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DEVELOPMENT OF BUILDING TYPE HORIZONTAL AXIS WIND MILL

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***Abstract* — This type wind turbine is mainly working in commercial development as in farm, house etc. Places are used for power generation. in this project working model is reduce noise level in effectively power generation its required minimum height 8m to 10m from land as compare to new technologies wind turbine as law so factor of safety is more at construction level .This project developed the limitation of turbine and new opportunity for power generation at low air speed flow places. This system develop more efficient and less costly method compared to all other wind turbine in this project wind are used in place of turbine in which no. of wing connected in series and lift obtained from low velocity air flow this lift is sum of all individual lift of an wing it's capable for power generation. In this project at commercial level there are wind speed is very law. So for that kind of places we will make a working model of horizontal axis wind mill.**

Keywords-wind mill, horizontal axis wind turbine, pulleys

I. INTRODUCTION

The natural energy resources like wind energy, hydro energy have not used most of places because main function affect as a velocity of wind is low, so we cannot used heavy capacity wind turbine. Horizontal-axis wind turbines (HAWT) have the main rotor shaft and electrical generator at the top of a tower, and must be pointed into the wind. Small turbines are pointed by a simple wind vane, while large turbines generally use a wind sensor coupled with a servo motor. Most have a gearbox, which turns the slow rotation of the blades into a quicker rotation that is more suitable to drive an electrical generator. Wind energy is renewable energy sources have been used by wind mill to produce electricity. The wind turbine is specially design and developed by new technology to produce more power generation as compared to old design wind turbine. Wind energy is renewable energy source.

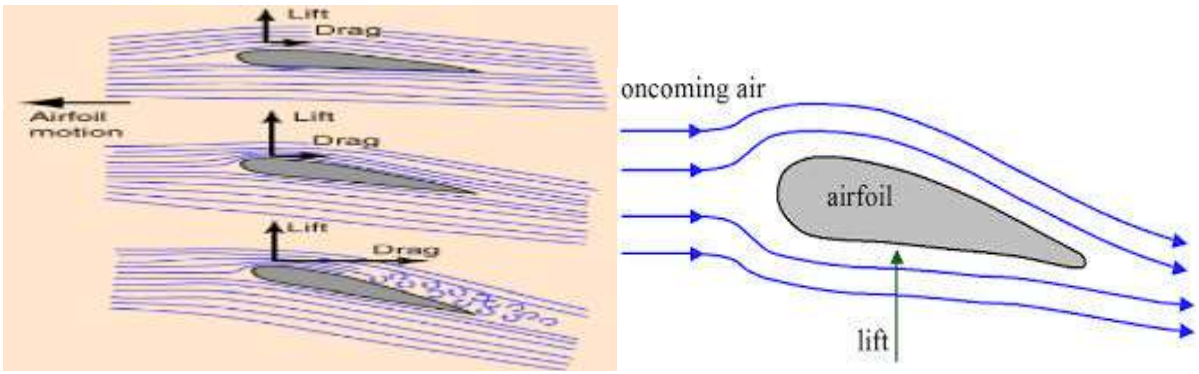
II. CURRENT SYSTEM

2.1Lift and drag

Lift is a reaction force an aero foil deflects the air as it passes the aero foil. Since the foil must bring to bear the force is adjust the road, the air should exert the might of the same magnitude but parallel direction on the foil. In the crate of an airplane wing exerts a downhill force lying on the air along with the air exerts the equal force on the wing.

The air flowing past the surface of body enters a force on it. Lift is component force that is particular to the received flow direction. It contrasts with the drag force, which is module of the surface force equivalent to the gush direction. If the solution is air, the energy is called an aerodynamic force. Inside water, it is called hydrodynamic power.

Lift is generally regularly related with the wing of preset wing aircraft, although lift is generated by propeller, kites, helicopter rotor and keels on sailboats, hydrofoil, wing on auto racing cars, turbines and other steam line objects.



Lift and drag

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Lift is also explored in animal world and even in the plant world by the seeds of certain trees. while the common meaning of world lift assumes that the lift oppose weight, lift in its technical sense can be in any direction since it is defined respect to direction of flow rather than the direction of gravity.

Lift is the force used to overcome gravity and is defined to be perpendicular to direction of the oncoming airflow. It is formed as a consequence of the unequal pressure on the upper and lower airfoil surfaces. The drag force is defined as a force parallel to the direction of oncoming airflow.

Lift force (L) by

$$L = C_L \frac{1}{2} \rho A V 2$$

Drag force (D) by

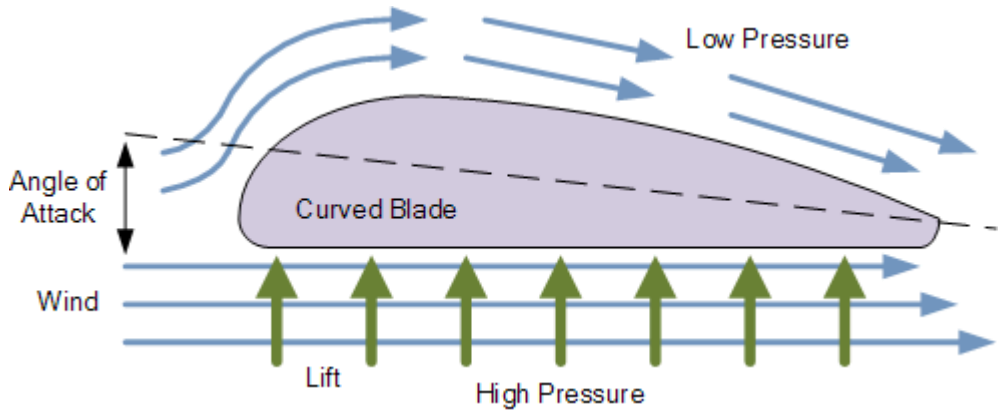
$$D = C_d \frac{1}{2} \rho A V 2$$

Where,

C_L = lift co-efficient
C_d = drag co-efficient
ρ= density
A = area
V = velocity

2.2Newton' law "lift & deflection"

There are several ways to explain how airfoil generates lift. Some are more complicated or mathematically rigorous than others. For example, there are explanation based on newton's law of motion and explanation based on Bernoulli principle.



pressure difference

Lift is a reaction force of an airfoil deflect the air as it passes the airfoil must exert force on the to change the direction, the air must exert a downward force on air and the air exerts the equal force on the wing.

This from the second and third of newton's law of motion the net force on an object is equal to its rate of momentum change, and to every action there is an equal and opposite reaction.

The air changes direction as it passes the airfoil and follows a path that is curved. Whenever airflow changes direction, a reaction force is generated opposite to the directional changes.

$$C_P = \frac{P - P_\infty}{\frac{1}{2}\rho U_\infty^2}$$

Cp = difference between local static pressure and free steam static pressure

2.3The power calculation

The power in the wind can be computed by using the concepts of kinetics. The wind mill works on the principle of

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converting kinetic energy of the wind to mechanical energy. The kinetic energy of any particle is equal to one half its mass times the square of its velocity,

Kinetic Energy =½ mv^2.

Amount of Air passing is given by

$m = \rho AV$ …….. (1)

Where

m = mass of air transferring

A=area swept by the rotating blades of wind mill type generator

ρ = Density of air

V= velocity of air

Substituting this value of the mass in expression of

$K.E. = ½ \rho AV.V^2$ watts

$= ½ \rho AV^3$ watts …….. (2)

ρ = density of air (1.225 kg/m^3)

Equation tells us that the max wind available the actual amount will be somewhat less because all the available the actual amount will be somewhat lee because all available energy is not extractable is proportional to the cube of wind speed. Equation also tells us that the wind power is proportional to intercept area.

Since the area is normally circular of diameter D in horizontal axis aero turbines, then,

$$A = \frac{\pi D^2}{4} \quad \text{(Sq. m)}$$

Put this quantity in equation second then

$$\text{Available wind power } Pa = \frac{\rho \pi D^2 V^3}{8} \quad \text{Watt}$$

III. FUTURE SYSTEM

3.1Definition of problem

Wind energy is used for power generation by wind turbine. But wind turbine as run with high air speed. Some other places the wind speed is less. At that place the wind energy is wasted. So at that kind of places we will develop a horizontal axis wind mill which can run at low wind speed. Currently winds turbines suggest the most impractical and cost valuable capital of generate electricity from a renewable energy resource. Wind is essentially air in motion, which carries with it kinetic energy. The amount of energy contained in the wind at any given instant in proportional to wind speed at that instant. The temperature of the wind also influences the energy contain of the wind but is not important in context of wind based energy production system. The idea of harnessing winds is not new. It was one of the first natural energy sources to be used by mankind. In the current system of wind mill there were the height of the wind tower is very high so the cost of the making of the tower is very high. And the wind speed is not stable so the constant speed is not obtained and the electricity is not constant so the electricity is very from the wind speed. Current wind mill system will not produce the power at commercial level it is the big problem in the wind mill system.

3.2Solution of problem

In this project we will make horizontal axis wind mill in different design. It is suitable for solve the limitation of wind power generation problem for commercial level.In this project our system by which the produce power from low velocity flow and it has several advantages over wind power generation.

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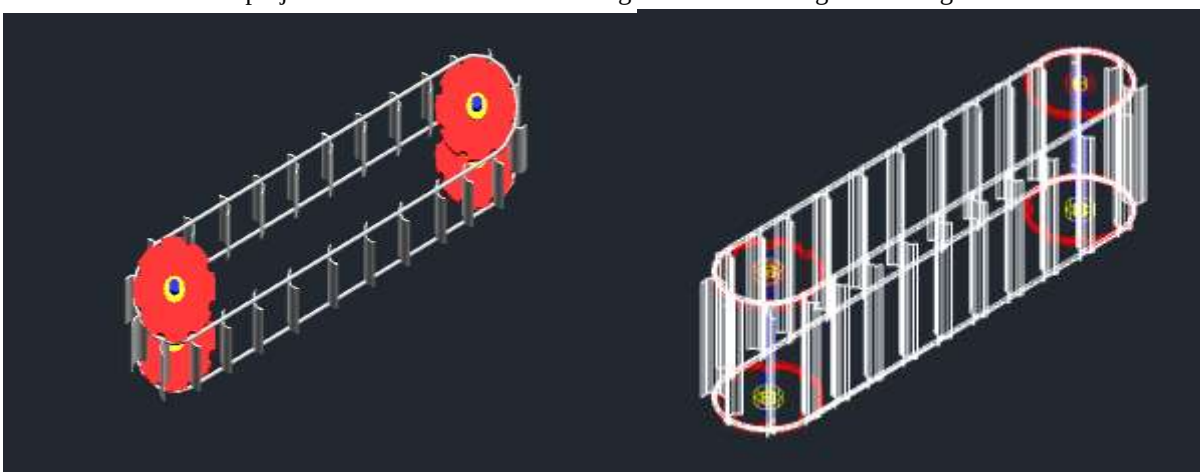
Over level terrain the velocity of wind varies in relation to the elevation above ground by the "one seventh power law". The power available in the wind is proportional to the cube of the velocity so our level terrain the power in the wind varies in relation to elevation above ground by the three seventh power law. In this project we will develop new working model of wind mill which will solve the problems of current wind mill system. We will make wind mill system for rural area. Which will capable for power generation at low velocity of wind. And it will also increase the efficiency of wind mill.

3.3New Design of Wind Mill

In this we will doing a development of horizontal axis wind mill. And make sure that the wind mill will use most of the air. In this project we will increases no of wings. And make design according to that.



Autocad new design model

As shown in the figurre sid view of the new design will look like. As shown in the figure there are wings are shown. In our new design we will use two shaft which will made of cast iron. And than we will used sheet metal as a wing of our design. In our new design there are also four pullys can be used.from this design we will increases the efficiency of wind mill.

3.4Components used in our design

- **Shaft-**

As shown in the figure the shaft is look like.in this we can use two cast iron shaft.

- **Pulleys-**

As shown in the figure the pulleys are look like.in the new design we will use four pulleys and these pulleys will put on shaft with bearing

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- **Bearings-**

In this new design we will use four bearing. on the bearings there are four pullys will fitted.

- **Blades (wings)-** blade will play a major role for producing electricity. If we will increases the blade than more electricity will produce. So in this design we will increases the blade.

The concrete constitution is made in the way of graceful air. With opening of door flow of air passed through lifting aero foil machine and according to Bernoulli's law the energy enclosed near air is converted in to lift of aero foil. Here no. of aero foil are connected in series so total lift obtain is sum of all individual aero foil the aero foil mechanism further connected to shaft. The generator converts that mechanical energy in to electricity. According to the rpm available appropriate generator selected for electricity generation.

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