Concept of Regenedyne Wind Power Generation

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***Abstract* - The aim of this major qualifying project is to design and implement a vertical axis wind turbine system that has the ability to operate in both low and high wind speed conditions. This technology provides an extreme efficient, versatile and elegant method of producing power from wind. Our choice for this model is to showcase its efficiency in varying wind conditions as compared to the traditional horizontal axis wind turbine and contribute to its steady growing popularity for the purpose of mass utilization in the near future as a reliable source of power generation. Hence the main objective of this project is to harness wind energy in more efficient way.**

***Index Terms* - Clean Green Power, Regenedyne.**

I. INTRODUCTION

Regenedyne wind power generation (RWPG) is the advance method of harnessing the kinetic energy of wind. The word regenedyne means generation by renewable source (wind). hence the name REGENEDYNE WIND POWER GENERATION. In this concept we invent the exhaust fan as a wind mill. The goal of this project was to design a wind turbine specifically for a low wind speed sites. As energy demand around the world is increasing day by day, Wind energy is the one option for fulfill the needs as compare to other renewable energy resources. Since most of the country has low speed wind available, this turbine would be applicable in many places. It is more efficient in rural areas.

II. PRINCIPLE

The basic working principle of a wind turbine is when air moves quickly, in the form of wind, the kinetic energy is captured by the turbine blades. The blades start to rotate and spin a shaft that leads from the hub of the rotor to a generator and produce electricity. The shaft drives the generator to produce electricity. The energy that can be extracted from the wind is directly proportional to the cube of the wind speed. We can then calculate the power converted from the wind into rotational energy in the turbine using equation. The wind mill works on the principle of converting kinetic energy of the wind to mechanical energy. We know that power is equal to energy per unit time. The energy available is the kinetic energy of the wind. The kinetic energy of any particle is equal to one half its mass times the squre of its velocity.

$$K.E.=\tfrac{1}{2}\, mV^2 \quad \text{------(1)}$$

The amount of air passing in unit time, through an area A, with velocity V, is AV, and its mass m is equal to its volume multiplied by its density ρ of air, or

$$m= \rho\, AV \quad \text{------(2)}$$

m is the mass of air transversing the area A swept by the rotating blades of a wind mill type generator.

Substituting this value of the mass in the expression for the kinetic energy, we obtain ,

$$K.E.=1/2\ \rho AV.V^2 \ \text{Watts} \quad \text{-------(3)}$$

This equation tells us the maximum wind available the actual amount will be somewhat less because all the available energy is not extractable is proportional to the cube of the wind speed It is the evident that small increases a wind speed can have marked effect on the power in the wind speed.

$$Pavail =0.5\ \rho\ AV^3Cp \quad \text{------(4)}$$

Where Pavail is output power available in watts.

ρ is density of air in kg/m^3.

A is area swept by blades.

V is velocity of wind.

Cp is the power coefficient called Betz limit

Cp max= 0.59

Cp(Power Coefficient)=power of wind rotor/power available in the wind.

III. PROPOSED SYSTEM

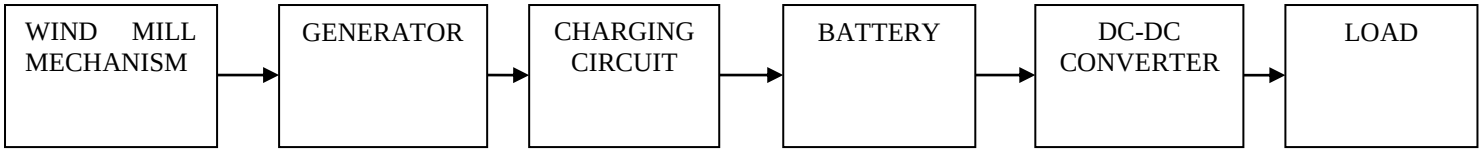

Fig 1. Block Diagram of Regenedyne Wind Power Generation

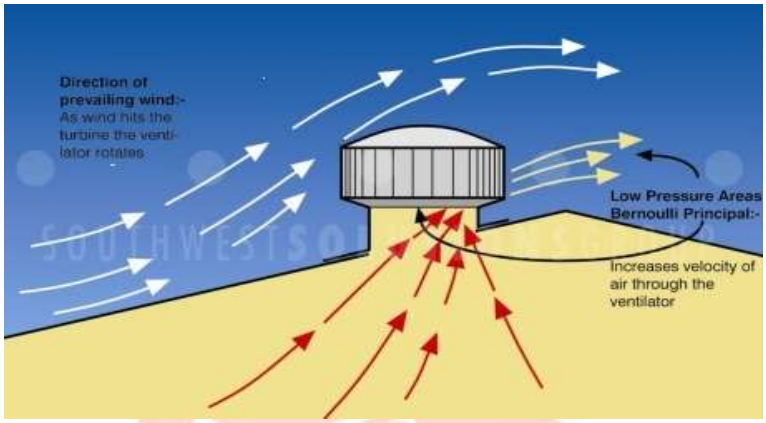

Fig 2. Working diagram of Regenedyne Windmill

1. Wind Mill Mechanism

It is a fabrication of blades. Total blades are 36. Thickness of one blade is 0.5mm. The frame is galvanized. Top cover and The ring is of stainless steel. material used for this blades is Aluminium. Properties of Aluminium:

Fig.3 Model of a Regenedyne Windmill

IV. Properties of Aluminium

Weight

One of the best known properties of aluminium is that it is light, with a density one third that of steel, 2.700 kg/m3. The low density of aluminium accounts for it being lightweight but this does not affect its strength.

Strength

Aluminium alloys commonly have tensile strengths of between 70 and 700 MPa. The range for

alloys used in extrusion is 150 – 300 MPa. Unlike most steel grades, aluminium does not become brittle at low temperatures. Instead, its strength increases. At high temperatures, aluminium‟s strength decreases. At temperatures continuously above 100°C, strength is affected to the extent that the weakening must be taken into account.

Corrosion Resistance

Aluminium reacts with the oxygen in the air to form an extremely thin layer of oxide. Though it is only some hundredths of a (my)m thick (1 (my)m is one thousandth of a millimeter), this layer is dense and provides excellent corrosion protection. The layer is self-repairing if damaged.

Non-Magnetic Material
Aluminium is a non-magnetic (actually paramagnetic) material. To avoid interference of magnetic fields aluminium is often used in magnet X-ray devices.

2. Generators
It works on the principle of electromagnetic induction. This method of excitation consists of a smaller direct-current (DC) generator fixed on the same shaft with the alternator. The DC generator generates a small amount of electricity just enough to excite the field coils of the connected alternator to generate electricity. A variation of this system is a type of alternator which uses direct current from the battery for excitation, after which the alternator is self-excited.

3. DC-DC Converter
It is a device that converts Dc to Dc signal by using full wave bridge rectifier, full wave output is obtained. Capacitor is used for filtering purpose.

4. Battery
It is a storing device. Batteries convert chemical energy directly to electrical energy. A battery consists of some number of voltaiccells. Each cell consists of two half-cells connected in series by a conductive electrolyte containing anions and cations. One halfcell includes electrolyte and the negative electrode, the electrode to which anions (negatively charged ions) migrate; the other half-cell includes electrolyte and the positive electrode to which cations (positively charged ions) migrate. Redox reactions power the battery. Cations are reduced (electrons are added) at the cathode during charging, while anions are oxidized (electrons are removed) at the anode during charging. During discharge, the process is reversed. The electrodes do not touch each other, but are electrically connected by the electrolyte. Some cells use different electrolytes for each half-cell. A separator allows ions to flow between half-cells, but prevents mixing of the electrolytes.
Batteries are classified into primary and secondary forms

- Primary batteries irreversibly transform chemical energy to electrical energy. When the supply of reactants is exhausted, energy cannot be readily restored to the battery.
- Secondary batteries can be recharged; that is, they can have their chemical reactions reversed by supplying electrical energy to the cell, approximately restoring their original composition.

Some types of primary batteries used, for example, for telegraph circuits, were restored to operation by replacing the electrodes.Secondary batteries are not indefinitely rechargeable due to dissipation of the active materials, loss of electrolyte and internal corrosion.

Battery cell types
Many types of electrochemical cells have been produced, with varying chemical processes and designs, including galvanic cells, electrolytic cells, fuel cells, flow cells and voltaic piles 1-Wet Cell , 2-Dry Cell
A dry cell uses a paste electrolyte, with only enough moisture to allow current to flow. Unlike a wet cell, a dry cell can operate in any orientation without spilling, as it contains no free liquid, making it suitable for portable equipment. By comparison, the first wet cells were typically fragile glass containers with lead rods hanging from the open top and needed careful handling to avoid spillage. Lead–acid batteries did not achieve the safety and portability of the dry cell until the development of the gel battery.

IV. APPLICATION AND ADVANTAGES

Application

1. This project demonstrates the utilization of the renewable resources (wind energy) in an Efficient way.
2. This type of generation can be used in remote places where conventional power supply is Uneconomic.
3. This methodology can be used for hybrid power generation.
4. Generated power by this method can be used ON and OFF grid.
5. The power so generated can be effectively used for street/domestic.
6. This method can be used in rural area.
7. 7.For home application by using these method like CFL,TV are work.

Advantage

1. A massive tower structure is not required , as VAWT‟s are mounted closer to the ground.
2. These are located closer to the ground and hence easier to maintain.
3. These have lower start-up speeds than their horizontal counterparts. These can start at speed as low as 10kmph.
4. They don‟t require yaw mechanisms. Require no lubrication.
5. Capable of generating power from wind speeds as low as 1.5m/s and reported to operate in winds reaching 40m/s.
6. Producing 20% more energy than a conventional turbine, at the same time decreasing operational costs by 50% over the traditional wind turbine.

V. CONCLUSION

It represent a very promising future for wind power generation. A single large turbine can output more than conventional horizontal wind turbines. The major components are placed at ground level. We can say the turbine can power more output with high efficiency conversion compared to traditional wind turbine. The system will provide electricity at a rate lower than coal and

nuclear. Thus we believe technology has the capacity to completely displace current technology in use for wind farm.

REFFERENCE

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