CONCEPTUAL BLADELESS WINDMILL

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Wind energy capacity, wind energy conversion, minimal cost factor, vorticity, cyclical pattern, vortices, vibration, vortex shedding, alternator, tunning system.

Introduction:

As we step into the 21st century, the need for more efficient and eco-friendly energy is fore ever increasing. The conversion of wind energy to electricity is the main goal of this project. Since 1950, India has been researching on how to implement wind energy as a fuel source. In, 2001, the wind energy sector really kicked off when the country reached the wind energy capacity of around 1000MW. As a result, India became the 3rd largest country to use wind energy. In, this project we further take the conversion of wind energy with minimal cost factor and simplicity compared to a traditional wind mill. This device captures the energy of vorticity, which is an aerodynamically unstable condition. AS the wind hits the structure, it rotates the mast in a cyclical pattern and this produces vortices. As the wind speed increases the vibration of the mast also increases and in turn increases the electricity produced. This effect is called as Vortex Shedding effect. The electricity is produced with the help of alternator and tunning system.

Objectives:

1. We are trying to incorporate a particular design of mast
2. Materials that were been used in the current production is Poly Vinyl alcohol.
3. There were a few faults found in the current product one among which was a flexible joint
4. It was used to assist oscillation of mast. Which could undergo fatigue or Failure because of prolong usage.
5. We incorporated a particular stand structure in replacement to the joint.

Methodology:

Ideology:

The idea of a vortex bladeless windmill occurred while going through the energy conversion problems faced by many states in India.

Where clean energy is still at its developing stages.

A vortex induced vibration bladeless windmill can be our answer for an efficient, clean and economical power generation.

Operational report:

The process varies greatly in efficiency based on device scale, spring tension and the strength of the magnetic field being used to generate electricity.

Mechanism:

The oscillation wind mill is used whose motion on the body is due to alternating lift forces.

Usage of the vortex-shedding phenomenon which generally occurs on nearly any bluff body.

A phenomenon known as 'lock in' condition is used when the vortex shedding frequency becomes close to the natural frequency of the body.

Conceptual design:

The mast is made in a conical design.

The centre base consists of magnets, coils which are connected to the piezoelectric device and the electric energy conversion is shown with LED lights.

Selection of components:

1. Mast structure
2. Magnets
3. Coils
4. Piezoelectric device
5. LED
6. Springs

Validation of result:

Depending upon the length of the mast we get the mechanical power output.

Power output depends on the velocity of wind.

Results:

SL NO.	WIND SPEED m/s	TIME minutes	VOLTAGE PRODUCED (V)	BULB GLOW (sec)
1	0.4	5	1.54	10
2	0.4	10	2.08	16
3	0.6	15	2.64	21
4	0.9	20	3.16	29
5	1.5	25	3.56	38
6	2.0	30	3.96	49

As we can see in the above result table,

When the device is kept out in the wind, the initial wind speed is less (comparatively), this in turn produces less voltage. The initial voltage is so less that the LED bulb glows for a very short time (comparatively). As the wind speed increases as shown in the above table the voltage also increases. Hence the bulb glows for a longer time as shown in the above table.

Conclusion:

1. The conceptual bladeless wind generation configuration which has been considered to obtain results appear to be very encouraging as for the model taken.
2. The purpose of the project is to give some fundamental results that we adopted for a bladeless wind system and would be proved as a stepping stone for future developments on this concept.
3. As the wind bypasses a fixed structure its flow changes and as a result a cyclic pattern of vortices is generated.
4. The overall project has been a success with all the project requirements been achieved.
5. As the wind energy is powerful and consistent, the usage of conventional windmill for utilizing the wind energy in lesser area and cost efficiency is not possible.
6. Hence this concept helps in achieving these criteria

Scope for Future Work:

1. In detail regular study on characterization of vortex induced windmill is need of the sustainable development in the present scenario of urban sprawling and climate change.
2. Improvement in the modern technology and methods is the need of the day for the substantial implementation of bladeless windmill into the society.