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BLADELESS WIND TURBINE

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ABSTRACT
It uses a radically new approach to capturing wind energy. The device captures the energy of vortices, an aerodynamic effect that has plagued structural engineers and architects for ages (vortex shedding effect). As the wind bypasses a fixed structure, its flow changes and generates a cyclical pattern of vortices. Once these forces are strong enough, the fixed structure starts oscillating, may enter into resonance with the lateral forces of the wind, and even collapse. There is a classic academic example of the Tacoma Narrows Bridge, which collapsed three months after its inauguration because of the Vortex shedding effect as well as effects of flattering and galloping.

INTRODUCTION
Renewable energy is generally electricity supplied from sources, such as wind power, solar power, geothermal energy, hydropower and various forms of biomass. These sources have been coined renewable due to their continuous replenishment and availability for use over and over again. The popularity of renewable energy has experienced a significant upsurge in recent times due to the exhaustion of conventional power generation methods and increasing realization of its adverse effects on the environment. This popularity has been bolstered by cutting edge research and ground breaking technology that has been introduced so far to aid in the effective tapping of these natural resources and it is estimated that renewable sources might contribute about 20% – 50% to energy consumption in the latter part of the 21st century. Facts from the World Wind Energy Association estimates that by 2010, 160GW of wind power capacity is expected to be installed worldwide which implies an anticipated net growth rate of more than 21% per year. This seminar report focuses on the regardless of wind speed.

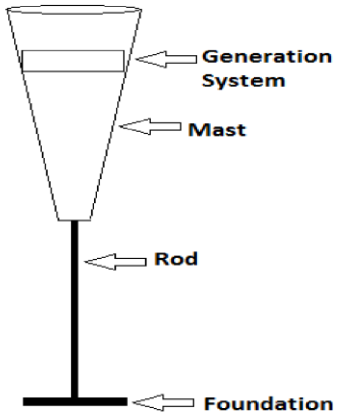
TYPES OF WIND TURBINE
Many types of turbines exist today and their designs are usually inclined towards one of the two categories: horizontal-axis wind turbines (HAWTs) and vertical-axis wind turbines VAWTs). As the name pertains, each turbine is distinguished by the orientation of their rotor shafts. The former is the more conventional and common type everyone has come to know, while the latter due to its seldom usage and exploitation, is quiet unpopular. The HAWTs usually consist of two or three propeller-like blades attached to a horizontal shaft and mounted on bearings at top of a support tower

DRAWBACKS OF WIND TURBINE
- The main drawback is that the wind turbine is costlier.
- Starting wind speed of conventional windmill is high and similarly conventional windmill not able to rotate with high speed and as well as conventional windmill can’t harness energy at low wind

speed less than 1.5m/s ,other type of problem associated with conventional windmill is that the bearing and rotating part

BLADELESS CONCEPT

The characteristic that set this wind generator apart from others is that it is fully supported and rotates with no risk of animal killing. This is vertically oriented with at the centre moving mast and generator.



It seems that basic generator would be most effective placing inside mast. This fig. Shows a basic structure regarding how the bladeless turbine integrated into design. The magnet used inside coil is cylindrical shape magnet,which moves and cause electricity generation output

COMPONENT DETAILS

MAGNETS

Out of the four options of magnets and as seen from the B-H graph the permanent magnets that that were chosen for this application were the N52 magnets. These Nd-Fe-B permanent magnets are nickel plated to strengthen and protect the magnet itself. For maximum output the coil must be such that a complete circular magnet move in or move out of the winding in this case only the maximum energy generation is possible. If the magnet moves only in half part of coil instead of moving in or out completely then there is less energy generation than first case, so proper care must taken while designing the coils and selecting magnet length diameter**.**

In this project we only implemented the circular type magnet[2]

MAST:

After a thorough research into both sub types of vertical axis wind turbine blades configuration, we decided to base the foundation of our design on the CATIA model. We tool a bit of different approach in our design by modifying it with curvature design from the bottom to top. This design was attained with only single sheet of triangular shape cut out from aluminium metal sheet and due to flexibility of sheet metal, we are able to make it in conical shape which uses vortex shedding effect for electricity generation which explained previously in effect of wind structure on wind turbine..

WINDING:

The number of winding per coil produces a design challenge. The more windings will increases the voltage produced by each coil but in turn it will also increase the size of each coil. In order to reduce the size of each coil a wire with greater size gauge can be utilized. Again another challenge is presented, the smaller the wire becomes the less current will flow before the wire begins to heat up due to the increased resistance of small wire.

COIL DESIGN :

These coils are arranged inside the blade, the coils are raised to a certain height for maximum energy generation and for maximum output the coil must be such that a complete circular magnet move in or move out of the winding in this case only the maximum energy generation is possible. If the magnet moves only in half part of coil instead of moving in or out completely then there is less energy generation than first case, so proper care must take while designing the coils and selecting magnet length. The coils are arranged in series aiding to obtain maximum output voltage. The series connections of the coils are preferred over the parallel connection for optimizing a level between the output current and voltage.

POWER GENERATION

The relationship between area and field density is known as flux (φ).The way in which this flux varies in time depends on generator design. The axial flux generator uses the changing magnetic flux to produce a voltage. The voltage produced by each coil can be calculated using Faraday's law of induction: $v = -N * d\varphi / dt$.

The term magnetic flux is formulated from the dot product of the area and the magnetic field density in uniform field.

Flux(φ)=BAcosφ

In most cases a uniform magnetic field cannot be produced so the flux is calculated by integral of the magnetic field with respect to the area.

$\varphi B = \int B dA$

FINAL MODEL

The overall structure of the prototype designed is shown in fig 6.6. The output voltage obtained from this prototype is measured using a multimeter and it is found be some value around 60mV.

Fig. Final model of Bladeless Wind Turbine

ADVANTAGES

One of the main advantages of Vortex is its dramatically low cost. In fact, the normalized cost of energy generation (LCOE) for a typical onshore facility is $0.035/kWh (about 35 euros/MWh), including capital costs, operation and maintenance, performance, land leases, insurance, and other administrative expenses.

Cost of generation for different sources This puts the technology at the very low range of capital intensity for such projects. It also makes it highly competitive not only against generations of alternative or renewable energy, but even compared to conventional technologies. These cost reductions come from reduced manufacturing costs: the tower and the generator equipment are basically one and the same.
The design completely eliminates mechanical elements that can suffer wear and tear from friction, leading to an estimated 53% reduction in maintenance costs compared to traditional wind, avoiding changing oil or changing most of the mechanical parts along the 20 years of the multi-blade wind turbine's life cycle.

DISADVANTAGES

Electrical power generation affected by environmental changes.

FUTURE SCOPE

From above information it is clear that the Bladeless turbine wind generator is the best option for electricity generation using wind power due to its various advantages.
The country like India which having more rural population and condition suitable for wind generation through bladeless wind turbine is the best solution. It will help to increase percentage of renewable energy for electrical power generation and provides electrically as well as economically efficient power to the consumers.
Here it can be mounted to a roof and be very efficient and practical. A home owner would be able to extract free clean energy thus experiencing a reduction in their utility cost and also contribute to the "Green Energy" awareness that is increasingly gaining popularity. Problem with bladeless wind turbine is that it's initial cost is high but once it get implemented then it's operational cost is very less since it compensates initial cost. Another problem is, awareness about this concept. This concept having very less awareness among the world hence research and development of this concept is very slow.
Hence have to spread this concept because only renewable energy can survive the world in coming future and in that wind energy is efficient option .

CONCLUSION

From above information it is clear that the Bladeless turbine wind generator is the best option for electricity generation using wind power due to its various advantages. The country like India which having more rural population and condition suitable for wind generation through bladeless wind turbine is the best solution. It will help to increase percentage of renewable energy for electrical power generation and provides electrically as well as economically efficient power to the consumers. Hence we have to spread this concept because only renewable energy can survive the world in coming future and in that wind energy is efficient option.

RESULT

The bladeless wind turbine model generate energy at lower wind speed than hat of conventional wind turbine and also having very low cost with less space.

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