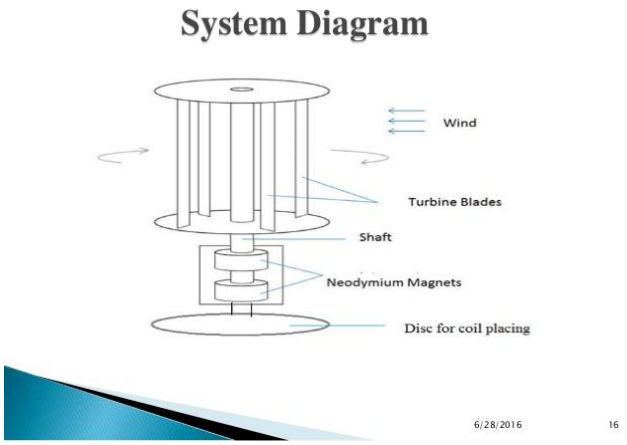
According to International Journal of Engineering and Innovative Technology (IJEIT) Volume 3, Issue 1, July 2013 titled "Wind Power Plant Using Magnetic Levitation Wind Turbine" The term wind energy is the process of converting wind into a valuable power source. The wind turbine is designed to take the kinetic energy of the wind and turn it into pure mechanical power. The power of the wind can be used in many different ways. The kinetic energy of the wind can be used on a farm for pumping water or grinding grain. When the natural energy of the wind is transferred to a generator the power is used as electricity for businesses, homes and schools etc. A wind turbine resembles the propeller blades. The propeller blades of the turbine rotate because of the moving air. The rotation of the propellers powers an electric generator and then generator supplies a home with electric current. To simplify the process the wind rotates the blades, the rotation causes a shaft to spin, and the shaft connects to a generator to make electricity.

International Journal of Emerging Technology and Advanced Engineering (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 4, Issue 4, April 2014) "Design and Analysis of Maglev Vertical Axis Wind Turbine" said that A combined savonius and darrieus vertical axis wind turbine would have many advantages over an individual savonius or darrieus rotor. A savonius produces high torque which would be useful in self-starting and darrieus rotor having a high tip speed ratio useful for electrical generation. However research on combined savonius and darrieus rotors is very scarce. This developed a two bucket savonius rotor and placed it on the central shaft of a traditional darrieus. Though the tip speed ratio is a still a little low for use as an electrical generator, the research demonstrated a simple way to enable a darrieus VAWT to be self-starting and achieve higher efficiencies.

III.

International Journal of Research in Engineering and Technology "Power Generation Using Maglev Windmill" said that The concept of vertical axis wind turbine using magnetic levitation successfully worked. Comparing with traditional horizontal wind turbines, single Maglev turbine having large capacity gives more output. The turbine *efficiency* is improved by utilization of magnets helping to spin with fast speed with negligible friction as it cancels out the stress on the shaft of the turbine. This modern design of turbine gives more power output with higher efficiency compared to conventional wind turbine.

For avoiding the vibration of the rotor, shaft was used.



III. CONSTRUCTION

Base:-

(i). First we took Aluminium Sheet and created a frame out of it. We created a square shaped frame by welding its corners.
(ii). Now to make it fixed base we joined plywood to the frame.
(iii). We took plywood and cut it according to the size of frame and then screwed plywood at both sides of frame.
(iv). Hence, by doing this we manufactured a fixed base which would sustain the weight of turbine and could be strong enough to adhere the forces when the turbine rotates due to wind.
(v). We also, drilled a hole in the centre of base so as to fix the shaft in it.

Coils:-

(i). Coils, the essential part for producing electricity is fixed over the base.
(ii). 10 coils were stick to the upper side of base in a circular shape.
(iii). The coils were turned 270 times with the help of a coil winders.
(iv). This coils were stick to the base and connected to each other and an output was taken out from a coil.

Shaft:-

(i). An aluminium shaft is used for this purpose.
(ii). This shaft is fixed in the hole which was drilled in the base.
(iii). It was fixed in the hole and stick it with a strong adhesion to make sure that it will sustain the wind force and rotation of turbine.

Neodymium Magnets:-

(i). The magnets used for the Magnetic Levitation process is Neodymium Magnets.
(ii). Two ring shaped magnets are used for the purpose of repulsion and are inserted in the shaft.
(iii). One magnet is placed over the base and another magnet is inserted in the shaft in such a manner that the two magnets should face each other with same poles so that they repel each other.
(iv). Due to repulsion, one magnet remains freely suspended in air and performs magnetic levitation processes.

Turbine:-

(i). A Savonius type turbine is used in our model which is made of clad sheet.
(ii). We first took a clad sheet and then cut it in the required shape by using ships.
(iii). We cut out three blades of same shape and size and welded it to two cylinders made of clad sheet so that it could be inserted in the shaft.
(iv). For eliminating fluctuation of blades we took a wire and joined it horizontally in the middle blades so that the blades should not flicker at high wind speeds.

Plate:-

(i). We used an Aluminium plate to complete the structure of turbine.
(ii). First, we drilled a hole at the centre of plate of same size of shaft and the cylinders in the turbine.
(iii). Then we joined the plate at the bottom of blades by Riveting and placed it in the shaft. The turbine floats in air due freely suspended magnet.
(iv). At the bottom of plate we stick ceramic magnets which are usually used in speakers.
(v). We stick 10 such magnets so that they should be parallel to the coils present on the base so that when turbine rotates, the magnets rotate over the coils and magnetic flux gets cut, producing electricity.

(vi). We stick this magnets over the plate with the help of strong adhesive like Araldite

IV. WORKING

When the wind strikes the turbine blades it starts to rotate with negligible friction as it is floating in air.
(ii). When turbine and plate rotates the magnets fixed on the plate rotate over the coils.
(iii). Due to rotation of magnets over coils the magnetic flux gets cut and emf is genrated.
(iv0. The output taken out from the coils gives current as per the rpm of turbine which is dependent over wind speed.

(v). the Neodymium magnets inserted in the shaft performs maglev action.
(vi). Due to repulsion another magnets freely in air showing antigravity properties due to which there is no friction.
(vii). Hence the turbine rotates at low wind at 1m\s too.

Table 1 Technical Specification

Serial No.	***Components***	***Qty***	***Specifications***
1	Fixed Base	1	Material: Aluminium & Plywood Width : 600mm Length : 600 mm Height : 70 mm
2	Shaft	1	Material : Aluminium Outer diameter : 20 mm Inner diameter : 16 mm Height : 600 mm
3	Coils	10	Material: Copper No. of Turns: 270
4	Disc or Plate	1	Material: Aluminium Diameter of Plate: 500 mm
5	Neodymium Magnet	3	Material : Neodymium (NdFeB) Outer diameter : 20 mm Inner diameter : 10 mm
6	Turbine	1	Blade type : Savonius Material : Clad Sheet
7	Magnet	10	Outer diameter : 55 mm Inner diameter: 25 mm
8	Generator	1	Type: Dynamo Voltage : 230 V RPM: 00rpm
10	Pipe joints	3	Name : T joint , Elbows

V. CONCLUSION

The home for the magnetically levitated verticalaxis wind turbine would be in residential areas. Here it can be mounted to a roof and be very efficient and practical. A home owner would be able to extract free clean energy thus experiencing a reduction in their utility costand also contribute to the “Green Energy” awareness that is increasingly gaining popularity.

Maglev wind turbines have several advantages over conventional wind turbines. For instance, they’re able to use winds with starting speeds as low as 1.5 meters per second (m/s) because of negligible friction achieved with the help of magnetic levitation created and due to the assistance from magnetic field. Also, they could operate in winds exceeding 40 m/s. Hence maglev wind turbine has a great future potential in terms of energy generation.

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