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Comparative Analysis of Integrated Micro Windmills Strength and its Efficiency of Power Generation with Single Rotor Centralize Windmill with Horizontal Axis in Vertical Plane

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Abstract: ***This paper is about the small integrated wind mills are simple in design hence there is no use of gear box in this system. The paper describes the overall reliable as compare to single centralized wind mill. A simple demo of integrated wind mills of 16 motor with their respective fans are assembled here on vertical plane with horizontal axis. This paper also included the various picture with different magnitude of assembled micro integrated wind mills. And some other attributes are also included. with ease erection as well as easy transportation to the site location along with some other attributes for easy and better understanding.***

Keywords: Integrated micro wind mills with duly assembled, single rotor centralized wind mills, strength, design of wind mills and its fabrication.

1. Introduction

In a small micro wind mills we have taken a lots of small motor.Through that each and every motor generate power with the help of blowing wind. This is very efficient and reliable as compare to single centralise wind mills. all the motor connection are connecting to series in the micro wind mills. Currently, the wind turbine that is running, they occupy a lot of space, creating certain amount of energy, we here going to implement. there are some changes in our implementation single wind turbine that instead of them we are with many small micro-wind turbine that will produced from certain micro blade fan and their respective motor. In the above case implementation, we conclude that the application is much better over single wind turbine with better strength .This application such as ecological balance of nature balance of nature in relation to birds, transport of equipment which are necessary to a turbine, it abolition of the shedding problem, continuity in power generation, to reduce the harmful effects of high-speed wind continuous rotation of the motor also in establishing certain amount of power

2. Theory

In the present world the renewable energy is one of the upcoming sources for harnessing the energy .as we know, day by day the conventional energy sources are decreasing. intoday's era the world a single big wind mills re capable to generate 1-2mw per mill system. For example in SUZLON(Rajasthan) makes model S9X having generation capacity about 2.1mw having diameter 95m with strength of wind cut off 25m/s and the tabular tower height is 85-100m.for providing strong stability to this big tower it requires more man power and its maintenance over the the turbine the power generation is a contributes of kinetic energy available swept area of wind unit system is taken out by- 1/2ρAV3. Where "ρ" stand as wind falling density over blades . "A" stand for swept area and "V" stand as velocity of wind. But here in real practical , the wind falling is only on turbine blade projected area in axial direction . hence the amount of wind falling on over all circumferences area of blades. The wind utilised on the projected area of blades and the maximum amount of wind crosses between the two identical blades of the wind mills. So this show the wastage of wind energy. A single centralize big unit of wind mill consist of nacellein back of its hub which help in pass the rotor"s shaft power to gear box to generator. Here gear box require extra capital investment and maintenance of a big unit which needs, attention and various safety norms for the maximum and minimum wind speed requirement and there wind cut off are loss factors of windmills which can not be fully controlled by safety norms and unable to utilized. the designing and manufacture of a big unit of wind mills done big scale industries and large factories.

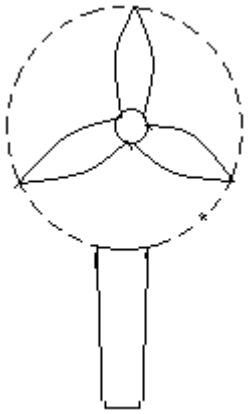

Figure 1 (a): Centralise wind mill in vertical plane

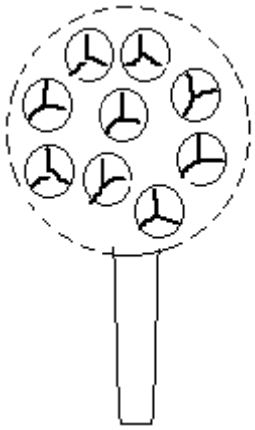

Figure 1(b): Integrated wind mill in vertical plane

Hence over all problem of single centralized wind mill which are depicted in above paragraph is improved by replacing the big wind mills by small integrated wind mills over same area of a big mill unit. Suppose the diameter of windmill rotor with blades is 95m.show the total area capture for rotation is πd2/4= 7084.625m2. as shown in above fig (a). We can see a single large centralized wind mills with a single rotor. In fig (b) there are micro integrated wind mills of same swept area as we know the input energy amount to wind mills takes amount of energy with wind falling on entire swept area of rotor. Here we see the area between the two correspondence blade is too vacant. So that this area can be utilize as maximum efficiency of generation of power by using small integrated micro wind mills as shown in fig (b) in axial plane. Hence from these area the maximum power will be harnessed and also design and fabrication of micro wind mills is less complex as compare to aa big wind mill unit.

Table 1

S. No	*Wind speed (m/s) (range)*	*Voltage generate (v) (Range)*	*Power produced (watts) avg.*
1.	0.90-0.95	0.8-0.9	0.00132
2.	1.0-1.50	1.12-1.15	0.00325
3.	2.0-2.50	2.0-2.6	0.01899
4.	3.0-3.50	2.83-3.5	0.05723
5.	4.0-4.50	3.8-5.9	0.12797
6.	5.0-5.50	6.3-6.9	0.24123
7.	6.0-7.00	07.02-7.40	0.45780
8.	07.50-09.00	07.50-8.60	0.93600
9.	10.50-12.50	8.90-9.40	2.53530
10.	13.00-14.00	9.50-10.00	4.10145
11.	14.00-15.50	10.0-10.40	5.34949
12.	16.00-17.00	10.50-11.00	7.48840
13.	17.50-18.00	11.01-11.20	9.32250
14.	18.00-20.00	11.40-12.45	11.4339
15.	20.50-22.00	12.46-14.75	15.9960
16.	22.50-23.50	14.90-16.00	20.2823
17.	24.00-25.00	16.40-17.00	24.5151
18.	25.50-26.50	18.10-18.45	29.2992
19.	27.00-28.50	18.80-19.30	35.6225
20.	28.50-29.00	19.30-19.60	39.6140
21.	29.50-30.00	19.80-20.20	42.7955

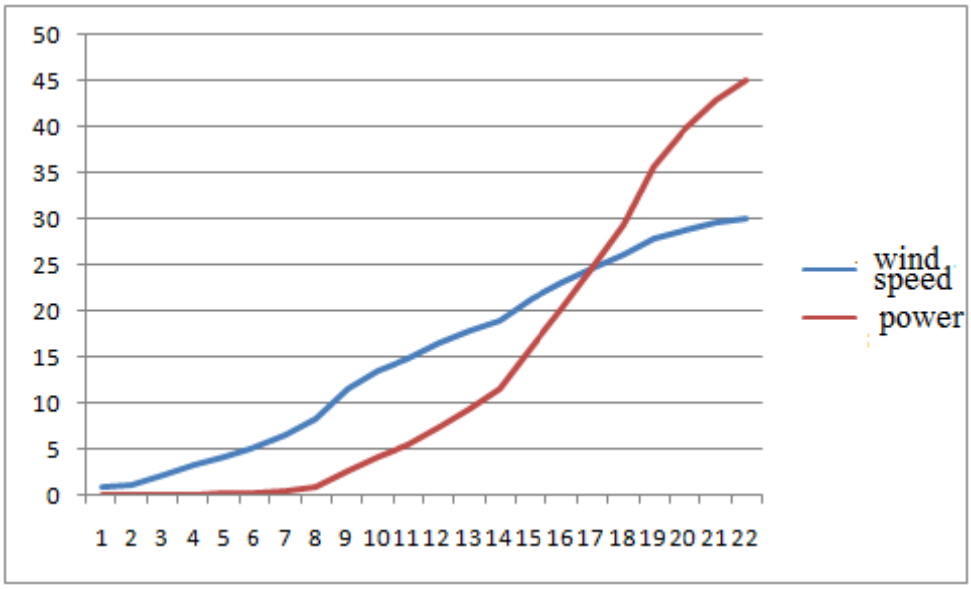

Figure 2

As above graph in fig(2) shows the variation of power with the wind speed. Here as the wind speed increases the generation of power is also increases. the vertical axis shows the wind speed in meter per second whereas the horizontal axis shows the number of reading taken and the two individual curve shows wind speed and the power (in watt).

The next generation concept small micro wind mills is very efficient to generate a electricity to our own way with a better strength as compare to single rotor centralized wind mill. . This technology we also use as a large scale purpose. Each component generates some power and through the parallel connection we generate a bulky power.-In a single centralise wind mills facing a many problem then and repairing time consume a more time. weight is very less as compare to single centralise wind mills. Micro wind mills do not affect any bird.Every motor generate some electricity and as for my better knowledge it will be more efficient then centralise wind mills. Through that Shedding problem is less and also Ecological balance of nature

The approaches that the wind turbine shows the power and the turbine control are also included for the control power flow field potentially that increases the possibility of an

optimization tests. The wind turbine levelled near mounted on the floor, where the speed of the blade depends on demand of air. However, when air current density is high, rotation of the turbine speed is high. if we focusing on the power of rotating wind turbines then called the maximum power optimum speed. the main aim and purpose, of small micro-wind is to generate high power as compare to single centralizing windmills. the area of concern of the wind farm is the same as both the turbine system, but the generation is in small micro-wind will be high. the components in a integrated wind turbine zone can be stable individually when any abnormal condition is occurs and also we are focusingthe accuracy and reliability on the economic model and its time of repair.

The analysis of power generation of integrated wind mills with varying wind speed is given in table 1. And its electrical assembling of micro wind mills are shown in fig. (3) its all the analysis data is shown in table. Also the application of using integrated wind mills is that here, there is no any boundation to occupy the area projection of falling air. Hence it can composed over many micro wind mills. Probably any suitable area can be stabled, hence all these micro wind mills are directly connected to the generator so that there is no losses occurs due to absence of gear box in it.

3. Future prospectus of Wind Mills

Future of micro wind. As for we see the population of India is very high. as we see the coming era is going to be more overly based on new technology such as nano technology smart technology. According to this coming technology we are going to stabilised such electric power generation technology through wind. Micro wind technology is able to generate a electricity in better way. As compare to centralise wind mills micro wind mills use both small and large scale purpose.

3.1 How micro wind mills work-

Through the wind micro crosses by wind blade swing properly and after that shaft will be rotating and each and every motor work in a similar way to generate a electricity. Every component generate some electricity and due to series connection we generate a bulky power. after that charge will be store in a battery bank. And as per requirement we consume power and send through the distribution line.

3.2 Blade and Frame Description:

1) The line of micro-wind mills that we Using a 4-blade fan . Here we use a free moving motor size. In a micro-windmills we use a 12V DC motor cw (it's micro-motor) having is 2400rpm.
2) Here we use a 4-blade fan. The diameterof the fan blade 11cm each. The blade, whicdirectly connected to the motor with the help of their respective shaft.

3.3 Motor Use

The each motor can generate dc voltage having range about 1v-20v with 2400rpm..the generation of voltage is depend upon the wind speed This topic is the blade light weight and high efficiency. The most important part of this topic, the aerodynamic shape of the blade.

4. Benefit

1) Breakdown is less :
In small integrated wind turbine there is reducing the nature of breakdown in any abnormal condition. as in single centralize wind mill there is generally breakdown occur due to the variation of speed of wind due to sometime apply the break on the turbine blade but in small integrated wind turbine this problem will be reduce.

2) Fabrication is less effective and good quality .:
In single centralize wind turbine have more effective and not so good fabrication as compare to the small integrated wind turbine.

3) Creep problem is less :
Creep problem is depends on time deformation of loaded members which is undergoing elastic situation. In small integrated wind turbine the creep problem will less in compare to the single centralize wind mill as the speed of naturally wind flowing speed.

4) No tip deflection :
There will noany problem occurs like tip deflection in small integrated wind turbine whereas in single centralize wind turbine is generally occurs due to high velocity of wind.

5) Can work with high velocities of air comparative to bog or centralized windmill:
As we know that today single rotor centralized wind mill can rotate at maximum 25m/s of wind velocityand minimum wind velocity required 5m/s. But in micro integrated wind mills it can easily work more than single rotor centralized wind mill about 30m/s and can also work minimum wind velocity up to 1m/s with better efficiency of power generation as compare to single centralized wind mills.

6) More efficient-
This micro integrated wind mill is highly efficient than a single centralized wind mill in all the velocity of wind . such as a single micro wind mill can produce about 19-20volt at 28-30m/s of wind velocity. If we integrate various micro wind mills then we can get maximum wind efficiency as compare to centralized rotor wind mills.

7) Cost effective-

If we compare to micro wind mills to single centralise wind mills then micro wind mills is very chip as compare to single centralise wind mills. If we taken a same area then its cost is just half of the centralisewind mills.

8) Transportation efforts required are less-

Micro wind mills is very sufficient and reliable as compare centralise wind mills. Size of the micro wind is very small as compare to centralise wind mill due to we can easily transport them.

9) Easy maintenance-

For the comparison of both the mills. Micro wind mills maintains is very easy because it work in separate way and any breakdown will be occurred in any cases then we can easily replace them . but if we taken a example of single centralise wind mills it required a more time and also replacement and repairing time is more.

10) Reduces green house emission for initial level.-

By using integrated micro wind turbine there is negligible green house emission. There is no any gas emission.

5. Approach

There are various approaches of integrated micro wind turbine such as:

1. Mainly to increase efficiency of integrated wind turbine over single centralize wind turbine which is running incurrently .
2. This technology help a better way to reduce the size of exiting wind turbine infrastructure.
3. An array of micro wind turbines adds a distinctive element of interest to a building, and it offers not miss business, it proof of its sustainability credentials.
4. In this technology extra benefit includes Wind turbines along with non-generating sculptures, which was designed to strengthen global profile of the country and drive their tourism sector.

One thing that you, if you keep a turbine array, the effect, the oversized and turbulence microclimate is could have on efficiency.

6. Result

By doing this practical experiment with wind energy, various integrated micro windmills and its comparison and its analysis. It concluded that it is better to use small integrated windmills regarding their strength and power generation with same area of big centralize windmills. It observed That the strength of this micro integrated wind mills is maximum about 30m/s, and also power generation may leads to minimum 0.95m/s wind speed. Hence increasing speed of wind, the generation is also rapidly increases as shown table 1.

7. Conclusion

The main motive of this paper is to make people of micro wind mills departments, organisation for vertical axis to take interest in using this instead of a single centralize wind mill which is better power generation, easy maintenance, strength as compare to to big unit wind mills, this is an very important research opportunity in wind energy power generation field., hence itproved that its a better way to harness power easily and reliable from all side for the wind energy.

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