Development of Alternate Energy System in Four Wheelers

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***Abstract*: Nowadays as the enormous use of gasoline powered vehicles significantly contributesto high demand and scarcity, environmental pollution etc. so in such cases we deal with a project to enhance a smart technology on automobiles by using the vehicles drag resistance or opposing wind flow using a rotational horizontal wind turbine system through which we can be able to generate power when the car is in its motion .we here add a alternate battery to the project for acquiring the whole power from the wind generator and to transfer it to the battery. As the wind energy is renewable kind we can the charge the battery with no other power source. The turbine system we mount it on the rear bumper of the car and setup a battery in the boot of the car from where we supply the power using the power cables to the ignition system of the car. so therefore we analyze the wind conditions and the rate of opposing power on the turbine system so we should design the turbine system to withstand the opposingconditions.**

Key words: Battery, Pollution, Renewable, Turbine.

1.0 INTRODUCTION

1.1 ENERGY RESOURCES

Renewable resources are available each year, unlike non-renewable resources, which are eventually depleted. A simple comparison is a coal mine and a forest. While the forest could be depleted, if it is managed it represents a continuous supply of energy, vs. the coal mine, which once has been exhausted is gone. Most of earth's available energy resources are renewable resources. Renewable resources account for more than 93 percent of total U.S. energy reserves. Annual renewable resources were multiplied times thirty years for comparison with non-renewable resources. In other words, if all non-renewable resources were uniformly exhausted in 30 years, they would only account for 7 percent of available resources each year, if all available renewable resources were developed. There are various types of renewable energy resource availablethey are:

1.Solar energy2 Wind energy
3 Wave and tidal power
4. Geo thermal5 Hydropower

2. WIND ENERGY

2.1 WIND ENERGY

Wind energy is a form of solar energy. Wind energy describes the process by which wind is used to generate electricity. Wind turbines convert the kinetic energy in the wind into mechanical power. A generator can convert mechanical power into electricity.

2.2 WIND POWER

The wind is a clean, free, and readily available renewable energy source. Each day, around the world, wind turbines are capturing the wind's power and converting it to electricity. This source of power generation plays an increasingly important role in the way we power our world

Wind power is the use of air flow through wind turbines to provide the mechanical power to turn electric generators. Wind power, as an alternative to burning fossil fuels, is plentiful, renewable, widely distributed, clean, produces no greenhouse gas emissions during operation, consumes no water, and uses little land.The net effects on the environment are far less problematic than those of nonrenewable power sources.

Wind farms consist of many individual wind turbines, which are connected to the electric power transmission network. Onshore wind is an inexpensive source of electric power, competitive with or in many places cheaper than coal or gas plants.Offshore wind is steadier and stronger than on land and offshore farms have less visual impact, but construction and maintenance costs are considerably higher. Small onshore wind farms can feed some energy into the grid or provide electric power to isolated off-grid locations.

Wind power gives variable power, which is very consistent from year to year but has significant variation over shorter timescales. It is therefore used in conjunction with other electric power sources to give a reliable supply. As the proportion of wind power in a region increases, a need to upgrade the grid and a lowered ability to supplant conventional production can occur.[8][9] Power-management techniques such as having excess capacity, geographically distributed turbines, dispatchable sources, sufficient hydroelectric power, exporting and importing power to neighboring areas, energy storage, or reducing demand when wind production is low, can in many cases overcome these problems.Weather forecasting permits the electric-power network to be readied for the predictable variations in production that occur.

In 2017, global wind power capacity expanded 10% to 539 GW. Yearly wind energy production grew 17% reaching 4.4% of worldwide electric power usage,and providing 11.6% of the electricity in the European Union.Denmark is the country with the highest penetration of wind power, with 43.4% of its consumed electricity from wind in 2017.At least 83 other countries around the world are using wind power to supply their electric powergrids.

Equation for Wind Power $P = 0.5_{\varrho}AV3$

-Wind speed

-The amount of energy in the wind varies with the cube of the wind speed, in other words, if the wind speed doubles, there is eight times more energy in the wind (2^3 = 2 x 2

x 2
= 8). Small changes in wind speed have a large impact on the amount of power available in the wind.
-Density of the air
-The more dense the air, the more energy received by the turbine. Air density varies with elevation and temperature. Air is less dense at higher elevations than at sea level, and warm air is less dense than cold air. All else being equal, turbines will produce more power at lower elevations and in locations with cooler average temperatures[5].
-Swept area of the turbine
WIND TURBINE
A wind turbine is a device that converts the wind's kinetic energy into electrical energy.
=1/2^3E
Wind turbines are manufactured in a wide range of vertical and horizontal axis. The smallest turbines are used for applications such as battery charging for auxiliary power for boats or caravans or to power traffic warning signs. Slightly larger turbines can be used for making contributions to a domestic power supply while selling unused power back to the utility supplier via the electrical grid. Arrays of large turbines, known as wind farms, are becoming an increasingly important source of intermittent renewable energy and are used by many countries as part of a strategy to reduce their reliance on fossil fuels. One assessment claimed that, as of 2009, wind had the "lowest relative greenhouse gas emissions, the least water consumption demands and... the most favourable social impacts" compared to photovoltaic, hydro, geothermal, coal and gas.

2.2.1 TURBINE EFFICIENCY

The maximum theoretical power output of a wind machine is thus 16/27 times the kinetic energy of the air passing through the effective disk area of the machine. If the effective area of the disk is A, and the wind velocity v, the maximum theoretical power output P.where ρ is the air density.
Wind-to-rotor efficiency (including rotor blade friction and drag) are among the factors impacting the final price of wind power.Further inefficiencies, such as gearbox losses, generator and converter losses, reduce the power delivered by a wind turbine. To protect components from undue wear, extracted power is held constant above the rated operating speed as theoretical power increases at the cube of wind speed, further reducing theoretical efficiency. In 2001, commercial utility- connected turbines deliver 75% to 80% of the Betz limit of power extractable from the wind,at rated operating speed.
Efficiency can decrease slightly over time, one of the main reasons being dust and insect carcasses on the blades which alters the aerodynamic profile and essentially reduces the lift to drag ratio of the airfoil. Analysis of 3128 wind turbines older than 10 years in Denmark showed that half of the turbines had no decrease, while the other half saw a production decrease of 1.2% per year.Ice accretion on turbine blades has also been found to greatly reduce the efficiency of wind turbines, which is a common challenge in cold climates where in- cloud icing and freezing rain events occur.

Vertical turbine designs have much lowerefficiency than standard horizontal designs.

2.2.2 TYPES OF WIND TURBINE

Wind turbines can rotate about either a horizontal or a vertical axis, the former being both older and more common.They can also include blades, or be bladeless.Vertical designs produce less power and are less common.
Horizontal axis
Large three-bladed horizontal-axis wind turbines (HAWT), with the blades upwind of the tower produce the overwhelming majority of windpower in the world today. These turbines have the main rotor shaft and electrical generator at the top of a tower, and must be pointed into the wind. Small turbines are pointed by a simple wind vane, while large turbines generally use a wind sensor coupled with a yaw system. Most have a gearbox, which turns the slow rotation of the blades into a quicker rotation that is more suitable to drive an electrical generator.Some turbines use a different type of generator suited to slower rotational speed input. These don't need a gearbox, and are called direct-drive, meaning they couple the rotor directly to the generator with no gearbox in between. While permanent magnet direct-drive generators can be more costly due to the rare earth materials required, these gearless turbines are sometimes preferred over gearbox generators because they "eliminate the gear-speed increaser, which is susceptible to significant accumulated fatigue torque loading, related reliability issues, and maintenance costs."
One Energy in Findlay, OH assembles one of their permanent magnet direct-drive wind turbines.
Most horizontal axis turbines have their rotors upwind of its supporting tower. Downwind machines have been built, because they don't need an additional mechanism for keeping them in line with the wind. In high winds, the blades can also be allowed to bend which reduces their swept area and thus their wind resistance. Despite these advantages, upwind designs are preferred, because the change in loading from the wind as each blade passes behind the supporting tower can cause damage to the turbine.
Turbines used in wind farms for commercial production of electric power are usually three-bladed. These have low torque ripple, which contributes to good reliability. The blades are usually colored white for daytime visibility by aircraft and range in length from 20 to 80 meters (66 to 262 ft). The size and height of turbines increase year by year. Offshore wind turbines are built up to 8(MW) today and have a blade length up to 80 meters (260 ft). Usual tubular steel towers of multi megawatt turbines have a height of 70 m to 120 m and in extremes up to 160m.
Vertical axis
Vertical-axis wind turbines (or VAWTs) have the main rotor shaft arranged vertically. One advantage of this arrangement is that the turbine does not need to be pointed

into the wind to be effective, which is an advantage on a site where the wind direction is highly variable. It is also an advantage when the turbine is integrated into a building because it is inherently less steerable. Also, the generator and gearbox can be placed near the ground, using a direct drive from the rotor assembly to the ground-based gearbox, improving accessibility for maintenance. However, these designs produce much less energy averaged over time, which is a major drawback.

The key disadvantages include the relatively low rotational speed with the consequential higher torque and hence higher cost of the drive train, the inherently lower power coefficient, the 360-degree rotation of the aerofoil within the wind flow during each cycle and hence the highly dynamic loading on the blade, the pulsating torque generated by some rotor designs on the drive train, and the difficulty of modelling the wind flow accurately and hence the challenges of analysing and designing the rotor prior to fabricating a prototype.

When a turbine is mounted on a rooftop the building generally redirects wind over the roof and this can double the wind speed at the turbine. If the height of a rooftop mounted turbine tower is approximately 50% of the building height it is near the optimum for maximum wind energy and minimum wind turbulence. While wind speeds within the built environment are generally much lower than at exposed rural sites,noise may be a concern and an existing structure may not adequately resist the additional stress.

2.5 COSTS

While the material cost is significantly higher for all-glass fiber blades than for hybrid glass/carbon fiber blades, there is a potential for tremendous savings in manufacturing costs when labor price is considered. Utilizing carbon fiber enables for simpler designs that use less raw material. The chief manufacturing process in blade fabrication is the layering of plies. By reducing the number of layers of plies, as is enabled by thinner blade design, the cost of labor may be decreased, and in some cases, equate to the cost of labor for glass fiber blades.

2.6.1 ADVANTAGES

Wind turbines are generally inexpensive. They will produce electricity at between two and six cents per kilowatt hour, which is one of the lowest-priced renewable energy sources.And as technology needed for wind turbines continues to improve, the prices will decrease as well. In addition, there is no competitive market for wind energy, as it does not cost money to get ahold of wind.The main cost of wind turbines are the installation process. The average cost is between $48,000 and $65,000 to install. However, the energy harvested from the turbine will offset the installation cost, as well as provide virtually free energy for years after.

Wind turbines provide a clean energy source, emitting no greenhouse gases and no waste product. Over 1,500 tons of carbon dioxide per year can be eliminated by using a one megawatt turbine instead of one megawatt of energy from a fossil fuel.Being environmentally friendly and green is a large advantage of wind turbines.

2.6.2 DISADVANTAGES

Wind turbines can be very large, reaching over 140 metres (460 ft) tall and with blades 55 metres (60 yd) long,and people have often complained about their visual impact.

Environmental impact of wind power includes effect on wildlife, but can be mitigated if proper monitoring and mitigation strategies are implemented.Thousands of birds, including rare species, have been killed by the blades of wind turbines,though wind turbines contribute relatively insignificantly to anthropogenic avianmortality.

2.7 WIND TURBINE GENERATOR Types of Wind Turbine Generator

A wind turbine is made up of two major components and having looked at one of them, the rotor blade design in the previous tutorial, we can now look at the other, the Wind Turbine Generator or WTG's which is the electrical machine used to generate the electricity. A low rpm electrical generator is used for converting the mechanical rotational power produced by the winds energy into usable electricity to supply our homes and is at the heart of any wind power system.

The conversion of the rotational mechanical power generated by the rotor blades (known as the prime mover) into useful electrical power for use in domestic power and lighting applications or to charge batteries can be accomplished by any one of the following major types of rotational electrical machines commonly used in a wind power generating systems:

1. The direct current (DC) machine, also known as a Dynamo The alternating current (AC) synchronous machine, also known as an ACGenerator
2. The alternating current (AC) induction machine, also known as an Alternator

All these electrical machines are electromechanical devices that work on Faraday's law of electromagnetic induction. That is they operate through the interaction of a magnetic flux and an electric current, or flow of charge. As this process is reversible, the same machine can be used as a conventional electrical motor for converting the electrical power into mechanical power, or as a generator converting the mechanical power back into the electrical power.

Wind Turbine Induction Generator

The electrical machine most commonly used for wind turbines applications are those acting as generators, with synchronous generators and induction generators (as shown) being commonly used in larger wind turbine generators, while smaller and home made wind turbines tend to use a low speed DC generator or Dynamo as they are small, cheap and a lot easier to connect up.

Fig 2.7 Wind Turbine Generator

So does it make a difference what type of electrical generator we can use to produce wind power. The simple answer is both Yes and No, as it all depends upon the type of system and application you want. The low voltage DC output from a generator or older style dynamo can be used to charge batteries while the higher AC sinusoidal output from an alternator can be connected directly to the local grid.

Also, the output voltage and power demand depends entirely upon the appliances you have and how you wish to use them. In addition, the location of the wind turbine generator, would the wind resource keep it constantly rotating for long periods of time or would the generator speed and therefore its output vary up and down with variations in the available wind.

Electricity Generation

A Wind Turbine Generator is what makes your electricity by converting mechanical energy into electrical energy. Lets be clear here, they do not create energy or produce more electrical energy than the amount of mechanical energy being used to spin the rotor blades. The greater the “load”, or electrical demand placed on the generator, the more mechanical force is required to turn the rotor. This is why generators come in different sizes and produce differing amounts of electricity.

In the case of a “wind turbine generator”, the wind pushes directly against the blades of the turbine, which converts the linear motion of the wind into the rotary motion necessary to spin the generators rotor and the harder the wind pushes, the more electrical energy can be generated. Then it is important to have a good wind turbine blade design to extract as much energy out of the wind as possible.

All electrical turbine generators work because of the effects of moving a magnetic field past an electrical coil. When electrons flow through an electrical coil, a magnetic field is created around it. Likewise, when a magnetic field moves past a coil of wire, a voltage is induced in the coil as defined by Faraday’s law of magnetic induction causing electrons to flow.

Simple Generator using Magnetic Induction

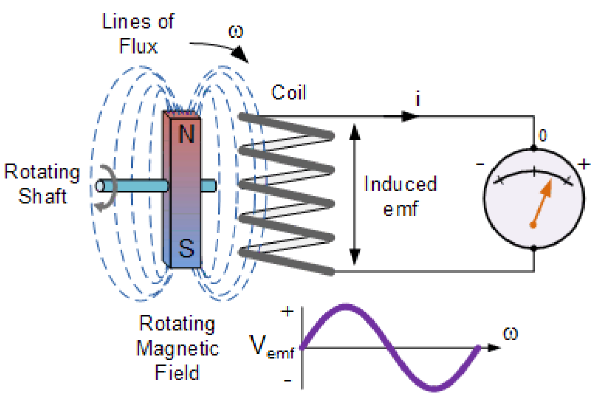


Fig 2.7.1 Electricity Generation Then we can see that by moving a magnet past a single loop of wire, a voltage known as and emf (electro-motive force) is induced within the wire loop due to the magnetic field of the magnet. As a voltage is induced across the wire loop, an electrical current in the form of an electron flow starts to flow around the loop generating electricity.

But what if instead of a single individual loop of wire as shown, we had many loops wound together on the same former to form a coil of wire, much more voltage and therefore current could be generated for the same amount of magnetic flux.

This is because the magnetic flux cuts across more wire producing a greater emf and this is the basic principal of Faraday’s law of electromagnetic induction and an AC generator uses this principal to convert a mechanical energy such as the rotation from a wind turbine or hydro turbine, into electrical energy producing a sinusoidal waveform.

So we can see that there are three main requirements for electrical generation and these are:

A coil or set of conductorsA magnetic field system

Relative motion between the conductors and field

Then the faster the coil of wire rotates, the greater the rate of change by which the magnetic flux is cut by the coil and the greater is the induced emf within the coil. Similarly, if the magnetic field is made stronger, the induced emf will increase for the same rotational speed. Thus: emf$\alpha\Phi$n. Where: “Φ” is the magnetic-field flux and “n” is the speed of rotation. Also, the polarity of the generated voltage depends on the direction of the magnetic lines of flux and the direction of movement of the conductor.

There are two basic types of electrical generator and alternator for that matter: the permanent-magnet generator and the wound- field generator with both types consisting oftwo main parts: the Stator and the Rotor.

The stator is the “stationary” (hence its name) part of the machine and can have either a set of electrical windings producing an electromagnet or a set of permanent magnets within its design. The rotor is the part of the machine that “rotates”. Again, the rotor can have output coils that rotate or permanent magnets. Generally, generators and alternators used for wind turbine generators are defined by how they make generate their magnetism, either electromagnets or permanent magnets.

There are no real advantages and disadvantages of both types. Most residential wind turbine generators on the market use permanent magnets within their turbine generator design, and which creates the required magnetic field with the rotation of the machine, although some do use electromagneticcoils.

These high strength magnets are usually made from rare earth materials such as neodymium iron (NdFe), or samarium cobalt(SmCo) eliminating the need for the field windings to provide a constant magnetic field, leading to a simpler, more rugged construction. Wound field windings have the advantage of matching their magnetism (and therefore power) with the varying wind speed but require an external energy source to generate the required magnetic field.

We now know that the electrical generator provides a means of energy conversion between the mechanical torque generated by the rotor blades, called the prime mover, and some electrical load. The mechanical connection of the wind turbine generator to the rotor blades is made through a main shaft which can be either a simple direct drive, or by using a gearbox to increase or decrease the generator speed relative to the rotational speed of the blades.

The use of a gearbox allows for better matching of the generator speed to that of the turbine but the disadvantage of using a gearbox is that as a mechanical component it is subjected to wear and tear reducing the efficiency of the system. Direct drive however may be more simple and efficient, but the generators rotor shaft and bearings are subjected to the full weight and rotational force of the rotor blades.

Wind Turbine Generator Output Curve

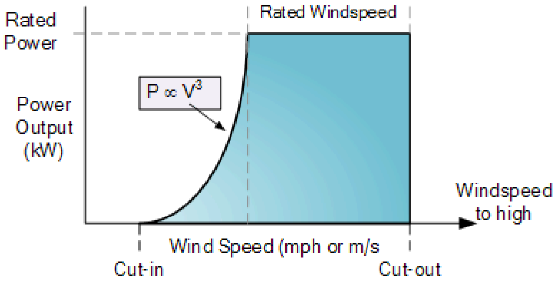


Fig 2.7.3 Wind Generator

Wind Turbine Generator Output

So the type of wind turbine generator required for a particular location depends upon the energy contained in the wind and the characteristics of the electrical machine itself. All wind turbines have certain characteristics related to wind speed.

The generator (or alternator) will not produce output power until its rotational speed is above its cut-in wind speed where the force of the wind on the rotor blades is enough to overcome friction and the rotor blades accelerate enough for the generator to begin producing usable power.

Above this cut-in speed, the generator should generate power proportional to the wind speed cubed (K.V3) until it reaches its maximum rated power output as shown.

Above this rated speed, the wind loads on the rotor blades will be approaching the maximum strength of the electrical machine, and the generator will be producing its maximum or rated power output as the rated wind speed window will have been reached. If the wind speed continues to increase, the wind turbine generator would stop at its cut-out point to prevent mechanical and electrical damage, resulting in zero electrical generation. The application of a brake to stop the generator for damaging itself can be either a mechanical governor or electrical speed sensor.

Buying a wind turbine generator such as the Windmax HY1000 to produce wind energy is not easy and there are a lot of factors to take into account. Price is only one of them. Be sure to choose an electrical machine that meets your needs. If you are installing a grid-connected system, choose an AC mains voltage generator. If you are installing a battery-based system, look for a battery-charging DC generator. Also consider the mechanical design of a generator such as size and weight, operating speed and protection from the environment as it will spend all of its life mounted at the top of a pole or tower.

4.1 WIND POWERED CARS

Increasing use of gasoline-powered vehicles significantly contributes toenvironmental pollution, noise and depletion of crude oil reserves. Electric-powered vehicles are known to solve some of the problems associated with gasoline-powered vehicles, but such vehicles are not yet in widespread use.

There are three types of electric automobiles.

The first one is called Electric Vehicle that stores electricity of electric utilities in the car borne battery. The second one is Solar Vehicle that carries multiple solar energy generating units to generate electricity to be stored in the car borne battery to propel motor. The third type of electric automobile generates electricity by using wind energy for battery usage. Besides all the three above-mentioned types, there are also some electric automobiles using all three ways of generating electricity. However, the criteria by which each country judges the performance of electric vehicles are based on customers' demand and mainly concern with top speed, accelerating ability and the distance upon one charging (so called endurance). Any method that can optimize the performance is considered as important technical breakthrough in the design of electric vehicle and will contribute greatly to its popularization.

Wind power has become a popular form of renewable energy, alongside solar power. Transportation and what powers it, is something that has long been in debate. There are questions about what it should run on and which fuel would be most efficient. There are some who thought that a wind powered car might be the answer to problems regarding transport and the pollution it causes.

A wind-powered car converts wind power into electric energy, thereby helping the car to move forward. There's an alternator connected to the valves which in turn changes kinetic energy into electric energy. The electric energy so generated is stored in a DC battery, and it's connected to a controller.

Lotus Nemesis. Argued to be the first official wind powered car, it is actually a hybrid and uses electric power as well as a turbine that has been placed outside of the car. The turbine will produce wind energy to help supply the car with energy, especially if the battery starts to run low.

Many inventions and researches have been done all around the world relating to this idea by trying to invent a more applicable wind turbine for power generating system in vehicles. At the same time, a lot of discussion and opinion were done and expressed regarding the idea. There are some key points that the author has highlighted in this research based on what other people, inventors and researchers had discussed.

The first point that concerns the author in this research is the area to attach or mount the wind turbine on the vehicle so that it is able to get the air flowing around the vehicle to turn the turbine blades and therefore gain some energy. Secondly, investigation is needed to determine how the attached wind turbine on the vehicle will affect the aerodynamic performance of the car and also the drag force. Last but not least, the most important point of all to be highlighted is whether this idea is practical and economical enough to be implemented or not. In this project, the author will evaluate the aerodynamic performance of a car when a wind turbine is attached or mount on the front bumper of the car. This project involves the simulation of the car model with three different cases in which a car with its original bumper, a car with front extended bumper, and a car with front extended bumper and wind turbine attached. Computer simulation software, ANSYS FLUENT will be used to simulate and investigate the effects of wind turbine against aerodynamic performance of the car. In addition, the study also covers the process of designing an optimum wind turbine system for harnessing wind energy in cars. At the end of the study, a result that compare the aerodynamics performance of car with and without wind turbine system will be obtained and the optimum design of wind turbine system for harnessing wind energy in car will be proposed.

Problem statements

Based on existing inventions and previous researches, for this project, the author is interested on several issues regarding the idea of electrical vehicle with wind turbine system. The appropriate position for the installation of wind turbine system will reflect other factors that should also be considered. Beside the appearance factor, the most interesting factor to be discussed is the drag force of the car. How far the wind turbine system effects the drag of the car will be investigated and explained in detail towards the end of this project. The author will also investigate the effect of extended front bumper on the aerodynamic performance of a car. The author will study the advantages of wind turbine installed in front of the car if exist.

5.1 AERODYNAMICS OF CAR

This chapter includes a review of the research method and the appropriate design used for this study. As stated earlier, one of the objectives of this research is to evaluate an aerodynamic performance of a car to implement the idea for wind turbine system installation for energy harnessing. The method used in this study is the Computational Fluid Dynamics (CFD) analysis. Probably, these will involve several other computer software to design the model and simulation work. The data gathered from the simulation will be interpreted and discussed.

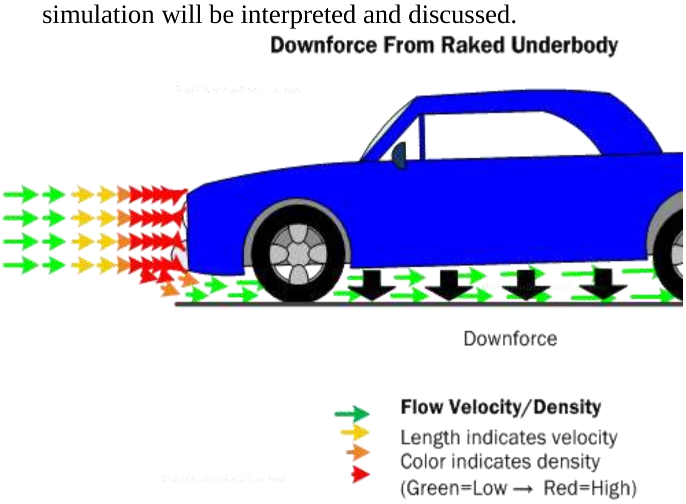


Fig 5.1 Aerodynamics Of Car

The two primary aerodynamic forces at work in wind-turbine rotors are lift, which acts perpendicular to the direction of wind flow; and drag, which acts parallel to the direction of wind flow. Turbine blades are shaped a lot like airplane wings -- they use an airfoil design.
The external flow is the flow over bodies that are immersed in a fluid, with emphasis on the resulting lift and drag forces. When a fluid

moves over a solid body, it exerts pressure forces normal to the surface and shear forces parallel to the surface of the body. We are usually interested in the resultant of the pressure and shear forces acting on the body rather than the details of the distributions of these forces along the entire surface of the body. The component of the resultant pressure and shear forces that acts in the flow directionis called the drag force, and the component that acts normal to the flow direction is called the lift force.

Drag is usually an undesirable effect, like friction, and we do our best to minimize it. Reduction of drag is closely associate whit the reduction of fuel consumption in automobile, submarines, and aircraft; improved safety and durability of structures subjected to high winds; and reduction of noise and vibration. The drag and lift forces depend on the density ρ of the fluid, the upstream velocity V, and the size, shape, and orientation of the body, among other things, and it is not practical to list forces for a variety of situations. Instead, it is more convenient to work with appropriate dimensionless number are the drag coefficient Cd, and the lift coefficient Cl, and they are defined as

Drag coefficient: $Cd = Fd/1/2\rho V2A$……………………………….(1)

Lift coefficient: $Cl = Fl/1/2\rho V2A$……………………………….(2)

Car manufacturers try to attract consumers bypointing out the low drag coefficients of theircars.

FLOW DIAGRAM

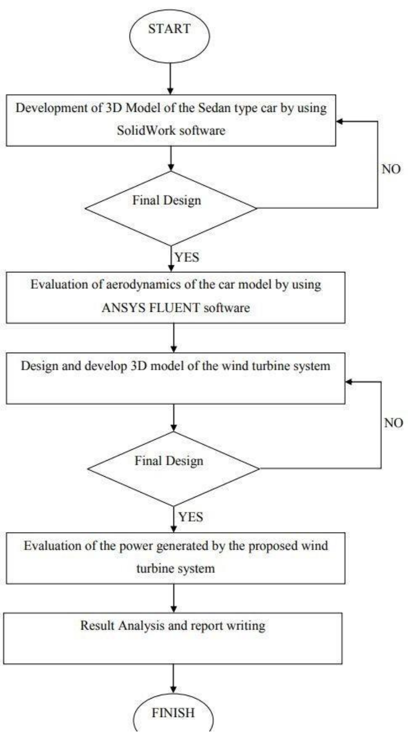


Fig 5.2 Flow Chart

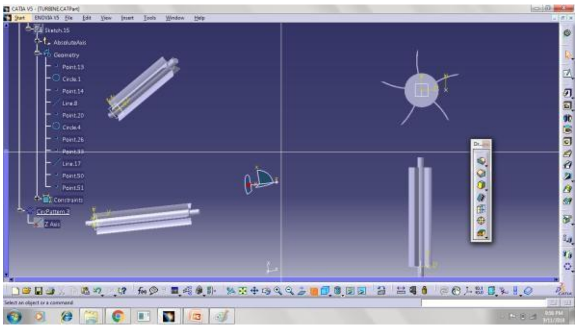
6.1 DESIGN

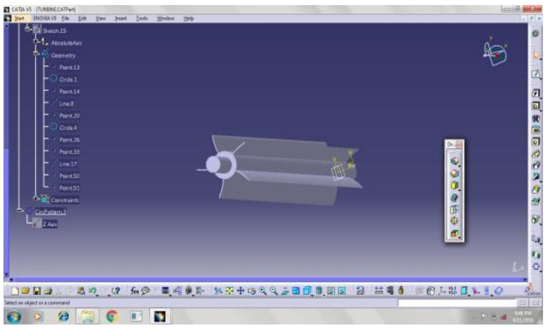
The first process involved in this study is to design a turbine model to be used in the simulation. catia v5 software is the instrument used to accomplish this work. In this study, the author had divided the simulation process totwo different cases which are based on differentobjects. The first case is meant to accomplish the objective of the study where the author wants to evaluate the aerodynamic performanceeffect by the extended rear bumper of a car at the same time to investigate the impact of the wind turbine mounted on that position.

The objective of the invention is to design anair system that can charge or maintain thecharge on a vehicle battery and that can provideelectricity to operate an electric motor forrunning a vehicle. The power system provides ameans for electricity generation while the vehicle is in motion by using either or both ofthe naturally occurring air currents and therelative air currents generated by the vehiclewhen in motion. Broad-bladed horizontal fanblades laterally extending across the vehicle areused to catch the current and to transfer thecurrent's energy to electrical alternators. This electricity ultimately provides power to thevehicle as the electricity is provided directly tothe electric motor that powers the vehicle, or isprovided to charge the batteries, which areconnected to the motor that powers the vehicle.

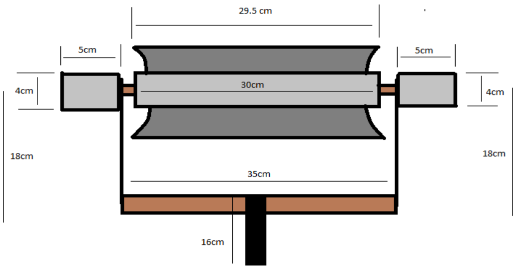
CATIA DESIGN

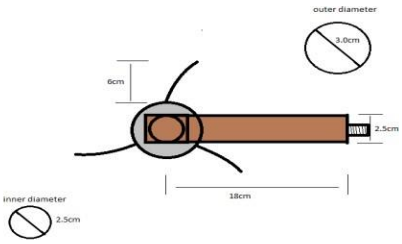
VIEW-1VIEW-2





VIEW-3VIEW-4





Wind generator

The electrical machine most commonly used for wind turbines applications are those acting as generators, with synchronous generators and induction generators (as shown) being commonly used in larger wind turbine generators, while smaller and home made wind turbines tend to use a low speed DC generator or Dynamo as they are small, cheap and a lot easier to connect up.

Fig 6.1 Wind Generator

CALCULATION

To find wind opposing power

$P=KC_\varrho 0.5_\varrho AV3$

$C_\varrho=0.35$

$_\varrho=1.225$ kg/m3

Swept area=3.5 cm2

∏r2 =22/7x3.52

=3.14x12.25

=38.465 cm2

V=wind speed let us assume 30 kmphK=0.000133=1.340 horsepower

=0.000133x0.35x0.5x1.225x38.46x302

=1.340x0.35x0.5x1.225x38.46x27000

=0.2345x1.225x38.46x27000

P=29.82 kilowatts

To find the weight of the turbineKinetic energy

k.E=0.5mv2 J

$m=_\varrho AV$

=1.225x38.4x30/1000

=1.4112kg

To find the kinetic energyk.E=0.5mv2

=0.5x1.4112x302

=0.5x1.4112x900

=63.50 J

WORKING

The car will be fixed with a mount in the rear bumper and the mount consists of a rotor with blades in it and it rotates horizontally in favourable to the wind direction as the car moves.The rotor is connected to a wind generator and then connected to a battery which the battery stores the current and further connected to the cars ignition system by a alternate switch which can be changed to normal cars 12vbattery as well as the battery in which power produced by wind energy.

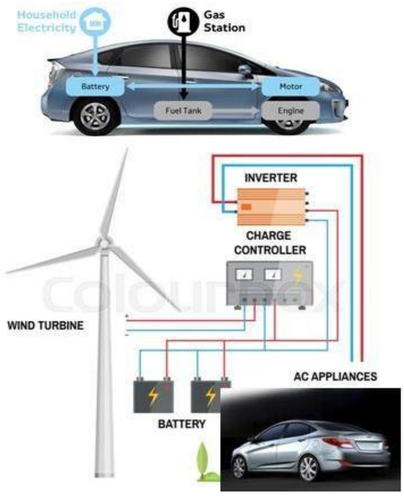


Fig 7.1 Working

FABRICATION

The above mentioned project is taken into consideration and thus verified assessed and implemented regarding the idea undertaken.

Wind blade materials used1.Steel
2.Pvc material

Steel wind blade design

The wind blade is thus designed using the material steel inorder to enhance proper wind flow dynamics.

Diadvantages of design

Thus the design on steel is much more heavy on comparision to the following design the blade design has less efficiency in obtainingpower.

Pvc wind blade design

The wind blade is thus designed using the material PVC in order to enhance proper wind flow dynamics.

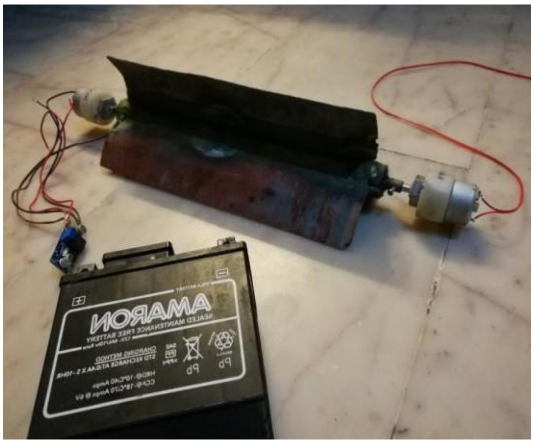


Fig 8.1.1 PVC wind blade design

Fig 8.1 Steel wind blade designComparision on both the blades

Steel wind blade design

The wind blade is thus designed using the material steel inorder to enhance proper wind flow dynamics.

The steel blade weighs about 594 grams. Pvc wind blade design

The wind blade is thus designed using the material PVC inorder to enhance proper wind flow dynamics.

The PVC blade weighs about 403 grams.

Fig 8.1.2 Difference between both the bladesProject apparatus used

The fabrication process of the project is donewith the help of the following materials:

1.Steel rod and pvc pipes.2.Voltage Booster.
3. STEEL sheets required.4.Wind Generator 5.Current carrying wires 6.Battery

MOUNTING

The wind energy unit is fixed in the frontbumper.
BATTERY STORAGE
The battery is placed under the front seat.IGNITION
The wires take the energy from the wind unitand stores in the battery
And thus it transmits the power to alternativeswitch connected to the
Ignition of the car

Positioning of blades1.Horizontal 2.Vertical

Horizontal position
The blade and the complete unit is placed in the horizontal position and the readings are conducted.

Fig 8.1.3 Horizontal position

Fig 8.1.4 Vertical positionVertical position

The blade and the complete unit is placed in the vertical position and the readings are conducted with the vertical flow dynamics.

READINGS
Wind speed horizonal -40 kmph - 0.97ampsWind
speed horizontal -60 kmph -1.35 ampsWind
speed horizontal -100 kmph -2.1amps Wind speed vertical
-40 kmph -0.65amps Wind
speed vertical -60 kmph -0.89amps Wind
speed vertical -100 kmph -1.4amps

CONCLUSION
Wind turbine technology has demonstrated the potential for contributing to the energy needs ofthe United States. If the sites with acceptable wind characteristics were fully utilized, they could contribute up to about 10 percent of the nation's electrical energy needs. The limitation is based on utility system stability issues rather than available site locations. As in all energy investment decisions, the ultimate penetration level will be driven by the cost of energy that is produced. In turn, this is decided by the initial cost of the wind energy plant and the annual cost for maintenance and operation.
Since a number of U.S. electric power utilities are continuing to add capacity, there will be an opportunity to introduce a new, longer-lasting design for a wind turbine system. Moreover, renewed interest by the public in environmental issues associated with power generation gives a special advantage to wind power. A new wind turbine system probably will take advantage of advances in semiconductor power electronics to improve energy production as well as provide reactive power control, which will make wind- generated electric power more amenable for use by the electric utilities. New speed control schemes will be introduced, but the major advance must come through the design of less expensive, longer-lived, and higher-efficiency rotors. A guiding principle in creating this design should be that knowledge of aerodynamic forces must be carefully integrated with the structural response of the material, all balanced by the practicalities of field experience and tempered by the need to manufacture a consistently high-quality product at reasonable cost.
This committee has examined the experience base accumulated by wind turbines, and the accompanying R&D programs sponsored by the Department of Energy and has concluded that a wind energy system such as described above is within the capability of engineering practice. However, certain gaps in knowledge exist. The achievement of this goal without costly and inefficient trial and error requires certain critical research and development. Because of the fragile nature of the wind power equipment

producers in the United States, this will require an R&D investment by the Department of Energy.

The committee cannot conclude withoutcommenting on the status of the wind power equipment industry. Because of the decrease in the number of machines installed in the past 5 years, since the tax incentives expired, there currently is only one major integrated manufacturer in the United States. In addition, only a few companies are actively producing blades. Moreover, in recent years, a major Japanese manufacturer has entered the world market to join the European manufacturers who have been participants for some time. As a result, the U.S. industry is not in a financial position to engage in the R&D necessary to gain worldwide technological leadership for what the committee sees as a future growing worldwide market for wind power. The committee believes that the United States is facing a future major reduction in fossil fuel sources of energy. When this is coupled with a resurgence of public concern for environmental issues in energy production, the need to develop wind power energy to the fullest extent possibleseems compelling.

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