



## COMBINING TWO TYPES OF WIND TURBINES HAWTS AND VAWTS IN SINGLE ASSEMBLY

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**ABSTRACT:** *Combining Horizontal Axis Wind Turbine (HWAT) and Vertical Axis Wind Turbine (VAWT) is the New Concept evolved and proposed for implementation. Large or Medium or Small Hollow Cylindrical Steel Support Tower for Horizontal Axis wind Turbine can be modified as VAWTs or Vertical Axis Wind Turbines. Any one of the Known suitable Vertical Axis Wind Turbine can be chosen as support tower for HWAT. The Vertical Tower modified to serve simultaneously as a support for the horizontal axis turbines and work as Vertical axis multiple wind turbines.*

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**Key words:** *HAWTs – Horizontal Axis Wind Turbines, VAWTs-Vertical Axis Wind Turbines, Horizontal Common Support Power Shaft, Vertical Support Tower, Swept Area, Solidity Ratio, Electricity Generation.*

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### INTRODUCTION

Increased Electrical Power output is the aim which can be achieved by redesigning the wind turbines by a combination of Vertical and Horizontal axis wind turbines. In a combined turbine, Material and Money can be made more useful, profitable and meaningful.

Instead of having a single Horizontal axis Wind Turbine rotor on top of a cylindrical tower of several metres height placed one side, Twin Horizontal Rotors having identical dimensions mounted on either side of the same horizontal shaft with a 45 degree offset such that a combination can be made to produce more electricity.

#### 1.2 New Concept of Wind Turbines:

New concept/idea evolved to combine the wind rotors for maximizing electrical power production can be adapted by the manufacturers. It is an enhancement of green energy production that is electrical energy production without pollution.

Detail Design with Digital Data once prepared and cleared without any errors creeping in, a prototype model is can be made. Testing the model in wind tunnel or just by using an industrial fan, the results from the basic design can be obtained.

Finally, Field testing is to be carried out with the physical model for fine tuning the basic design.

Detail design using computer can be prepared for each and every individual component and sub assembly to aid mass production.

#### 2.1 Further Detail:

Instead of having a single Wind Turbine rotor of several meters diameters and placing it one side of the wind Turbine Tower, Twin Rotors having identical dimension can be placed on either side of the support tower for more effective energy conversion.

For example, a single rotor HAWT turbine is having say 10 metre diameter, it can be replaced by two 10 metre diameter three bladed rotors on either side of the horizontal shaft. Two HAWT Wind Turbines can be placed on either side of the support Tower or structure in such a way that front rotor blades are offset by 45 degree and placed in the middle of the rear rotor blades. This arrangement will ensure the rear turbine blades are not in the wake of the front turbine blades.

### **2.2 HAWTs and VAWTs Wind Flow Visualisation:**

Computer based Fluid Flow pattern can be obtained to predetermine the simulated wind flow. Further by providing input data to the computer like Wind Velocity, Mass of individual blades, Radius of Gyration of the individual Blade and maximum expected angular speed of the individual turbine the Efficiency of energy conversion can also be predetermined.

Wind flow will tend to find the Gap or Path between the rotor blades and pass through the rear rotor. The wind also gets deflected all around the outer tip of the front rotor blades can also be harnessed by the rear wind rotor.

### **CONCLUSION**

Development by the way of new ideas, updating the knowledge and adapting the latest Designs is preferable. The new proposed wind turbine is towards maximizing the utilisation of material at the same time higher conversion of energy per turbine from the naturally available wind.

Wind is free of cost but wind turbines require investment. Life span of operation of wind turbines depends upon periodical inspection and maintenance. For the wind turbine with proper maintenance, working life of 20 years can be expected.