



iJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 6 Issue: IV Month of publication: April 2018

DOI: <http://doi.org/10.22214/ijraset.2018.4601>

www.ijraset.com

Call: ☎ 08813907089

E-mail ID: ijraset@gmail.com

Magnetically Levitated Vertical Axis Wind Mill

Chetan S. Shegokar¹, Kishan S. Ambekar², Gajanan A. Sairise³, Piyusha D. Patil⁴, Prashant M. Chavan⁵

^{1, 2, 3}UG Student, Department of Electrical Engineering, D. Y. Patil Institute of Engineering & Technology, Ambi, Pune 410 506

^{4, 5} Assistant Professor, Department of Electrical Engineering, D. Y. Patil Institute of Engineering & Technology, Ambi, Pune 410 506

Abstract: *In current situation the request on power is significantly higher than that of its generation. Wind control can possibly conquer the request in vitality segment. This request can be overwhelmed by utilizing vertical hub windmill. This undertaking gives data about breeze turbine for control age. Attractive levitation, maglev is a strategy by which a question is suspended with no help other than attractive fields. Attractive weight is utilized to check the impact of the gravitational and some other speeding up. Attractive aversion gives points of interest of no utilization of metal ball thus turbine gives widespread revolution. Power is created by vertical hub motion generator with utilization of perpetual magnets and set of loops. Subsequently this innovation give an extraordinary proficient, adaptable and exquisite strategy for control age from twist with almost zero contamination and environmentally friendly power vitality is conceivable utilizing this model on higher scale.*

Keywords: *Magnetic Levitation, Neodymium magnet, Clean Green Power, Vertical Axis Wind Turbine and Generator. horizontal axis wind turbines.*

I. INTRODUCTION

The expression "Levitation" alludes to a class of advances that utilizations attractive levitation to move vehicles with magnets instead of with wheels, axles and course. Maglev (got from attractive levitation) utilizes attractive levitation to drive vehicles. With maglev, a vehicle is suspended a short separation far from a "guide way" utilizing magnets to make both lift and push. Rapid maglev trains guarantee emotional enhancements for human travel boundless reception happens. Maglev trains move more easily and to some degree more unobtrusively than wheeled mass travel frameworks. Their no dependence on rubbing implies that speeding up and deceleration can outperform that of wheeled transports, and they are unaffected by climate. The power required for levitation is normally not an expansive level of the general vitality utilization. The majority of the power is utilized to defeat air protection (drag). Albeit ordinary wheeled transportation can go quick, maglev permits routine utilization of higher best speeds than regular rail, and this compose holds the speed record for rail transportation. Vacuum tube prepare frameworks may theoretically permit maglev trains to accomplish speeds in an alternate request of greatness, yet no such tracks have ever been fabricated. Contrasted with regular wheeled trains, contrasts in development influence the financial aspects of maglev trains.[1]

Vitality assumes the indispensable part in our everyday life. Without the vitality there is each work is deficient. There are two kinds of vitality viz, Renewable vitality and Non Renewable vitality. Considering the future request utilization of sustainable power source is essential.

As sustainable power source is the perfect wellspring of vitality. In current situation there are numerous more strategies to deliver vitality. Some of them are eco inviting and some of them cause contamination. As traditional vitality dirties and makes hurt nature, the improvement of perfect and sustainable power source, for example, geothermal vitality, biomass, sun based and wind turns out to be critical to people groups life.

Wind vitality contribute significant part in customary vitality division. The breeze vitality is a one of the quickly expanding wellspring of vitality.

The significant issue with this innovation is change in the wellspring of wind. To conquer this issue maglev idea is utilized as a part of this task. Its fundamental favorable position is less contact and congruity of turn at low speed of wind. The proposed plan of wind process is fitting to imbue on parkways. As it is reasonable for all breeze heading. Utilizing the breeze from quick moving vehicle, wind process begin pivoting. This superior innovation is useful for the age of energy[2]-[4].

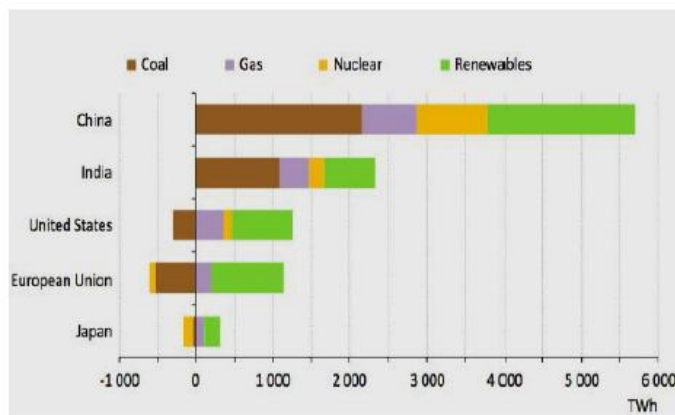


Fig.1: Comparison in energy sources

II. LITERATURE REVIEW

A. Suresh Mashyal

The work manages outlining a versatile expressway wind turbine, which is to be contribute towards the worldwide pattern in wind vitality creation attainably. Wind turbines are generally utilized in provincial regions; the principle objective the work is to outline a breeze turbine that can be utilized as a part of urban communities. Specifically, the turbines will utilize the breeze draft made by vehicles on the interstate to produce power. The thought is to counterbalance the measure of contamination made by consuming petroleum derivatives by presenting a potential wellspring of clean vitality. As the vehicles moves from roadways/freeways, there is a making of weight segment on both the sides of the street. This weight section is made because of awkwardness of high weight/low weight vitality band made by the autos. Because of this weight band wind stream and make weight push. The weight push is adequate to create power through composed breeze turbine[5].

B. Zbigniew Goryca

The paper introduces the plan of two multi post generators with changeless magnets outlined by the creator and in addition chose after effects of tests led on them. The generators are utilized as a part of little breeze control plants with even pivot wind turbines (HAWT) and vertical hub wind turbines (VAWT). On account of one of a kind, licensed development of the attractive circuit, a little stopping up torque was gotten regardless of a major number of rotor shafts and straight-teeth stator spaces. The paper portrays the plan of generators, the reliance of voltage on rotational speed out of gear, the reliance of voltage on stack for the evaluated speed and also estimations of the cogging torque. The generators can be utilized as a part of small scale water control plants.

III. SYSTEM DESCRIPTION

A. Magnetic Levitation

Attractive levitation, maglev, attractive suspension is technique by which a protest is suspended with no help other than attractive fields. It works on the shock attributes of perpetual magnets. Attractive power is utilized to balance the impact of gravitational quickening and some other speeding up. Utilizing of combine of perpetual magnets like Neodymium magnets and generous help attractive levitation can without much of a stretch be experienced[6].

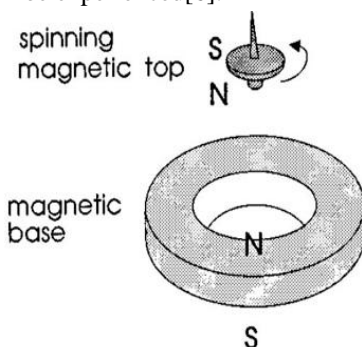


Fig.2: Magnetic Levitation

B. Magnetic Levitation Wind Mill

In this framework the pole of the vertical breeze turbine comprise of magnets that is one magnet is put on shaft of the breeze process and other magnet is put on the container of the supporting structure, to such an extent that they create pivoting shocking power. Since the external post of the principal magnet is same as that of internal shaft of the second magnet which is settled on supporting structure. This framework does not expect power to work in light of the fact that no electromagnets are included. The vertical pivot twist idea for the breeze turbine that is actualized as the power age part of this undertaking certain uniqueness compare to it[7].

C. Maglev Principle

The trademark that set this breeze generator apart from the others is that it is completely upheld and turns about a vertical pivot. This pivot is vertically situated through the focal point of the breeze vent which takes into account an alternate kind of rotational help as opposed to the traditional metal roller framework found in flat breeze turbines.

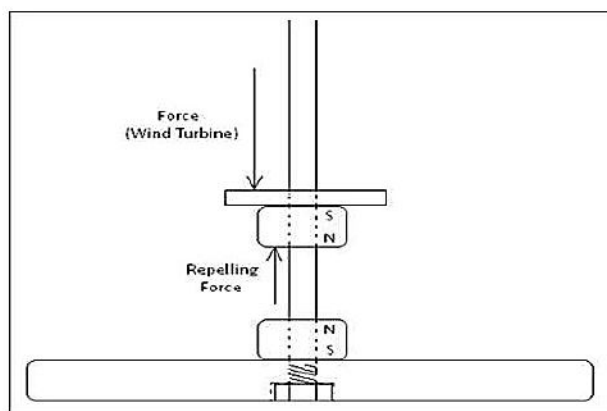


Fig.3: Basic Placement of magnet

D. Basic principle of System

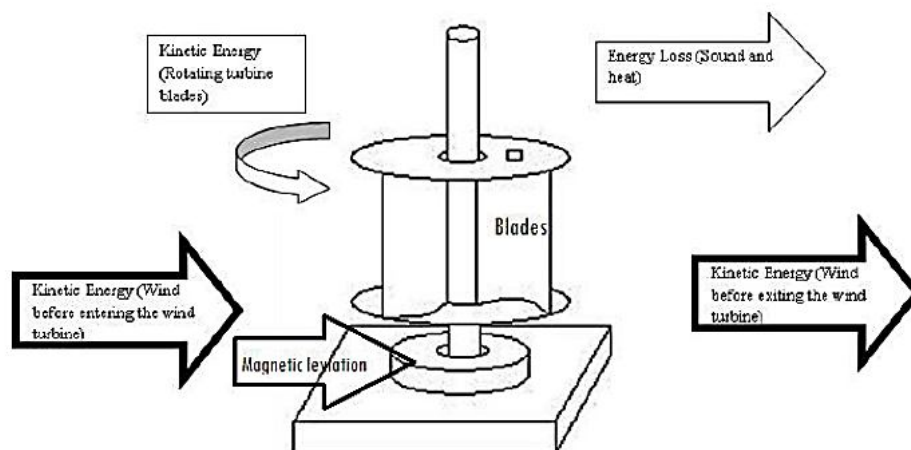


Fig.4: Working model of Magnetically Levitated Vertical Axis Wind Mill

Attractive levitation is a system by which a protest is suspended in air so impact of gravity on that question diminishes altogether with no help other than attractive fields. Here attractive weight is utilized to for the most part neutralize the impacts of the gravitational powers. Attractive levitation is a greatly viable framework for wind vitality. Here how it functions:- At the last one magnet is put. It repulses the other magnet which is welded to the pole of generator. The pole contains the vertically situated cutting edges of the breeze turbine. Presently because of this shock control between the magnets the upper magnet connected to shaft is suspends is air suspended,. For this levitation full perpetual uncommon earth magnets produced using neodymium are utilized. Because of this no vitality misfortune through grating happens in generator. This additionally helps in diminish the support cost and builds the life expectancy of the breeze generator[9].

IV. MODELLING AND SPECIFICATION

A. Neodymium Magnets

In choosing the vertical hub idea for the breeze turbine that is executed as the power age bit of this undertaking, certain uniqueness compared to it that did not relate to the next breeze turbine plans. The measure of attractive power that requirements to check the heaviness of the breeze turbine must be resolved before the kind of magnet material is chosen.

Magnet Specification

Type- Neodymium, Thickness - 8 mm, Inner Diameter- 36 mm, Outer Diameter- 76 mm

B. Rotor Design

Since the power created is straightforwardly relative to the square of the measurement of the rotor, it turns into a significant parameter. It's fundamentally dictated by the connection between the ideal power required to be created and the mean breeze speed of the territory. Power created,

$$P = \eta_e \eta_m C_p P_0 = \frac{1}{2} \eta_e \eta_m C_p A \rho V^3$$

$$= \frac{1}{8} (\eta_e \eta_m C_p \pi D^2 \rho V^3)$$

Where,

η_e = efficiency of electrical generation, η_m = efficiency of mechanical transmission

In the absence of concrete data, the Following empirical formulae can be used.

$P = 0.15 V^3 D^2$, for slow rotors, $P = 0.20 V^3 D^2$, for faster rotors.

The below figure shows the design of turbine model.

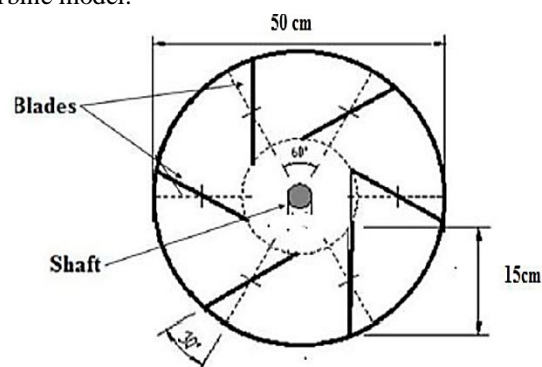


Fig 5. Design Of Turbine Model.

Radial Flux Generator is selected for better voltage generation.

4 pole Rotor is used, 30 × 3 mm four number neodymium magnets are used as rotors.

G.I material are fixed on the base.

Technical Specifications

G.I Material- L type G.I material used for fixing a neodymium magnets on base.

Magnets- 30×3 mm neodymium magnets.

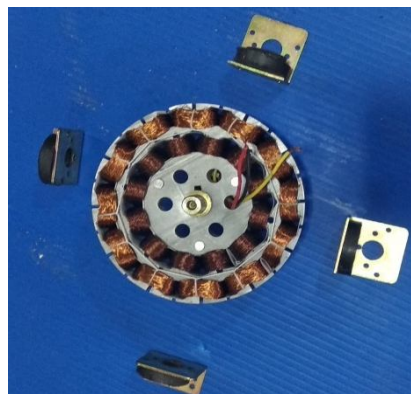


Figure 6. Rotor Design

Blade Design Edges are made of the inflexible PVC material having a decent mechanical quality likewise water and corrosive safe property.

Sharp edges are settled to the best and base round circles with PVC arrangement.

Specification Length- 500 mm , Width- 150 mm , Thickness- 7 mm



Figure7. Blade Design

C. Supporting Rod

The supporting rod is made of the PVC material which is non- magnetic material.

Specification

Length- 800 mm

Diameter- 25 mm



Figure 8. Supporting Rod

D. Base Design

The base is made of the two circular plywood with 85 mm distance between plywood's. They are fixed on wood block material.

Specification

Outer Diameters-500 mm ,Inner Diameter- 25 mm ,Thickness- 12 mm

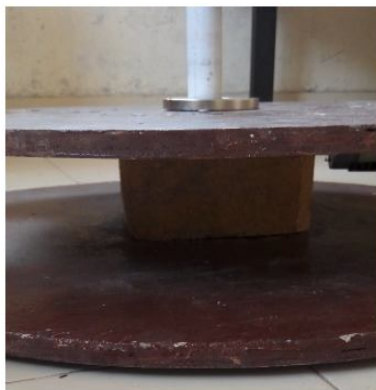


Figure 9. Base Design

V. CONCLUSIONS

Outline and create of Magnetically Levitated Vertical Axis Wind Mill is effectively actualized. The imperative idea of attractive levitation clarified in this paper. The frictional misfortunes which can expect to be insignificant, so Maglev wind turbine helps in accomplishing more prominent productivity. On the off chance that we utilize more quantities of curls in stator and more quantities of magnets in rotor the emf produced in loops will be more. To get more yield another path is to diminish turbines claim latency by utilizing lighter weight materials for turbine. So that for a similar breeze speed it will pivot speedier, thus it will create more power.

REFERENCES

- [1] Bonnacorsi, "On the Relationship between Firm Size and Export Intensity", Journal of International Business Studies, XXIII (4), pp. 605-635, 1992.
- [2] R. Caves, "Multinational Enterprise and Economic Analysis", Cambridge University Press, Cambridge, 1982. \
- [3] Prashant M. Chavan, Girish R. Walke, "Using STATCOM interfacing of renewable energy source to grid and power quality improvement", 2015 International Conference on Energy Systems and Applications, 30 Oct.-1 Nov. 2015, Pune, India, 10.1109/ICESA.2015.7503365. IEEE
- [4] M. Clerc, "The Swarm and the Queen: Towards a Deterministic and Adaptive Particle Swarm Optimization", In Proceedings of the IEEE Conference on Evolutionary Computation (CEC), pp. 1951-1957, 1999.
- [5] H. H. Crockell, H. Etemad and L. S. Sulude "Specialization and International Competitiveness in Managing the Multinational Subsidiary" Croom-Helm, London, 1986.
- [6] K. Deb, S. Agrawal, A. Pratab, T. Meyarivan, "A Fast Elitist Non-dominated Sorting Genetic Algorithms for Multiobjective Optimization". NSGA II, KanGAL report 200001, Indian Institute of Technology, Kanpur, India, 2000.
- [7] Prashant M. Chavan, Gayatri P. Chavan, "Interfacing of hybrid power system to grid using statcom & power quality improvement", Information, Communication, Instrumentation and Control (ICICIC), 2017 International Conference, 17-19 Aug. 2017, Indore, India, 10.1109/ICOMICON.2017.8279079. IEEE
- [8] Prashant M. Chavan, Girish R. Walake, "Interfacing of Renewable Energy Source to Grid Using STATCOM to Improve the Power Quality", International Journal of Engineering Technology, Management and Applied
- [9] Cheremisinoff, N. P. (1978). Fundamentals of wind energy. Ann Arbor, MI: Ann Arbor Science. Cooper, P., & Kennedy, O. (2005). Development and analysis of a novel vertical axis wind turbine.



10.22214/IJRASET



45.98



IMPACT FACTOR:
7.129



IMPACT FACTOR:
7.429



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089  (24*7 Support on Whatsapp)