



## VERTICAL AXIS WIND TURBINE

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### ABSTRACT

*The objective of the project is to design a wind turbine to recapture wind energy from vehicles on the highway. Wind energy is considered the fastest growing clean energy source however; it is limited by variable natural wind. Highways can provide a required considerable amount of wind to drive a turbine due to high vehicle traffic. This energy is unused. Extensive research on wind patterns is required to determine the average velocity of the wind created by oncoming vehicles. The wind turbines will be placed on the medians therefore fluid flow from both sides of the highway will be considered in the design. Using all of the collected data, existing streetlights on the medians can be fitted with these wind turbines. Additionally, since the wind source will fluctuate, a storage system for the power generated will be designed to distribute and maintain a constant source of power. Ideally, the turbine can be used globally as an*

*unlimited power source for streetlights and other public amenities. For this project we are looking for "Vertical Axis Wind Turbine". Mainly Helical type of turbine can be used for this type of application as it collects wind from all kind direction. The price of turbines is increasing in accordance with the rising cost of energy and commodities. The cost of designing the turbine, calculated in energy savings must be recovered in areasonable time period. Each vehicle on the highway offer an intermittent and uncontrolled source of wind power. The design of the wind turbine must include storage of power and a system to distribute the generated power effectively. Operational noise level and space are other important design considerations. The design of the other parts like Shaft, Flange, Bearings etc is also same important. So review has been made in order to make this project successful.*

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## INTRODUCTION

Wind energy is the fastest growing source of clean energy worldwide. A major issue with the technology is fluctuation in the source of wind. There is a near constant source of wind power on the highways due to rapidly moving vehicles. The motivation for this project is to contribute to the global trend towards clean energy in a feasible way.

## DESIGN CHALLENGES

The price of turbines is increasing in accordance with the rising cost of energy and commodities. The cost of designing the turbine, calculated in energy savings must be recovered in a reasonable time period.

Each vehicle on the highway offers an intermittent and uncontrolled source of wind power. The design of the wind turbine must include storage of power and a system to distribute the generated power effectively.

Operational noise level and space are other important design considerations. The wind turbines should have as little negative impact on the placement location as possible.

Wind turbines are traditionally used in remote locations. This offers the additional challenge of having to transport the power generated to the location wherein it will be utilized. Fortunately, the wind turbine in this project is designed

for use in high traffic areas where the demand for power is high.

## MAIN BODY

### Material Selection

The proper selection of material for the different part of a machine is the main objective. In the fabrication of machine. For a designengineer it is must that he be familiar with the effect, which the manufacturing process and heat treatment have on the properties of materials.The Choice of material for engineering purposes depend suppon the following factors:

1. Availability of the materials.
2. Suitability of materials for the workingncondition in service.
3. The cost of materials.
4. Physicaland chemicalpropertiesofmaterial.
5. Mechanical properties of material.

The mechanical properties of the metals are those, which are associated with the ability of the material to resist mechanical forces and load.We shall now discuss these properties as follows:

- |            |              |
|------------|--------------|
| A.Strength | B.Elasticity |
| C.Stress   | D.Plasticity |
| E.Stress   | F.Ductility  |

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G. Brittleness                      H. Malleability

I. Toughness                      J. Resilience

When a part is subjected to a constant stress at a high temperature for long period of time, it will undergo a slow and permanent deformation called creep. This property is considered in designing internal combustion engine's, boiler and turbines.

### Hardness

It is a very important property of the metals and has a wide variety of meanings. It embraces many different properties such as resistance to wear, scratching, deformation and machinability etc. It also means the ability of the metal to cut another metal. The hardness is usually expressed in numbers, which are dependent on the method of making the test.

The hardness of a metal may be determined by the following test.

1. Brinell hardness test
2. Rockwell hardness test
3. Vickers hardness (also called diamond pyramid) test and
4. Shore scleroscope.

In engineering practice, the machine parts are subjected to various forces, which may be due to either one or more of the following.

1. Energy transmitted
2. Weight of machine
3. Fictitious resistance
4. Inertia of reciprocating parts
5. Change of temperature
6. Lack of balance of moving parts

The selection of the materials depends upon the various types of stresses that are set up during operation. The material selected should withstand it. Another criterion for selection of metal depends upon the type of load because a machine part resists load more easily than a live load and a live load more easily than a shock load.

Selection of the material depends upon factor of safety, which in turn depends upon the following factors.

1. Reliability of properties
2. Reliability of applied load
3. The certainty as to exact mode of failure
4. The extent of simplifying assumptions
5. The extent of localized
6. The extent of initial stresses set up during manufacturing
7. The extent loss of life if failure occurs



8. The extent of loss of property if failure occurs

## CONCLUSION

Conclusively, extensive data is collected on wind patterns produced by vehicles on both sides of the highway. Using the collected data, a wind turbine is designed to be placed on the medians of the highway. Although one turbine may not provide adequate power generation, a collective of turbines on a long strip of highway has potential to generate a large amount of energy that can be used to power streetlights, other public amenities or even generate profits by selling the power back to the grid. This design concept is meant to be sustainable and environmentally friendly. Additionally, a wind turbine powered by artificial wind has a myriad of applications. Theoretically any moving vehicle can power the turbine such as an amusement park ride. The highway wind turbine can be used to provide power in any city around the globe where there is high.

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