IOSR Journal of Engineering (IOSRJEN) **ww.iosrjen.org**
ISSN (e): 2250-3021, ISSN (p): 2278-8719
PP 00-00

Bladeless Wind Turbine

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Abstract— *In this project we are focusing on generating electrical power .We know the need of Non-conventional energy system at this time to our country. The power is generated by the piezo-electric arrangement is fitted in the blade less wind mill. It is a new wind energy technology specially designed for on-site generation on residential areas, being able to work on grid, off grid, or along regular solar panels or other generators. Compared to traditional wind turbine the cost of bladeless wind turbine is very less as well as cost required for installation is very less.*

I. Introduction

We know that, 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 called renewable because of their continuous availability for use over and over again. The popularity of renewable energy has experienced an increased in recent times due to the depletion of the conventional sources and increasing realization of its serious 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 This paper focuses on the regardless of wind speed. It is a wind turbine without blades.

The main advantage of this is energy absorption. through the vortices of a rigid member similar to a Aerodynamic effect. We are about to generate electricity through the use of the windmill without shovels. This wind the mill will have no blades. It will generate electricity using the oscillation due to the wind.

There are some issues to be considered while using traditional wind turbine

1. Conventional windmill required huge investment for assembling the part of windmill.
2. It requires land/places where high velocity wind is available frequently throughout the year.
3. Due long height and mostly build in open place they prove fatal to birds due to rotation of the birds.
4. If not designed properly they produce low frequency noise which is bad for human health.
5. Transportation of huge windmill parts is very costly and risky.
6. Space required for wind mill farm is 60 acres per megawatt capacity of wind farm
7. The cost of manufacturing different parts of wind mill is very high. Normal wind mill required Rs 180000-480000 per kilo watt.

II. Block Diagram

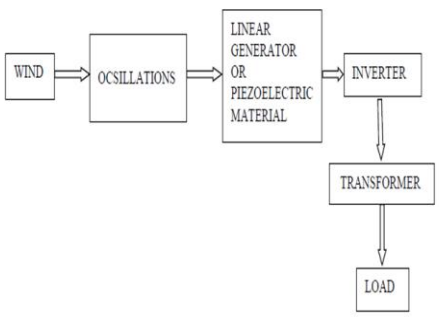

Figure 1: Block Diagram

The Fig. 1 shows the block diagram representation of bladeless power generation system through piezoelectric material. This diagram explains the detailed function of each block and their parameter specifications.

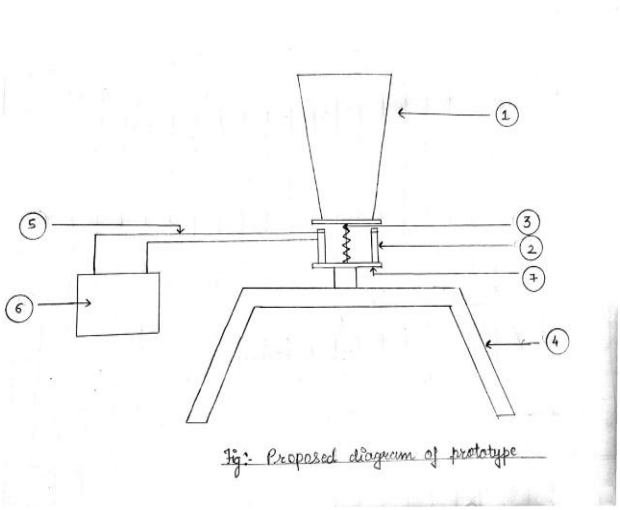

Figure 2:Actual Schematic Diagram

1. Mast:

The mast is a conical shaped, rigid structure which oscillates when subjected to wind .The Mast is lighter in structure in order to increase the oscillations also decrease the mechanical stress on the suspension spring and Centre base of the system.

2. Piezoelectric Material:

Piezoelectricity is the capability of certain crystalline materials to change mechanical energy into electrical energy and vice-versa. It shows relation between a mechanical stress and an electrical voltage in solids. This is reversible, an applied mechanical pressure will generate a voltage and an applied voltage will change the shape of the solid material.

3. Spring:

Spring is mounted at the center of the mast which provides the oscillation of the mast in any of the direction. This spring is capable to withstand the weight of the mast.

4. **Centre Base:**

Base is made up of the iron structure which supports the model. The base provides equidistant point for the position of the mast. It is able to sustained the mechanical stress acting on it. This system mechanism provides the strong frame base to the mast and adjoined springs.

5. Battery:

The battery used here is a 6 V, 0.5Ah, lead-acid battery. This battery will store the charge when the power is generated by piezoelectricity. This charged battery can be utilized for the use of consumer.

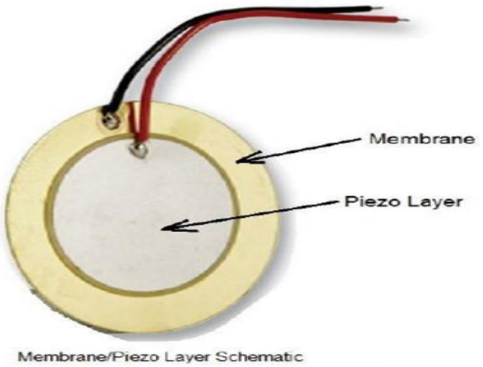

Figure 3: Piezoelectric Material

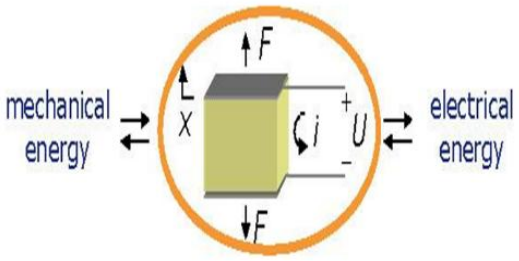

Figure 4: Piezoelectricity Mechanism

III. Working Methodology

In the bladeless wind turbine, it converts the linear oscillation of mast to rotational motion and that is the main principal of bladeless wind turbine. As the mast is subjected to wind energy, it tends to oscillate due to the vortices formed around the structure of the mast, which can be converted to rotational force to generate electricity. In the bladeless wind system configuration, the mast is fixed with respect to the ground. Energy is obtained by continuously oscillation of the mast. Mast is attached to the spring arrangement so that it should regain its position again. Now when the mast oscillates it exerts pressure on the piezoelectric material. Piezoelectric disc is a material which converts mechanical stress into electrical potential or vice versa. As piezoelectric material has quality of producing electric charged whenever it is compressed or struck. Hence due to mast it gets pressurized at electricity is produced in the DC form. This output charges the battery.

Figure 5: Prototype

When the wind strikes the mast it causes the mast to vibrate. These vibrations are converted into mechanical energy. When the wind strikes the mast from a direction stream lines of the wind tend to depart and get shredded off. This results in formation of vortices in air. When these vortices are strong enough to overcome the resistance of mechanical stresses of the structure, the mast oscillates.

ADVANTAGES

1. It currently takes up as much as 30% of the area of a conventional generator, with maximum amplitude around a diameter at the top. It may capture atleast 40% of the wind power present in the air.
2. It is a cost effective solution because of the less wear and tear, maintenance cost is less also gear mechanism is not in involved.
3. Piezoelectric material has a very high frequency response.
4. Piezoelectric material has small dimensions and large measuring range.
5. Since bladeless wind turbine does not have same magnitude of movement as traditional one, effect on bird population is expected to be much smaller
6. Less noise pollution.

DISADVANTAGES

1. Abortion of wind is comparatively less than that of traditional wind turbine.
2. Height of the mast can be increased according to the output required.

APPLICATIONS

1. Bladeless wind turbine can be used in industries, houses, schools, off grid power for rail signalling, lighting, farms and in remote telemetry also.
2. We can use it on the highways where due to vehicles wind can be easily trapped and the maximum output can be taken out. Due to the passing of heavy vehicles from both the sides mast can oscillate more often.
3. Bladeless wind turbine can be use for small scale energy production as well as large scale. It can be used in the farms for powering water pumping ,powering lightning in stables etc. and for small scale it can be used in houses.
4. Bladeless wind turbine can be used in rail signalling to supply power to the signalling system.

IV. Conclusion

Wind energy holds the potential to be the world's primary source of energy. The papers conclude that the bladeless windmill is one of the greatest wind energy generation system .The system is mainly adaptable with lighter material and low maintenance cost, hence it is easy to install this project within the specified space in large amount.

This continuous need of generation of electricity can be easily satisfied . The overall project uses less space area. There is a future growth in this bladeless wind turbine with more accurate in power generation with high megawatt/hr. The main purpose of this paper is to provide some fundamental results on the bladeless wind.

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