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VERTICALAXIS WIND MILL TURBINE

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ABSTRACT

The objective of the project is to design a wind turbine to recollect wind energy from automobiles on the highway. Wind energy is considered the fastest developing clean energy source however; it is limited by flexible natural wind. Highways can provide a significant amount of wind to drive a turbine due to high vehicle traffic. This energy is not used, to utilize this renewable energy i.e. wind into useful form such as electricity, we introduce 'The Vertical Axis Wind Mill Turbine', which will use the wind and will give the output in the form of electrical energy which can be further used for domestic purpose such as for household appliances and it can be also preferred for lightening of street lamp.

Keywords: Wind Mill Turbine , Wind energy ,Renewable Energy.

I. INTRODUCTION

The people are making the use of wind to make their lives more comfortable since from seventh century. In Persia,the concept of wind mill was originated.For irrigation of farm land, crush grain and milling, the Persians used the wind . This is probably where the term windmill came from. In the twelfth century, the wind mill widely used in Europe, some areas such as the Netherlands have grown from creating vast wind farms. The firstly discovered windmills, however, were not very reliable or energy efficient. Only half the sail rotation was consumed. They were usually slow and had a low angle speed ratio but were useful for torque. The man has constantly tried to improve the windmill since its creation . As a result, over the years past, the number of blades has decreased on windmills. Most modern windmills have 3-4 blades, while past windmills have had 4-8 blades. Old windmill also had to be manually fixed into the wind, whereas modern windmills can be mechanically turned into the wind. The sail design and materials used to produce them have also improved over the years. In many cases, the height of the rotor is directly proportional to its efficiency. By taking this problem under consideration, modern wind turbine should be at least twenty feet above and three hundred feet away from anhindrance, though it is even more perfect for it to be thirty feet above and five hundred feet away from any hindrance.

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II. RESEARCH & DEVELOPMENT

Along with its state-of-the art infrastructure and expertise, for improve planning , operation and control of power system in the power sector,CPRI has made important contributions . Other than in-house R&D, CPRI also carry out sponsored research projects from manufacturers and other agencies in different areas of specialization.

III. SCOPE OF THE PROJECT

In order to consume the available wind resources and to reduce the usage of non-renewable energy resources. The fastest-growing renewable energy resources is wind energy so far.The concept of vertical axis wind mill turbine so far has been supported by market incentives backed by government policies encouraged sustainable energy resources.Large-scale wind facilities upcoming the output rating of conventional power plants, control of the power quality is required to reduce the adverse effects on their combination into the network.

IV. COMPONENTS USED

- Shaft
- Blades
- Permanent magnet DC motor(PMDC motor)
- Battery
- Gears
- Solar Plate
- Bearings

V. DESIGN AND CALCULATION

A wind mill is machine for wind energy transformation. A wind turbine converts the kinetic energy of the wind's motion to mechanical energy transferred by the shaft. A generator further converts it to electrical energy. So it is compulsory to keep in mind, while designing the windmill's structural part**.**

Fig. Wind Mill Turbine

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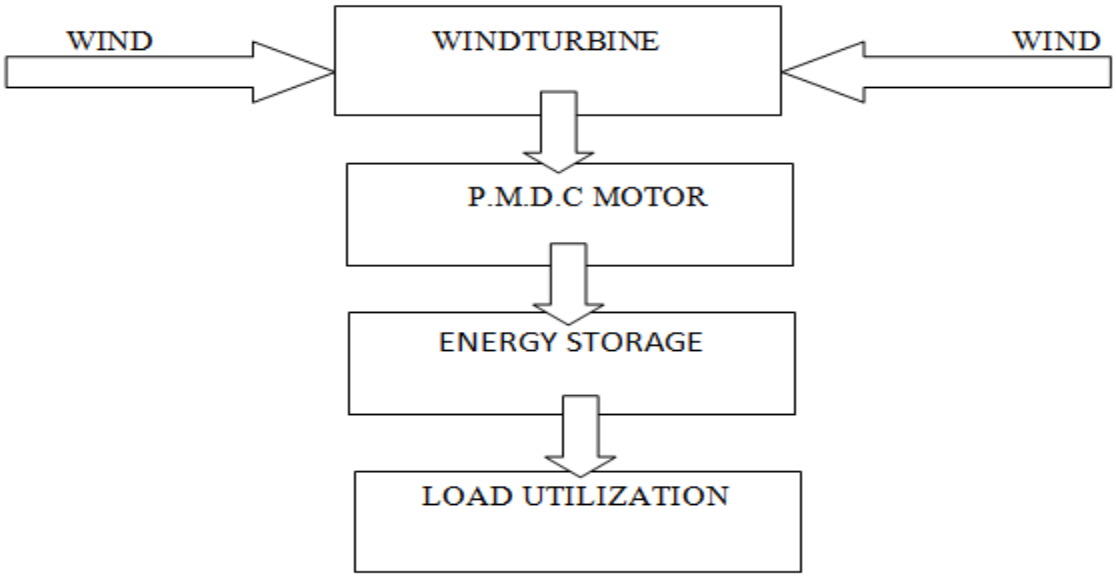
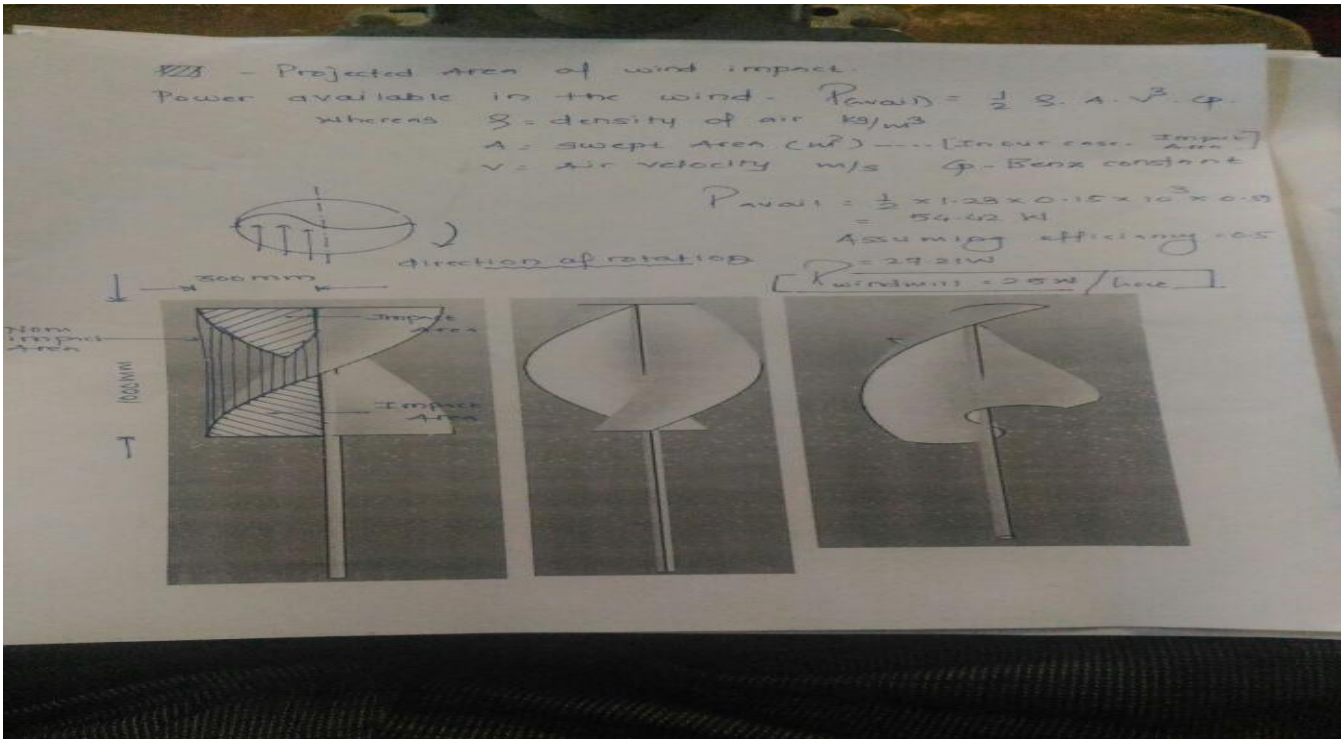
BLOCK DIAGRAM OF WIND POWER GENERATION:





Power of wind is described by –

K.E.=1/2 . m .v^2…….(1)

Where,k.E.=kinetic energy(J)

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M=mass flow(kg/s)

V= speed(m/s)

M=p.a.v…….(2)

Equating equation (1) and (2),

K.E.= 1/2 p.a.v.v^2

K..E= 1/2p.a.v^3 watt

VI. WORKING PRINCIPLE

As the vehicle moves from near the turbine, blades then will start rotating due the back pressure created by the vehicle movement, the blades will rotate about the shaft and the power created by the shaft will be further transmitted to alternator / motor, which will convert the power into useful electrical signal, this electrical signal produced by the alternator / motor will be stored in the battery and will be used according to application.

VII. GENERAL CONSIDERATIONS

7.1 Wind Speed

This is very essential to the productivity of a windmill. The wind turbine only produces power with the wind. The wind rotates the axis and causes the shaft on the generator to sweep past the magnetic coils generating an electric current.

7.2 Variable Control

This will be measured by using the same artificial wind source; e.g., a conventional electric fan or hair dryer. The placement and distance of the wind source will be motionless and shall remain constant in relation to the windmill blades.

7.3 Blade Length

The length of the blade is directly proportional to the swept area. Longer blades have a superior swept area and thus catch more wind with each revolution. Due of this, they may also have extra torque.

7.4 Shape of Blade

This is essential because if anmost favorable blade shape is discovered, then the overall productivity of a windmill can be improved.

7.5 Size/Geometry

The final design should be no higher in diameter than about 3m, and should not be so big as to be steady. It should be as light as possible, resulting in a low moment of inertia. This is important, as a large moment will add to the required starting torque. The self-starter should be decently mechanical and it will not rely on electronics. It must be exclusively wind-powered, will not run on any further source of energy.

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7.6 Human Factors/Safety

No human interaction should be necessary during regular operation. A braking mechanism must be mounted, however, to shut down the turbine if wind speeds are too high, so that maintenance can take place.

7.7 Durability/Maintainability

The turbine must be capable to withstand the weather over a long period, as well as wind speeds up to 30 m/s and temperatures ranging from -20°C to +35°C and other forms of rainfall. The whole assembly should be easy to work on, due to its compact size and relative effortlessness. However, it should not be necessary to change the blades or shaft. All other parts should be practically easy to replace, and even easier to inspect.

VIII. ADVANTAGES

- It is a renewable source of energy.
- Wind power system are non-polluting so it has no adverse effect on the environment.
- No fuel provision is needed.
- On a small scale up to a few kilowatt system is not costly.
- On a large scale costs can be competitive conventional electricity and poor costs could be achieved by mass production.
- They are always facing the wind - no need for routing into the wind.
- Have greater surface area for energy capture -can be many times greater.
- Are more well-organizedin gusty winds – already facing the gust.

IX. DISADVANTAGES

- Initial cost of setup is high.
- If the vehicle is running slow, it is not effective.
- Small vehicles do not generate high power.

X. CONCLUSION

Our work and the results obtained so far are very positive and highlights the principle that vertical axis wind energy conversion systems are practical and potentially very contributive to the production of clean renewable electricity from the wind even below less than perfect sitting conditions. It is hoped that they may be constructed used high-strength, low- weight materials for development in more developed nations and settings or with very low tech local materials and local skills in less developed countries.

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