REVIEW ON ANTHROPOGENIC WINDMILL

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Abstract - *This paper describes about the modified wind mill that can generate electricity. The system is new modification of the wind mill system is by adding the extra fins to help it to spin faster and more efficiently. Optimize design and performance of the system also discussed. We know that wind can be used to generate power. But, how about creating wind to generate electricity? A young researcher who has only studied up to Class XII has successfully managed to get his wind energy project an Australian patent. Just goes to show that innovation, invention and research are not limited only to universities and manors of higher education. It can flourish amidst green field and muddy surroundings too.*

Key Words: wind mill, wind energy, dynamo

INTRODUCTION

We know that wind can be used to generate power. But, how about creating wind to generate electricity? A young researcher who has only studied up to Class XII has successfully managed to get his wind energy project an Australian patent. Just goes to show that innovation, invention and research are not limited only to universities and manors of higher education. It can flourish amidst green field and muddy surroundings too. Wind energy is supposed to be one of the best unconventional green sources of energy. But it has its limitations. First, a perfect location is needed to install a windmill, so that it can create sufficient energy. Secondly, the investment required is quite high. This young inventor Birudev Hajare has developed a technique which produces wind power without the need of a windmill, at ground level with a bare minimum natural wind velocity. Birudev has applied for a world patent and already has an innovation patent from the Australian government. Speaking to this reporter, Birudev said, I have already applied for a Patent Co-operation Treaty (PCT) which will give my project international identity. A Pune-based PCT form is helping me complete the formalities. To realize what Birudev, a 34-year-old inventor has done, we had to travel 20 km from the city, cross green fields and slushy roads to reach the typical semi-urban setup of Manjari. Birudev Hajare, a smalltown man stays in Manjari Khurd. When asked about the project, the not-very-highly educated Birudev starts talking about unconventional energy sources and about wind power [1] like a expert. He impressed us with all his statistics and energy formulae riddled in the conversation.

Birudev Hajare has done a two-year course in electricity from Ghule College of Manjari. Since his college days, he has been working on this project. Apart from working on his invention with zeal, Birudev works in a small fabrication workshop in Ramtekdi Industrial Estate, Hadapsar.

ground and with turbulent winds because the blade bearing need smoother, more laminar wind flows. The wind ventilators blades are easily need a special installation procedure. It also has relatively cost of production, installation and transport compared to wind turbine. The turbines does not need to be pointed into the wind to be effective.

Objectives

To provide a device for harnessing wind energy.
To provide a device for harnessing wind energy that is less capital intensive.
To provide a device for harnessing wind energy that is suitable for low windvelocity regions.
To provide a device for harnessing wind energy that is operable at ground level.
To provide a device for harnessing wind energy that is easy to install.
To provide a device for harnessing wind energy that is easy to maintain.
To provide a device for harnessing wind energy that is operable under varyingweather conditions

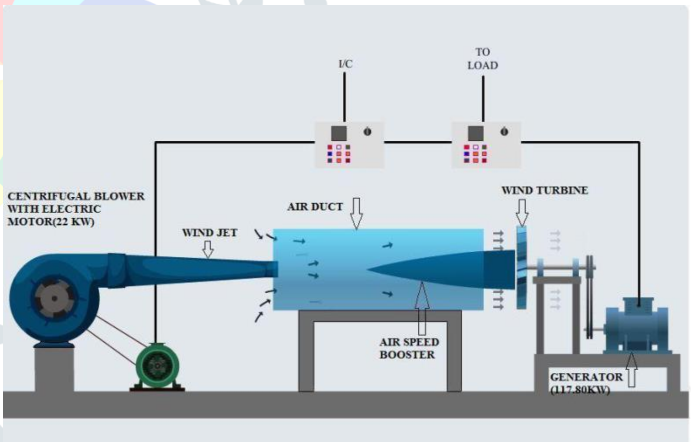


Fig 1 – General arrangement

A literature review

Birudev Hajare. Birudev has developed a technique which produces wind artificially, which in turn generates electricity. Blowers (that he fabricated himself) work as turbines that produce wind by moving or giving velocity to the air around it. A conventional source of energy electricity is used to run these blowers. And, in case this gets you skeptical, don't be! It generates almost three times the amount of electricity it uses. Birudev has created a pilot set-up at a friend's farm house. He put together an input AC power, a duct (comprising entry and exit points which channelizes wind), a fan (adapted to be driven by an AC motor), an alternator (to convert mechanical energy to electrical energy), and a speed-boosting shape. The speed-boosting shape reduces the volume of duct. It also creates more pressure, thus more (kinetic) energy. Four AC motors run the blowers, each with a capacity of 12.5 horsepower (hp). The blowers suck the air from outside. The setup has a capacity of generating power of 147.5 hp. It is the pressure difference between inside the duct and outside, helps create the artificial wind. The wind enters the narrow duct with great pressure that moves the turbine at the end. The turbine is directly attached to the AC generator which converts this mechanical energy into electrical energy. The entire setup, which Birudev built with the help of villagers and friends, cost him Rs 5 lakh. Even though vertical axis wind turbines have been neglected till now, they can prove to be highly promising in the case of the new rotor design. In the last two decades, attention has been focused on improving the efficiency of vertical axis wind turbines. According to Bergey, Griffiths and Pao r , the maximum conversion efficiency of the horizontal axis wind turbine is . Air is treated stationery, non- viscous and incompressible in the analysis of Betz limit. Paul of Van Nostrand Reinhold Company stated that the vertical axis turbine will have efficiency almost identical to the horizontal axis wind turbine.

Power performance of Savonius wind rotor (Cp 15%) is rather low when compared with that of the wind rotors with a horizontal axis (Cp 45%) and Darrieus-type wind rotor with a vertical axis (Cp 35%) . However, Savonius wind rotor has many advantages over others in that its constructions are simpler and cheaper, it is independent of the wind direction and has a good starting torque at lower wind speeds. Therefore, available in the literature are a lot of studies that have been conducted to increase the performance of a Savonius wind rotor.In these studies, a number of scientists have experimentally and numerically examined the effects of various design parameters of Savonius wind rotor such as the rotor aspect ratio, the overlap and the separation gap between the rotor buckets, the prole change of the bucket cross section, the number of buckets, the presence or absence of rotor endplates, and the in.uence of bucket stacking . Many experimental and numerical studies have been carried out on Savonius wind rotors to investigate the .ow .eld and the pressure distribution on blades . In addition, the effect of the swinging angle of the rotor blades on rotor characteristics and power has been investigated by Aldos . The optimum swinging angle of rotor blades increased the maximum

Burcin Deda Altan presented the idea of curtain with different size and angles of curtains. The article of Burcin Deda Altan brings a comprehensive theoretical and empirical study of air concentrating curtain arrangements in the area of wind energy. In the analysis, five different slope angles are used. In stepwise, the length andangle of is changed to determine its effect on the increase in the wind speed. The variations of outlet speed by varying lengths of and angles of curtains and ramp.

Shikha reported a new vertical axis wind rotor for low wind speed areas with a convergent nozzle for the amplification of wind speed. Such novel rotors can be built in small units instead of large central power plants suitable for different load requirements. The importance of the work is especially due to the current trend of high power generation. Another success has been made to analyze the optimal nozzle dimensions for a better performance of the system.

Touryan et.al. ,conducted few investigations on the vertical axis wind turbine to enhance the power coefficient using a nozzle system. In investigations, the efficiency of the turbine is increased approximately to 33%. But, according to Modi the power coefficient of a fairly streamlined vertical axis wind turbine is only 22%. Sharpe developed a theoretical model using the computer programme for aerodynamic analysis of various stream tube for a vertical axis wind turbine.

was a two-bladed Savonius rotor having bucket diameter of 8 cm and height of 10 cm and in the lower side, there Sabzevan proposed the idea of placing a flat plate to collect a large amount of air on to the drum of VAWT. The power coefficient is thus, increased by 15%. The rise in power coefficient can be compared with the simulated version of Obeidat According to Obeidat, the rise in power coefficient of VAWT is 17%. Opawa applied the discrete-vortex method for the analysis of flow separation for the generation of vortices around the rotor of VAWT.Fujisawa compared the flow velocities, pressures and vortices with flow visualization technique for the rotor of identical dimensions.

Mahesh Kamoji et. al. studied the Savonius rotor for the effect of gap ratio. Savonius rotor is a vertical axis wind turbine. It has high static torque coefficient because of which it is suitable for water pumping applications. The static torque coefficient though high, is not uniform at various rotor angles. It varies from a negative value at rotor angles of 135° to 165° to a maximum positive value at a rotor angle of 45°. The calculated coefficient static torque from the measured coefficient of pressure distributions on the static blade and the measured coefficient of static torque are in close agreement with each other as reported by Fujisawa et. al. for gap ratios from 0 to 0.5. Effect of end tip condition of the Savonius rotor and Reynolds number on the local pressure distribution and static torque is not reported in the open literature. Effect of gap ratio, end tip condition (blunt edge and round edge) at various rotor angles on the local pressure drop and coefficient of static torque is studied for a conventional Savonius rotor. The static torque coefficient is found to be independent of Reynolds number and the end tip condition. The static torque coefficient *increases with increase in the gap ratio from 0 to 0.5 and it decreases with the further increase in the gap ratio.*

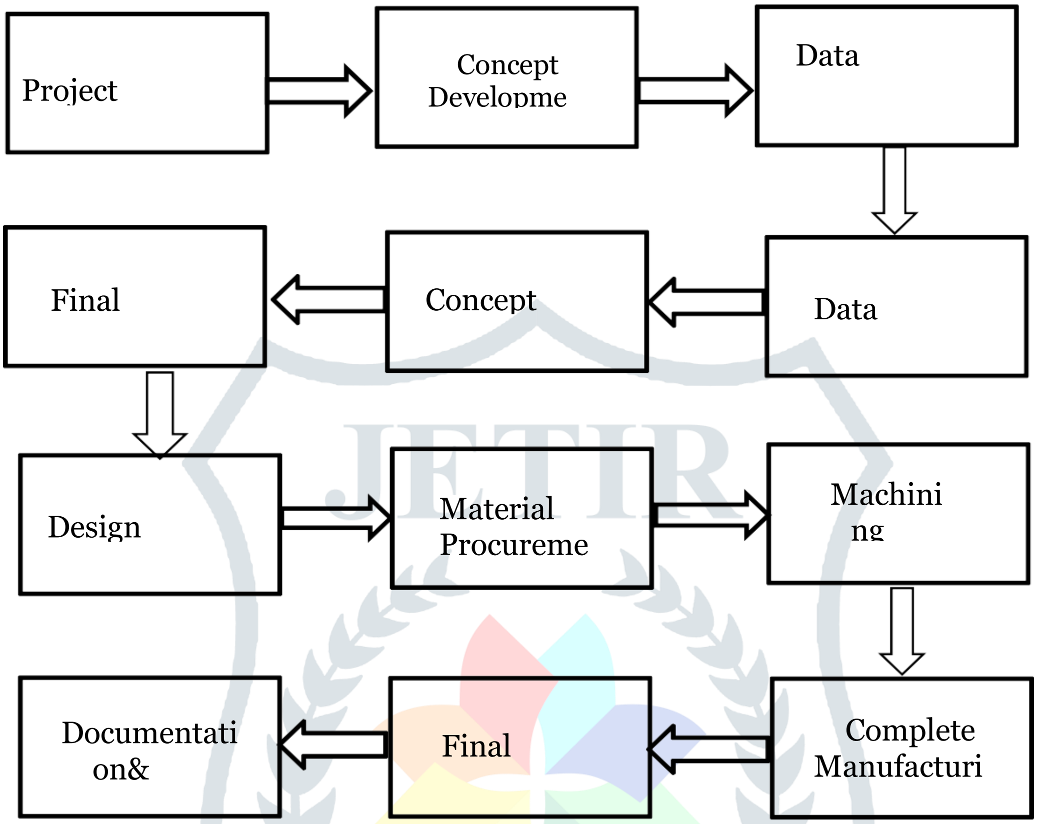
R. Gupta et. al. made experimental investigations to study the performance of a Savonius rotor as well as a Savonius- Darrieus machine. For this purpose, two types of models, one Savonius rotor and the other Savonius- Darrieus machine were designed and fabricated. The Savonius rotor was a two- bladed system having 8 cm bucket diameter and 20 cm in height with provision for overlap variation. For the Savonius-Darrieus machine, in the upper part, there

Marion H. Ewers Et.aL. US Patent US4134707 discloses a wind turbine apparatus with discrete segments which can be added to incrementally increase the driving force and power generation of the machine. One of the side walls along with the rotor dense a venturi to enhance the apparent wind speed. This arrangement though efficient, has a limitation because of its arrangement. The requirement of increased power generation increases the height of the assembly and hence such an arrangement is only possible in locations where space and height is not a restraint.was Darrieus machine having three curved blades of dimension of 10 cm in height and 4 cm in radius. The overlap variation was made in the upper part. These were tested in a subsonic wind tunnel and it was observed that there was an improvement in the power coefficient for Savonius-Darrieus machine compared to only Savonius rotor under the same test conditions.

E. Wendell Hewson made investigation into the amount of available power in the wind energy. According to his paper, there is vast energy available in the earth's winds for man's use. It is conservatively estimated that the wind power available to man is the equivalent of the output of 1000 typical fossil fueled or nuclear power plants of 1000 megawatts (MW) capacity each. By contrast, the water power potential of the earth is only one-tenth as large. Large wind generators have been built and used during the past 50 years.Research on wind power sites in the mountainous coastal and valley areas of the Pacific Northwest is being conducted. Terrain modification, aero-generator "farms", special duty installations, environmental impacts, land use, and net energy costs are all taken into consideration. It is concluded that wind power shows promise of supplying substantial amounts of supplementary electrical energy and that the development of this wind power potential should proceed with the federal government taking a lead role.

Design Methodology

Fans are used to move air (or other gases) in large volume at low gauge pressures. A windmill is a fan in reverse. A fan consists of a wheel or impeller, and a housing. Sometimes the housing is absent, and we have just the impeller, as in an aircraft propeller. The two principal types of fans are the axial-flow and the centrifugal. We will talk mainly of propeller-type axial flow fans here, but the general principles will apply to both types. The ducting and other appurtenances associated with a fan are called the system, which may be absent when a fan is used in the free air just to generate a breeze. If the system is at the output of a fan, the fan is called a blower, while if the system is at the input, the fan is an exhauster. The moving part of the fan is the



impeller or wheel, and the stationary part the housing. A propeller fan may have a housing as simple as a circular aperture, called the shroud, which nonetheless makesthe fan more efficient. At the other limit, the fan may be enclosed in a duct and work against static pressure.
The frictional loss from air flow in a duct can be estimated by the pipe flow equations.If L is the length of a circular duct of diameter D, then the head loss is h' =0.015(L/D)(V2/2g), where I have chosen what seems to be a reasonable value for the constant, usually written 4f and the one found in the Moody Chart and other references. For other duct shapes, replace D by 4R, where R is the hydraulic radius (area/perimeter). For air, the "wetted perimeter" is just the perimeter, of course. A square duct of side a has R = a/4.Torque is the rate of change of angular momentum, just as force is the rate of change of linear momentum. When a fluid exerts a torque on a turbine runner, the reaction is a change in angular momentum of the fluid. The air that leaves a fan is rotating, thereaction to the torque that turns the impeller. Fluid is given angular momentum by the guide vane which ideally, is destroyed by the torque exerted on the runner. With somemachines, however, the water at the exit may still have considerable angularmomentum, and the energy in this motion is energy that does not appear at the shaft.Where velocity in the exit fluid is part of the desired output (as with a fan), vanes tostraighten out the flow help to recover some of the energy that would otherwise be Fans for use under low pressure differences generally have a small hub, with the blade occupying most of the cross-sectional area. As the pressure differential increases, it becomes more efficient

to concentrate the blade area near the periphery of the impeller. The hub then becomes larger, and the blades are stubby vanes on its surface. This is seen at the forward end of a jet engine, where the fan forms the compressor that efficiently decelerates the air relative to the engine, raising its pressure. Energy is added by burning fuel in the compressed air. Its velocity increases as it returns to atmospheric pressure, forming a jet the reaction to whose momentum provides the thrust.At the front end of assembly, the D. C. fan is used to initiate the air supply at sufficient speed for the windmill. The D. C. fan intakes air and force it out with high velocity. But this air speed is not sufficient to operate the windmill.
D. C. 12 Volt
1.85 Amp
170*170*50 mm

WORKING PRINCIPLE OF ANTHROPOGENIC WINDMILL

Figure 3 : Principle of Working

E=(1/2) x ρ x A x V^3
Conventional windmills are limited by time and location for harnessing wind energy effectively. the present invention envisages an anthropogenic wind mill that harnesses wind energy without the constraint of time and place.
The kinetic energy of the wind is converted into mechanical energy with the help of windmill unit and this mechanical energy is converted into electrical energy by a generator. More the speed of wind more is the kinetic energy available to convert intopower. The amount of energy that is generated by windmill is derived from the aboveformula.
Wind power is the power in watt (joule/sec) of the wind, air density is about 1.23 kg/m3 at sea level and velocity is wind speed inm/sec.
A direct relation between wind speed and wind power is evident from above formula.If the velocity is double, the wind power would rise 8 times. Hence, control of wind speed is a critical aspect for successfully harnessing wind energy.
By changing the parameter of the element, the amount of energy output can be easily manipulated as per the requirement. A part of the output is again fed to the windmill self-sufficient without depending further upon the external source of power

Advantages
Wind Energy is an inexhaustible source of energy and is virtually a limitless resource.Energy is generated without polluting environment.
This source of energy has tremendous potential to generate energy on large scale.
4.Like solar energy and hydropower, wind power taps a natural physical resource.
5.Windmill generators don't emit any emissions that can lead to acid rain or greenhouse effect.Wind Energy can be used directly as mechanical energy.
In remote areas, wind turbines can be used as great resource to generate energy.
9.In combination with Solar Energy they can be used to provide reliable as well assteady supply of electricity.
10.Land around wind turbines can be used for other uses, e.g. Farming. 11.Anthropogenic windmill a generate wind energy at any place any time in anyquantity desired.

CONCLUSIONS

- Induced that the energy generated by the anthropogenic wind mill in accordance with presence invention is sufficiently and viably higher than energy spent on boosting wind speed to a predetermined pressure and velocity for desired windmill operation.
- By changing the parameters of element that comprise the wind speed controlling mechanism of windmill in accordance with presence invention the amount of energy output can easily manipulated as per requirement a part of energy output is again fed to run the windmill self sufficiently without depending further upon external source of power so our DC input is 12 volts and we get output about 18 volts

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