Next Generation Windmill

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Abstract - *Wind is a renewable form of energy, which is ecofriendly. At present, the wind farms are mostly away from sea shore. The main objective of our project is to build the NEXT GENERATION WINDMILL. Due to the stationary windmills, we are unable to generate the required power. And for this, we have adopted the concept of Helium gas wind turbine. This windmill is going to a make a huge revolution in production of energy in the future.*

Key Words*: *Wind mill, Buoyancy, Helium balloon, Wind power, Lift capacity

1.INTRODUCTION

The world is moving towards renewable energy production as a reliable means to answer the increasing demands of power and clean global environment. To meet the needs of the future, this helium gas wind turbine is going to a huge role in the production of clean power.

The most important thing is that, it is more suitable to place this wind turbine near the sea shore, as it takes less space than the traditional wind turbine. And the most important thing is that it is designed to move according to the wind speed.

The higher the altitude, greater the wind speed. In recent times, there has been an increasing interest in both from research and commercial establishments for extracting wind from higher altitudes. And to meet those standards this helium gas wing turbine can be the first step.

2. CONFIGURATION OF THE SYSTEM

Here a Helium balloon is used to lift the wind turbine to higher altitudes as shown in Fig.1. The wind turbine contains Turbine blades, Shaft and Generator. A helium balloon used to lift this arrangement to higher altitudes and tethered to ground by means of a supporting tether. The designated altitude for the balloon is 30 meters from the ground. At 30 meters the density of air is 1.20 kg/m^3 and density of helium is 0.1786 kg/m^3 at 25 degrees [2]. A 1 m^3 of helium of helium can lift 1 kg of load [2].

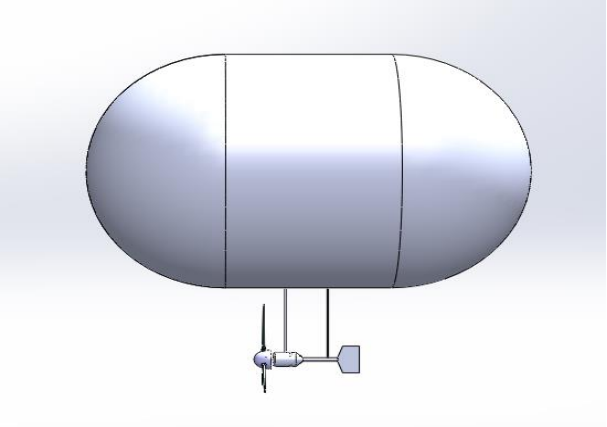

Fig.1 Next Generation Wind Mill

3. COMPONENTS USED IN THIS SYSTEM

3.1 Helium Balloon

A balloon filled with helium gas is the main requirement of a airborne wind turbine. It carries the rotor, rotor blades, generator, shaft to higher altitudes. It can fly up to 100 meters from ground. The table below gives the dimensional parameters and properties of the helium balloon.

Table -1: Balloon Properties

Parameters	Values
Buoyant Force [4]	120 N
Volume	10 m^3
Lift capacity	10kg
Helium required	10000 liters

3.2 Rotor

The portion of the wind turbine that collects energy from the wind is called rotor. It rotates about an axis at the rate determined by wind speed and shape of the blades. It Lifts and rotates when wind blows over them, causing rotor to spin.

In Next Generation Wind Mill we use 3 rotor blades. And rotor diameter is 1 meter. The material of the rotor blades chosen for the wind mill is Nylon fiber since it is light weight [3]. We require light weight components since our total system is balanced by a helium balloon.

3.3 Generator

The generator converts the turning motion of the wind turbine blades in to electricity. Inside this component, coils of wire are rotated in magnetic field to produce electricity. Specifications of the used in the system is given in the below

Table -2:

Specifications	
Power	150W
Voltage	24V
Rated speed	5500RPM
Type	5500RPM
Moment of force	5kgf.cm
Weight	1.06kg

3.4 Shaft

It drives the generator to produce electricity. A shaft is a rotating machine element, usually circular in cross section, which is used to transmit power from one part to another, or from a machine which produces power to a machine which absorbs power

4. WEIGHT OF THE COMPONENTS

As discussed above in the Next Generation Wind Mill the components weights are very much important because we are holding the components with the help of a helium balloon. That a 1 m^3 helium can lift 1kg of weight. Because of this on reducing the weight of the components we can reduce the volume of the volume of the helium gas that required to lift the turbine. The weights of the components are given in the below.

Table -3: Components and their weights

Parameters	Weight Estimation(kg)
Rotor Blades & Hub	1
AC Motor	3
Wire	0.75
Supporting Threads	1
Other Weights	3
Total	8.75

5. PROBLEMS THAT CAN BE RECTIFIED BY NEXT GERATION WINDMILL

5.1 Expansive Installation

Though the cost of building a windmill reducing over time, wind turbines are still expensive. First, an engineer must carry out a site survey. This may involve having to erect a sample turbine to measure wind speeds over a period of time. If the area seemed adequate, then a turbine needs to manufactured, transported and erected on top of prebuilt foundation. All this consumes lot of time and money.

But in the next generation wind turbine no need to erect a sample turbine , since this wind mills are portable we can easily bring a sample turbine or original turbine in to the site and we can test them, if the power produced is not up to mark than we shift them to other places easily. Also, there is no requirement to build a foundation for this next generation wind mill.

5.2 Transportation

Due to the increase in demand of the power generation, the industries are trying to increase the power generating capacity from 1.5 to 3 megawatts by increasing the size of the wind turbine. These days the size of the wind is 100meters and more, so it will be very difficult to transport such a heavy substances, especially to rural areas.

In Next generation wind mill there is no need to build such a heavy components, since we are placing the turbine in higher altitudes the Next generation wind mill of medium size can easily produce the equal amount of power that produced by a large normal wind mill. Since it is small we can easily transport the entire setup are as parts.

Fig-2: Blade

5.3 Seasonal change of wind speed

Wind speeds are not same in every season in some seasons the speed of the wind will be high, in some it will be low. In such cases a portable wind turbine is much efficient then a fixed wind turbine, since we can easily transfer them from one place to other.

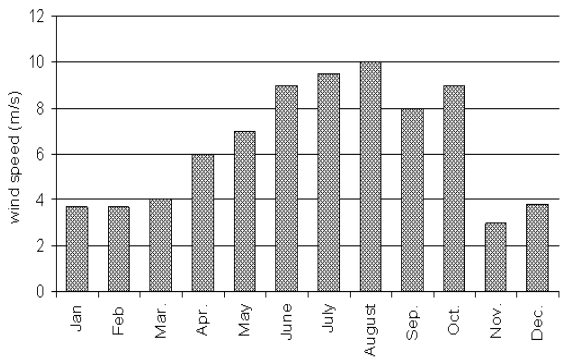

Chart -1: Wind speed

6. CONCLUSION

The world is moving towards renewable energy. In this context, airborne wind energy is set to play an important role. The Next generation wind mill can generate more power that can be generated by a conventional wind turbine, since it can reach higher altitudes with help of a helium balloon, the wind speed will increases on reaching higher altitudes. The Next generation windmill is also portable. Transportation of this wind mill is easy when compared with conventional wind mills. Since our system is balanced by a helium balloon, strong and light in weight materials are used in the system so that we can reduce the weight of system.

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