

Review Paper on Savonius Maglev Wind Turbine

Mukesh T. Bobade¹, Adarsh A. Panchbhai², Prof. Ajay Mahawadiwar³
^{1,2,3}Mech. Department, Abha Gaikwad-Patil College of Engg

Abstract—Magnetic levitation is a method by which an object is suspended with no support other than magnetic fields. Levitation is used for counteract the gravitational effect and any other accelerations. The principle advantage of a maglev wind turbine from conventional is the turbine rotor is afloat in the air due to magnetic levitation and as well as mechanical friction is eliminated totally. That's why rotor is rotated at high speed in low speed wind.

A savonius vertical axis turbine is run at the low speed wind. Savonius would have advantage over other turbine as savonius produces high torque at low speed wind which would be useful in self starting. Savonius turbine blade has better performance and self starting ability and it is very useful for electrical generation with magnetic levitation.

Keywords— Blades, Magnetic Levitation, Magnets, Wind Energy

I. INTRODUCTION

Renewable energy source i.e. wind power, solar power, geothermal energy, hydropower and various form of biomass these are used to generate the electricity. These renewable energy having never ended so it can be used again and again. Now a day's up to 90% energy can be developed by using fossil fuels i.e. coal, natural gas etc. to fulfill their needs, in order to increasing in the population. Cost and demand for fossil fuel is increased. These fossil fuels are used to generate the electricity because of it. It comes to the end of point and also increase the rate of pollution but as compared to fossil fuel the wind energy form all renewable energy it is fastest growing upto 30% of annual graph.

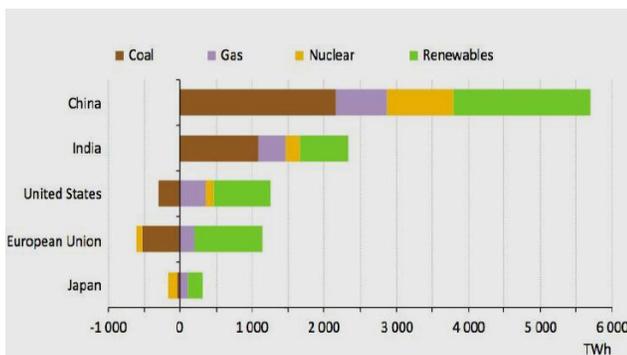


Figure I. Power Generation 2010 -2013

The wind turbine is used to convert the kinetic energy of wind into a mechanical power; this mechanical power can be used to generate the electricity by using wind. Wind turbine is used to generate the electricity in the bulk quantity. These electricity can be distributed to customers, other industries etc by using utility grids these utility grids power plants.

The maglev wind turbine it is a vertical axis wind turbine, it can be operated on the phenomenon of magnetic levitation. The repulsion cause between two same poles of the magnets that called as levitation the main advantage of this turbine is that one is frictionless bearing and another one is magnetic levitation. It also required less maintenance. In maglev wind turbine the wind having speed of 1.5m/sec can be used and then it will increase speed of wind up to 20% over the conventional wind turbine and cost is reduced up to 50% because of these it has higher efficiency than conventional and increases the life of generator and also reduced the maintenance cost.

Beijing 2007, Asia exhibition in which the magnetic wind turbine was firstly invented in Asian zone. The speed of wind is lower near up to 7m/sec normally in cities, but the frictional resistance of a sub-sist wind turbine cannot be started when the speed of wind is not large.

In this project we use the savonius turbine because of having good starting torque and it can be operated at an angle of the drag.

All title and author details must be in single-column format and must be centered. Every word in a title must be capitalized. Email address is compulsory for the corresponding author.

Wind Power- Wind is one of the fastest growing electrical energy sources in all over the world. Wind power is very plentiful, eco-friendly, clean and does not produce hazardous gaseous or greenhouse gaseous. So it is used as an alternative of fossil fuels. The general basic power generation methods like thermal, it produces lots of poisonous gaseous which is not good for environments as well as human being.

II. WIND POWER AND WIND POWER TECHNOLOGY

Wind is one of the fastest growing electrical energy sources in all over the world.

Wind power is very plentiful, eco-friendly, clean and does not produce hazardous gaseous or greenhouse gases. So it is used as an alternative of fossil fuels. The general basic power generation methods like thermal, produce lots of poisonous gases which are not good for environments as well as human beings.

The project's ability to function mainly depends on the power of wind and its availability. Wind is also known as another form of solar energy because it comes about as a result of uneven heating of the abstract topography of the earth's surface. With wind turbines, two categories of wind are found in the earth's surface: local and planetary winds. These winds are mainly found on the shore lines, mountain tops, valleys, and open plains. The former is the type you will find in regular environments like the city or rural areas, basically where settlements are present. This type of wind is not conducive for effective power generation technology. Wind power technology is a process which promotes the use of wind generation for mechanical power and electricity. It defines the wind characteristics of wind turbines with respect to wind behavior.

China has by far the world's biggest wind power sector according to 31% of the global total. Also India is fast catching up with Spain, despite being a relative newcomer to the wind sector in 2004. India had 22,465 MW of wind power capacity, having added 2,315 MW during the year.

Wind farms consist of many individual wind turbines which are connected to the power transmission network. Onshore wind is an inexpensive source of electric power. Comparative with or in many places cheaper than coal or gas plants. Wind power gives variable power which is consistent from year to year but which has significant variation over shorter time scales. It is therefore used in conjunction with electric power sources to give a reliable supply.

III. MAGNETIC LEVITATION PRINCIPLE

Magnetic levitation, maglev or magnetic suspension is a method by which an object is suspended above another with no support other than a magnetic field. The electromagnetic force is used to counteract the effect of gravitational force.

Magnetic Levitation

Magnetic levitation is known as maglev and this phenomenon works on the principle of repulsion characteristics of permanent magnets. This technology has been mainly used in the railway industry in the Far East to provide very fast and reliable transportation. On magnetic levitation trains and with ongoing research, its popularity is increasingly attaining new heights.

Neodymium magnet pairs are used for magnetic levitation and substantial support can be easily experienced.

By placing these two neodymium magnets on top of each other on the same poles for making repulsion, the magnetic levitation or repulsion will be strong enough to keep both magnets at a distance away from each other. Repulsion force or levitation is also used for suspension purposes and is strong enough to balance the weight of an object depending on the verge (threshold) of the magnets. In this project, we expect to implement this technology from the purpose of achieving vertical orientation with our rotor as well as axial flux generator.

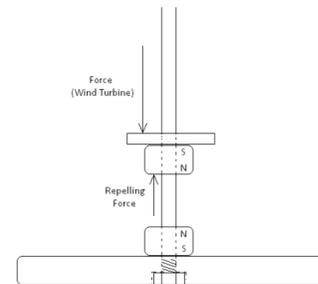


Figure II.-Basic Magnet Placement

IV. MAJOR COMPONENTS OF MAGLEV WIND TURBINE

Magnet

Two ring type or hollow type Neodymium (Ne-fe-B) magnets of diameter 40mm outer and inner diameter is 20mm and 10 mm thickness. They are placed at the shaft by which the required repulsion between the rotor and stator.

These magnets are responsible for generating the useful flux that is going to be utilized for the power generation system.

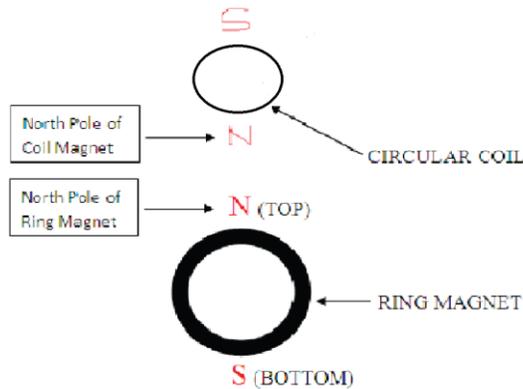


Fig. III: Block Diagram of Magnetic Levitation Experimental Set-Up

V. GENERATOR

Generator is a device which converts the mechanical energy into electrical energy. Generator is used for various applications and the most part have similarities that exist between these applications. However the few different presents what is really distinguishes a system operating on motor. With the axial flux generator design, its operability is based on permanents magnets alternator where the concepts of magnets and magnetic field are the dominants factors in this form of generator functioning these generators have air gap surface perpendicular to the air gap generates magnetic fluxes parallel to the axis.

VI. TYPE OF TURBINE

There are many types of turbine used in wind power plant and this wind turbine has two main categories. Horizontal axis turbines (HAWTs) and vertical axis wind turbine (VAWTs). As the name pertains, each turbine is distinguished of their rotor shafts. The former is the more conventional and common type everyone has come to know, while the latter due to seldom usage and experimentation, is quiet unpopular. The HAWTs usually consist of two or three propeller-like blades attached to a horizontal and mounted on the bearings the top of a support tower. When the wind blows, the blades of the turbine are set in motion which drives a generator that produces AC electricity.

For optimal efficiency these horizontal turbines are usually made to point into the wind with the aid of a sensor and a servomotor or a wind turbine application with the vertical axis wind turbines the concepts behinds their operation similar to that of the horizontal designs.

VII. CONCLUSION

At the end of the project, the vertical axis maglev wind turbine was a success. The design of the blades and rotors are capable enough to rotate at low wind speed and give the output. The magnets are levitated properly while working which gives smooth rotation and hence there is negligible friction.

Acknowledgement

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BIOGRAPHIES



Mr. Mukesh T. Bobade student Of Bachelor of engineering, Department of Mechanical Engineering, Abha Gaikwad-Patil College Of Engineering, Nagpur



Prof. Ajay Mahawadiwar Head Of Department, Mechanical Engineering, Abha Gaikwad-Patil College Of Engineering, Nagpur



Mr. Adarsh A. Panchbhai student Of Bachelor of engineering, Department of Mechanical Engineering, Abha Gaikwad-Patil College Of Engineering, Nagpur