POWER GENERATION USING MAGLEV WIND TURBINE

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ABSTRACT

Since a decade the demand for electricity is increasing rapidly and rate of power demand is running ahead of supply. The present day existing schemes of power generation are insufficient to keep pace with ever increasing demand. To overcome this problem we have to invent new schemes of power generation and acquire maximum renewable energy in efficient way. The recent severe energy crisis has forced to think & develop the power generation by renewable sources.

This project dwells on the implementation of an alternate structure of a wind turbine for power generation purposes. Magnetic levitation has apparently moved to paradigm stage. The levitating blades spin with little resistance, and the power output is increased. They also can be a spin in light breezes. Maglev wind turbine principle provides efficient frictionless power generation with less maintenance, compared to Horizontal Axis Wind Turbine (ordinary system). The aim of this major qualifying project is to design and implement a magnetically levitated wind turbine system that has the ability to operate in both low and high wind speed velocity conditions. This new model of wind turbine uses magnetic levitation to reduce the internal friction of the rotor which is considered as a revolution in the field of wind technology, and reduces the effect of gravitational force, producing 30% more energy than a conventional ordinary turbine, at the same time decreasing operational costs by 45% over the ordinary wind turbine.

KEYWORDS: Magnetic levitation, VAWT, neodymium magnet, permanent magnet.

I. INTRODUCTION

The Maglev wind turbine configuration is an immense as contrast with customary wind turbine. Its fundamental preference is only employments of frictionless metal rollers and an attractive levitation configuration does not required more space as contrast with conventional wind turbine. It likewise requires less support. The Maglev wind turbine was initially disclosed at the Wind Power Asia show in 2007. The interesting working rule behind this plan is through attractive levitation. Attractive levitation is a to a great degree productive framework for wind vitality. The vertically arranged cutting edges of the wind turbine are suspended noticeable all around swapping any requirement for heading.

Wind is a non-customary wellspring of vitality, by which the power can be gotten by changing over active vitality of twist into electrical vitality by utilizing wind turbine. There are two sorts of wind turbine, one is customary wind turbine and other is maglev wind turbine, yet era of power utilizing maglev innovation is presently ending up plainly more focused and compelling. It chips away at the guideline of electromagnetism. It has a few focal points over normal wind turbine and has certain applications.

II. SYSTEM DEVELOPEMENT

Magnetic levitation, maglev, or magnetic suspension is a method by which an object is suspended above another object with no support other than magnetic fields. The magnetic force is used to counteract the effects of the gravitational force. This system has been developed by placing two magnets on top of each other with like polarities facing each other. The magnetic repulsion will be strong enough to keep both magnets at a distance away from each other. The force created as a result of this repulsion can be used for suspension purposes and is

strong enough to balance the weight of an object depending on the threshold of the magnets. The power will then be generated with an axial flux generator, which incorporates the use of neodymium magnets and a set of coils. The generated output is in the form of AC and can be used for AC Loads.

A. DESIGN OF WORKING MODULE

This system is constructed by taking following specifications and material:

Blade material: Acrylic,
No of blades:8,
Height of blade:20cm
Inner diameter of magnate:2cm,
Outer diameter of magnate:6cm

Underneath outlined figure gives a thought of maglev wind turbine. This framework takes a shot at the repugnance and fascination qualities of perpetual magnets. This innovation has been used in the maglev rail industry in the Far East to give quick and solid transportation on maglev rails and with progressing research its fame is improving and achieving new statures.

Utilizing two changeless magnets and neodymium magnets and considerable bolster attractive levitation can without much of a stretch be experienced. By mounting these two magnets on top of each other with comparative polarities before each other, the attractive aversion will be sufficiently solid to avoid both magnets as much as possible far from each other. The constrain made subsequently of this repugnance can be utilized for levitation reason and is sufficiently solid to adjust the heaviness of cutting edge get together of wind turbine.

The wind speed a large portion of the Asian zone is much lower than 7 m/s extraordinarily in urban areas, yet the mechanical frictional resistance of existing wind turbine is to huge for the most part it can't starter when wind speed is no sufficiently huge. This venture presents structure and guideline of the proposed attractive levitation twist turbine for better use of wind vitality. There are few parameters which is going to consider in the design of magnetically levitated wind turbine.

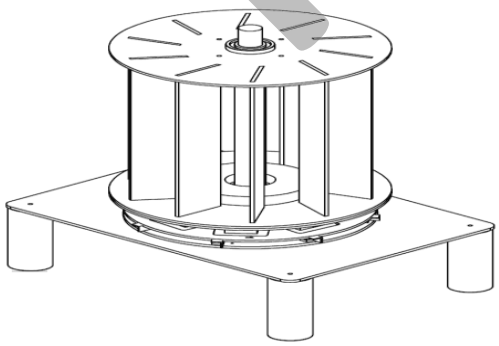


Figure II.1: Working model of maglev wind turbine

B. DIAMETER OF THE ROTOR

Since the power created is relative to the square of the measurement of the rotor, it turns into a crucial parameter. It is fundamentally found by the connection between the ideal power required to the era and the mean twist speed of the territory.

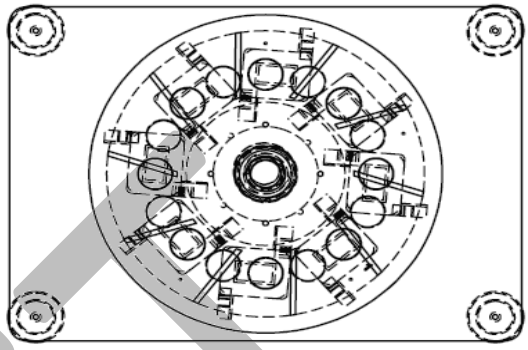
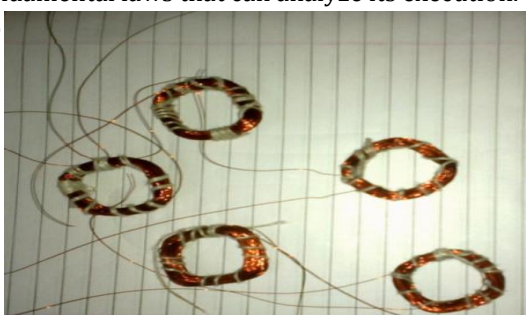


Figure II.2: Top view of Turbine

The decision of the quantity of sharp edges of a wind turbine is hard to its operation and additionally development. More number of cutting edges is known to make unsettling influence in the framework, and a lesser number would not be sufficiently competent to secure the ideal measure of wind vitality. Subsequently the quantity of sharp edges ought to be dictated by considering previously mentioned limitations

C. DESIGN OF COILS

While planning a generator it is essential to know about the fundamental laws that can analyze its execution.



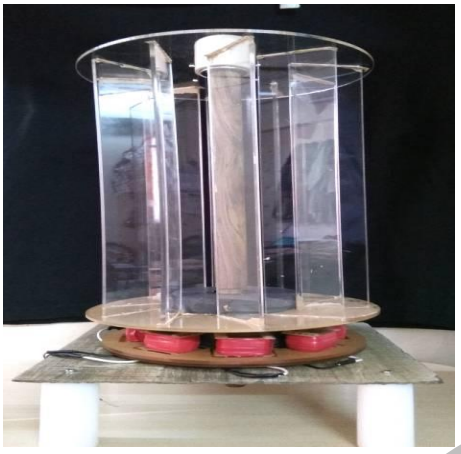
Photograph: Copper coils

So as to instigate an emf in a curl a close-by varrying attractive field must exist. The emf incited not just relies on upon the greatness of the field thickness additionally on the curl region. The connection between the range and field thickness is called as flux.

III. WORKING MODULE MAGLEV WIND TURBINE

Dissimilar to the common even hub wind turbine, this outline is suspended with the assistance of maglev vertically on a rotor shaft. This maglev conspire which will be taken a gander at in incredible detail fills in as a

productive substitution for metal roller utilized on the regular wind turbine and is generally actualized with perpetual magnets .this levitation will be utilized between the turning shaft of the turbine sharp edges and the base of the entire wind turbine framework. At the point when twist goes ahead the turbine cutting edges because of the drag compels the rotor turns which pivot the pole which coupled to generator development which changes over the mechanical vitality into electrical vitality.

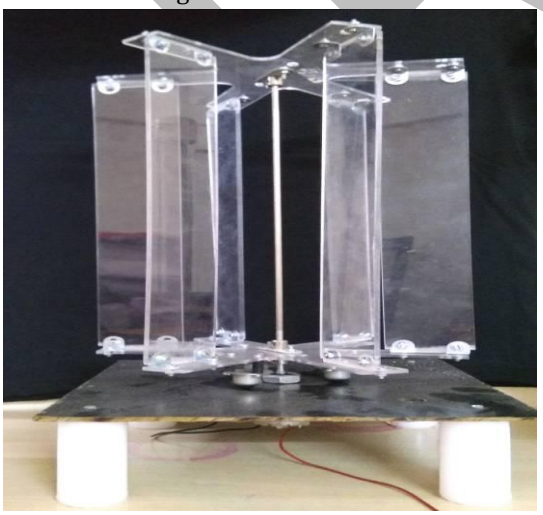


Photograph III.1: Working module

IV. ORDINARY MODULE

The ordinary module is designed and constructed for the comparison point of view with maglev wind turbine having same structure and design specification.

Blade material: Acrylic,
No of blades:6,
Height of blade:20cm
Inner diameter of magnet: not used
Outer diameter of magnet: not used



Photograph IV.1:- Ordinary module

With the vertical hub wind turbines, the idea driving their operation is like that of the flat plans. The significant distinction is the introduction of the rotors and generator which are all vertically organized and for the most part on a pole for support and solidness. This likewise brings about an alternate reaction of the turbine edges to the twist in connection to that of the level arrangements. A customary or ordinary vertical hub configuration is appeared in above photo.

ABBREVIATIONS AND ACRONYMS

HAWT	Horizontal Axis Wind Turbine.
VAWT	Vertical Axis Wind Turbine.
MWTG	Maglev wind turbine generator.
MW	Mega watt.
PMB	Permanent magnet bearings.
AMB	Active magnet bearings.

E. RESULTS

Table IV.E.1:- output comparison

Wind Speed (m/s)	Ordinary wind turbine			maglev wind turbine		
	Speed (rpm)	Electric Quantities		Speed (rpm)	Electric Quantities	
		Voltage (V)	power (W)		Voltage (V)	power (W)
1.7	50	2.1	0.023	90	4.6	0.09
2.6	89	3.8	0.05	135	6	0.3
3.5	126	5.3	0.1	170	10	0.5
4.9	192	6.2	0.4	240	13	0.9
5.8	231	8.2	0.6	270	18	1.2
6.9	278	12.2	1.1	330	24.7	2.3

V. CONCLUSION

Attractive levitation Wind Power Generators, speak to an extremely key future for wind control era. A maglev turbine can yield more than conventional wind turbines. The rotor that is outlined outfit enough air to turn at low and high wind speeds while keeping the focal point of mass nearer to the base yielding strength because of the impact of attractive levitation. The proficiency of turbine is expanded (around 30%) by supplanting the heading by magnets, the attractive levitation helps the turbine to turn at substantially speedier rate as it will wipe out the gravity impact. We can state the maglev turbine can control more yield with high effectiveness transformation contrasted with conventional wind turbine.

VI. FUTURE SCOPE

This design of maglev wind turbine is readily fulfilled with improved design and suitable material, So as to give more efficiency than ordinary system and more researches have been developing to make it more feasible in future. So the efficiency of acquiring renewable energy increases.

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