Design & Analysis of Vertical Axis Wind Turbine for Power Generation

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Abstract— This project is taken up to make use of the maximum wind energy, which is moving out unused and mainly the wind, which we get through the passing of vehicles on the highways. The windmills will be kept on the median for the maximum utilization of the wind, which can be coupled with a series of windmills to increase the efficiency of the electricity, generated and can be utilized for charging electric vehicles and other various purposes. We also aim at minimizing the pollution by avoiding power generation through non-renewable sources of energy hence we considered in identifying and calculating the right dimensions of blades, rotors and hub, materials to be used, positioning of the windmills including height of placement, maximum wind direction in the placement region, minimum wind force required to rotate and other primary needs to get the maximum output. Also, choose the right airfoil design needed and performed Q-blade analysis of the blades to choose the right design of the blade and ensure the safety of the system. An attempt to replace the stock bearings with repulsion magnets which has very less friction and also can accelerate the wind energy captured by the turbines increasing the efficiency of the wind mill.

Index Terms— Windmill, Median, Efficiency, Power-Generation, Wind Force, Airfoil, Q-Blade Analysis, Repulsion Magnets

I. INTRODUCTION

Energy: Energy, in material science, the limit with respect to tackling job. It might exist in potential, active, warm, electrical, compound, atomic, or other different structures. There are, besides, warmth and work—i.e., energy during the time spent exchange starting with one body then onto the next. After it is moved, The energy is constantly assigned by its character. After, heat moved may become nuclear power, although work done may show as the mechanical energy.

*Horizontal Axis Wind Turbine (HAWT)*HAWT's are the most generally utilized breeze turbines. It has a set of experiences beginning from up to 10 AD. Little turbines are pointed by a straightforward breeze vane, while enormous turbines by and large utilize a breeze sensor combined with a servo engine. Most have a gearbox, which transforms the lethargic turn of the edges into a speedier pivot that is more reasonable to drive an electrical generator.

II. CALCULATIONS

The average natural wind speed to be 1.57 m/s. Density of air is 1.2 kg/m3.Turbine 1.2m in D and 0.62m H, the Pw of the wind is given by,

$Pw = ½ \rho A u^3$

where

Pw - power of the wind (W)

ρ - Air density (kg/m^3)

A – Area of turbines (m)

U - Undisturbed wind breeze speed (m/s)

A= Dxlb

Where,

A- Swept area of project (m^2)

D-dia of turbine (m)

L.b- length of the Blades (m)

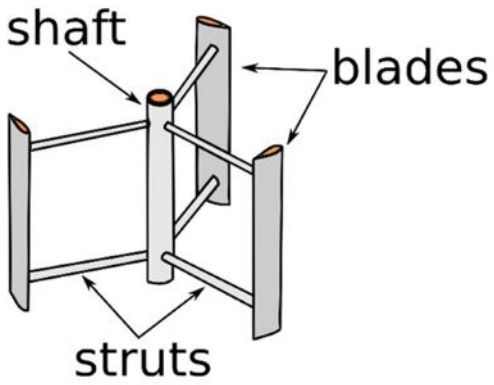
$A= (1.2) * (1.0)=1.2m^2$

Pw=1/2 * (1.204) * (1.2) * (1.57)3 = 0.46kw

III. TABULATION

BLADE DIMENSIONS	SHAFT DIMENSIONS	PULLY DIMENSIONS
Height = 620mm	Diameter = 20mm	Turbine Pulley = 300m
Diameter = 700mm	Length= 1300mm	Generator Pulley = 25mm
Thickness = 0.8mm		Center distance of the pulley = 300mm
Angle = 45^0	-	-
Angle between blades = 120^0	-	-

IV. FIGURES



CONCLUSION

On the planet today, most machines are planned determined to restrict ozone depleting substance discharges which is a significant reason for environmental change. Non-sustainable wellspring of energy appears to be gradually losing its strength. Through inventive thoughts in innovation, inexhaustible wellsprings of energy have been tapped to give this perfect energy.

By utilizing this spotless wellspring of inexhaustible wellspring of energy, not exclusively will it decrease the cash spent on power charges yet additionally assist our planet with recuperating the impacts of contamination and thusly diminish discharge of ozone harming substances to the ozone layer.

Wind turbines are a beginning for society to reduce the harm never really earthed by not utilizing fuel sources that produces contamination.

The objective of this undertaking was to plan an upward pivot wind turbine. Our work and the outcomes acquired so far are extremely reassuring and support the conviction that upward pivot wind energy transformation frameworks are functional and conceivably exceptionally contributive to the creation of clean inexhaustible power from the breeze considerably under not exactly ideal sitting conditions. It is trusted that they might be built utilized high-strength, low-weight materials for organization in more created countries and settings or with recyclable materials and nearby abilities in less created nations. The Involute breeze turbine planned is ideal to be situated at the parkways medians to create power, controlled by wind. The hefty vehicle traffic gives it a benefit for more wind opportunity. With putting it on roadway medians, it self control up streetlamps or potentially business use. In many urban areas, thruways are a quicker course for regular drive with better places and needing consistent lighting makes this an effective method to deliver electrical energy.

Vertical hub wind turbine addresses an extremely encouraging future for wind power age. An upward wind turbine can give yield more than regular HAWT.

In this manner, it very well may be inferred that Vertical hub wind turbine can deliver power more with higher effectiveness contrasted with customary breeze turbine. At an extremely low speed wind speed Thus, this innovation has the ability to totally dislodge current innovation being used for wind ranches.

Our work and the outcomes got so far are extremely promising and build up the conviction that upward pivot wind energy change frameworks are down to earth and possibly exceptionally contributive to the creation of clean sustainable power from the breeze much under not exactly ideal sitting conditions. It is trusted that they might be built utilized high-strength, low-weight materials for arrangement in more created countries and settings or with extremely low tech

neighborhood materials and oval abilities in less created nations.

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