Bladeless Wind Turbine – A Review

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***Abstract*— Energy is one of the most important inputs for the developments of any country. Today there are crises in the non-renewable energy sources. The non-renewable energy sources are limited and also it harmful for the environments as well as human. The renewable energy sources have some limitations that lower output, higher cost and environmental situation. The paper represents the main concept of the wind turbine. The basic concept of wind and its different kinds of part of wind turbine. But wind turbines with blade have some major drawbacks so to remove this type of drawbacks and increase the capacity of the wind turbines the bladeless wind turbine takes placed. The paper shows that design of the bladeless wind turbine. The comparison of blade turbines and bladeless turbine.So paper shows that the how can bladeless wind turbine useful in the generation of electrical energy and how can increase the efficiency of wind with the help of this turbines.**

Keywords - Wind Turbines; Types of Wind turbines; Bladeless wind turbine; Tesla Turbine; Comparison

I. INTRODUCTION

Now a day's power generation is most discussed topic for any country. Non-renewable energy sources are in limited quantity and also its uses is so harmful to the atmosphere. So fulfil the requirement of electricity, the power should be generates from the renewable energy sources. Solar, wind, tidal, hydro are renewable energy sources. In now days the use of renewable energy sources is increased because of its benefits like unlimited quantity and pollution free. The solar, wind and hydro power generation system is mostly used for power generation. Now talk about the power generation from the wind turbine.

As per know that, use of wind for power generation, by using wind mills. It has big blades which rotate and also rotate the generator which is arranged on the same shaft. So when wind flows towards the blades and it start to rotate and generator or alternator starts to produce electricity. So the rotating speed of generator is totally depended on the speed of blades. There are types of blades used in wind mills like three blades, it is commonly used but as for test, two blades are also used. But two blades are provides an unbalanced system so that, three blades wind mills is convenient preferred. The power generation is also depended on the design of blades. The process of power generation from wind is related to the blades of wind mill. The main components of wind mill are wind turbine, gear system, electrical generation and controller. It is a renewable energy source and also it can't pollute the atmosphere. The major disadvantages of the wind turbine are producing a noise, foundation and its efficiency. The wind power placed outside of city because of more space required and constant flow of wind. The efficiency is low as compare to the other renewable energy sources because its output is very much less as compare to the input of wind mill. The maintenance cost of wind turbine is also high because of rotating parts are present. So, much power losses happened in the rotating parts.

II. BLOCK DIAGRAM

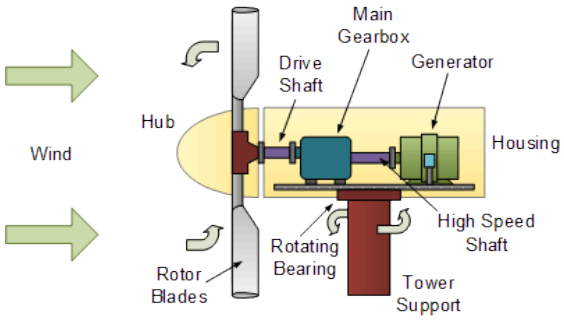

Fig 1 Components of wind turbine.

The diagram shows that there are different kinds of components used in the generation of energy from wind. The diagram shows that the different kind of components is blades, gear system, controlling system, generator set.

A. Blades

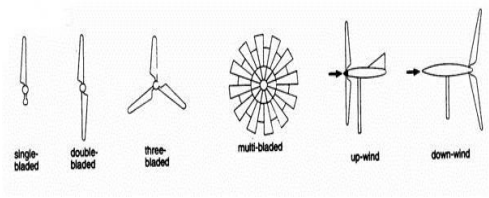

Fig 2 Types of blades

The blades and the proper design of blades play an important role in the generation of energy in wind turbine system. The diagram shows that there are different kinds of blades are used in the wind turbines system. The blade design and other

technical things depended on output, environmental situation, speed of wind etc.

B. Gear system

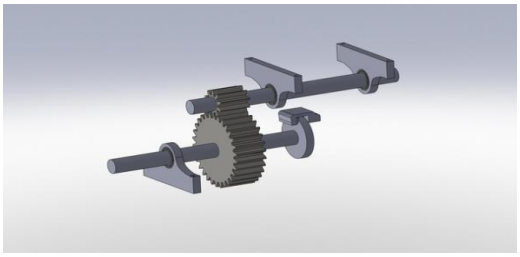

Fig 3 Gear arrangement

It converts kinetic energy into the mechanical energy. As per the diagram the gears are connected with blades. Gears are arranged in such a manner that single rotation of blades converts the number of rotations output shaft which is connected to generator.

C. Generator :

Generating system, which converts this torque into electricity. The generator is connected with output shaft of gear system from this the conversion of mechanical energy into the electrical energy.

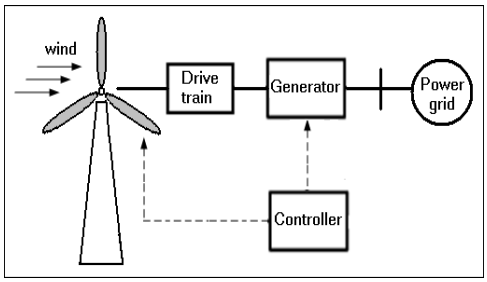

Fig 4 Components of wind turbine

III. TYPES OF WIND TURBINES

There are mainly two types of wind turbines. First are horizontal wind turbines and second are vertical wind turbines. All Dutch type wind turbines are example of horizontal wind turbines. In the horizontal wind turbines the machinery is arranged horizontally. It has very complicated design and multi blades are also examples of horizontal wind turbines. It requires a structural support. It has very small starting torque and multi blades wind turbines has different kinds of blades as per requirements as compared to the three and two blades wind turbines. The blade of wind turbine made from aluminium and it generates the noise as well as vibration also. It gives us output on desired speed only.

The second type of wind mill is vertical wind turbines. In this type of wind turbines the rotating parts are arranged as vertically and blades are also arranged as vertically. But vertical wind turbine has simple design as compared to the horizontal wind turbines. It not requires a structural support like horizontal wind turbines. In the vertical wind turbines the blades are arranged on the one shaft. That is connected to the generator or alternator. It will rotate on low wind speed. It has higher starting torque as compared to the horizontal wind turbines.

Fig 5 Horizontal wind turbine

Fig No. 6 Vertical wind turbines

In the simple types of the turbine there are so many losses occurs due to rotation of blades and other coupling parts and complex system. The disadvantages of with blade turbine are its variation. The smother output can be possible in the bladeless wind turbine. The efficiency of blade less wind turbine is much higher than blade turbine.

TABLE I. POWER OUTPUT TABLE OF WIND TURBINE

WIND SPEED (m/s)	POWER OUTPUT (kW)	WIND SPEED (m/s)	POWER OUTPUT (kW)
3	0	12	1127
4	35	13	1198
5	89	14	1250
6	148	15	1250
7	275	16	1250
8	446	17	1250
9	621	18	1250
10	811	19	1250
11	990	20	1250

IV. BLADELESS WIND TURBINE

The basic working principle of blades wind turbine is given below, the bladeless wind turbines works on the same principle same as that of normal wind turbine but the major difference is that there is no blades available in the turbine. The diagram shows the design of the bladeless turbine that, when air flow from the turbine the pressure can be generated and with the help of this pressure the force generated. Now as per diagram shows there are inner blades to which shaft is connected. It can be rerated as per the pressure of the turbine and the whole shaft is rotated. The generator is connected to the shaft. So from this pressure concept the output can be

achieved in bladeless wind turbine. The Tesla turbine is the part of bladeless wind turbine

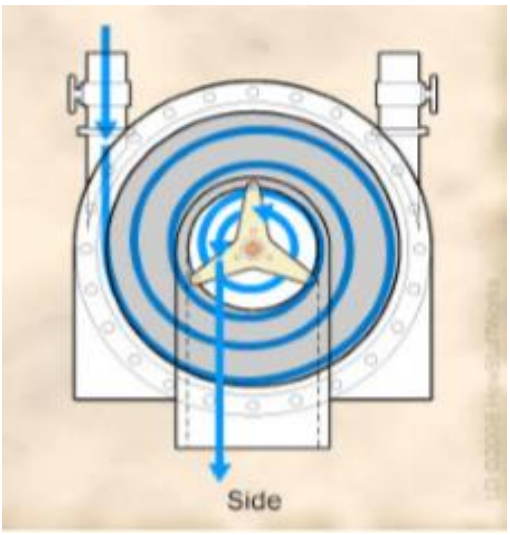

Fig 7 Working of Tesla turbine

V. Tesla Turbine

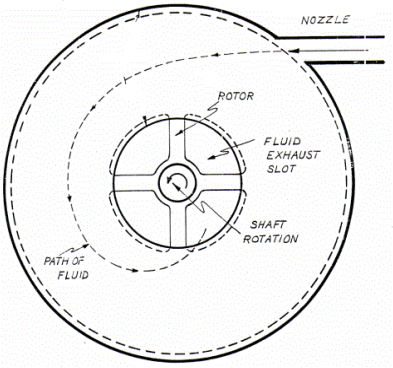

Fig 8 Design of Tesla turbine

The diagram shows that the design of Tesla turbine. The turbine increases the pressure of wind into the housing of the turbine. When the pressure will increase in the turbine the vane will start rotating and a vane is directly connected to the central shaft. The vanes are designed according to the pressure which is generated in the turbine. The pressure exert on the vanes tangential. That's why the vanes start to rotate and the generator starts to produce electricity. The vanes are made by low weight materials. If motor will connected to the shaft the Tesla turbine is worked as a pump. In case of increase in load the efficiency will decreased and the quantity of air is decreased so the centrifugal force is also decreased. At the light load the shaft will rotates at higher speed than heavy load.

VI. Specifications Of Bladeless Wind Turbines

According to Betz law the rotor cannot capture all power of wind, so Betz Law says that the theoretically limit of efficiency of wind turbine is 59%, but Tesla turbine give efficiency above 59% ,the Tesla turbines, produce low toque at high angular velocity. The material generally use to make Tesla turbine is stainless steel, there is no rotating part so efficiency is higher than ordinary wind turbine,

VII. Specification Of Micro Tesla Turbine

There is the disk of size 37.6 mm, Outer radius and 34.0 mm inner radius .the distance between inner and outer radius is 5.00 mm. The radius of the centre shaft is having size 4 mm. Its efficiency approximates 80%.

VIII. Comparison Between Blade Less Wind Turbine Vs. Blade Wind Turbine

Table II Comparison between blade less wind turbine and with blade wind turbine

NAME	WITH BLADE WIND TURBINE	BLADELESS WIND TURBINE
Operation	Not Smooth as compare to bladeless	Smooth operation
Maintenance	Higher maintenance	Lower Maintenance
Efficiency	Lower efficiency	Higher Efficiency
Design	Easy design	Complex design
Working	More maintenance	Less maintenance
Losses	More losses because bladeless are available	Less losses because smother operation

IX. Conclusion

Due to Innovation of bladeless turbines the generation and other drawback of blade turbines are not only eliminated but also efficiency of wind turbines has been increased

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