WIND ENERGY WATER PUMPING SYSTEM

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ABSTRACT:

This project concept is based on mechanical engineering and sustainable development in developing countries. Hence research and analysis has shown that wind energy, solar energy and biomass are the most prominent solutions to the above problems because they are eco-friendly and readily available in nature. Wind Mill is used to generate wind energy . The windmills provide mechanical energy that is used directly on machinery. E g: water pump or wind turbines that provide electrical energy .The covers are in place to prevent soil from clogging the holes, drip irrigation system was not part of this project. A water pumping windmill which can be built largely with materials and skills available in rural areas has been designed and fabricated. The windmill uses a rotor and incorporates a novel sail-type construction. The pump is of a positive displacement type using the casing of a pneumatic type for the pumping chamber. Two prototypes have been constructed and these have indicated a reasonable performance and reliability.

KEY WORDS: water pumping, wind mill, rotor, positive displacement, prototypes, pumping chamber.

INTRODUCTION:

Wind energy water pumping system is very important, a wind pump is nothing but a windmill used pumping water. They are most basic wide-spread energy needs in rural area of the wind. Wind power was abundant. abort 175 years ago, at 1kw per machine, they represented 5000 MW of distributed power. When five million water pumping wind mill were at one time spread across the American west. Wind pump have been processing in sudan. since the 1950s for the purposes of pumping water, for drinking and irrigation in remote desert areas Gezira region, the red sea hills along the main Nile north of Khartoum down to Wadi Halfa.

Wind Water Pumping by windmills is possibly one of man's earliest inventions with wind energy historically being used for a wide range of applications, ranging from grinding grain to sawing wood, with many other applications as well. But there are millions of people throughout the world who do not have access to clean water for all of their daily needs. In many of these situations, water is only available from wells or aquifers, but to be usable it must first be pumped from those sources The amount of energy produced by wind turbine based on wind speed and size of the blades. The wind rotating speed is doubles increased at the time when power produced increase eight time respectively. In addition to this process the blade is large size to the windmill captured more wind on rotating time. At the diameter of the circle formed by the blades doubles at power generating increase for four times.

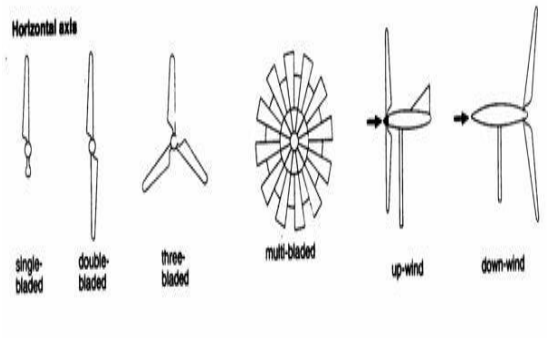
Type of wind turbine:

Vertical axis turbine

The vertical axis wind turbine where the main rotor is shaft is set transverse to the wind (but not necessarily vertically) while the main components are located at the base of the turbine. the axis along which values of y are measured and at which both x and z equal zero.

Horizontal axis turbine

The horizontal wind turbine is work at simple principal. The wind turns two or three propeller-like blades around a rotor. The rotor is connected to the main shaft, which spins a generator to create electricity.



Double bladed water pump turbine

The design presents engineering challenges but the hope is that it could greatly improve the economics of offshore wind power. By some estimate two bladed turbine cost is 20% less to build and install while generating same amount of power as conventional turbine. Two-bladed wind turbine designs have the advantage of saving the cost of one rotor blade and its weight, of course. However, they tend to have difficulty in penetrating the market, partly because they require higher rotational speed to yield the same energy output. This is a disadvantage both in regard to noise and visual intrusion. Lately, several traditional manufacturers of two-bladed machines have switched to three-bladed designs. Two bladed turbines cost less because they use fewer materials. The removal of one blade makes the rotor lighter, which in turn makes it possible to place the rotor on the downwind side of the tower.

Multi bladed water pump turbine

Wind turbines are built to catch the wind's kinetic (motion) energy. The question arises why modern wind turbines are not built with a lot of rotor blades, like the old "American" windmills. Turbines with many blades or very wide blades, i.e. turbines with a very solid rotor, however, will be subject to very large forces, when the wind blows at a hurricane speed (remember that the energy content of the wind of the wind varies with the third power of the windspeed).

The Wind Turbine manufacturers have to certify that their turbines are built, so that they can withstand extreme winds which occur, say, during 10 min once every 50 years. To limit the influence of the extreme winds turbine manufacturers therefore generally prefer to build turbines with a few, long, narrow blades.

OBJECTIVES:

The main objective of our project was to design a windmill and therefore our scope will be limited to a windmill for pumping water. Main motor is fixed shaft in the horizontal axis and it runs horizontally.

1. Improved torque characteristics on the current designs.
2. Improved efficiency based on the current designs.
3. The design should be a low-cost model.

The wind van is coupled with the servo motor when it is oriented in the direction of the wind. A proposed design for a simple drip irrigation system has been developed based on the conditions at the project area. The water is emitted through the holes in the plastic pipes.

CONCEPT OF THE PROJECT:

My project is horizontal wind energy water pumping system. This project main concept is underground water to pumping to use the windmill. The horizontal wind turbine main shaft to rotate based on speed of wind at the time wind turbine blades are rotating perpendicularly .the blades are used for only rotating purpose. The blades are rotating clock wish the same time shaft to be rotating when piston to connecting the end of the shaft. The shaft rotating at the same time of period the piston to move up and down direction. The Water to pumping for underground similar to piston movement.

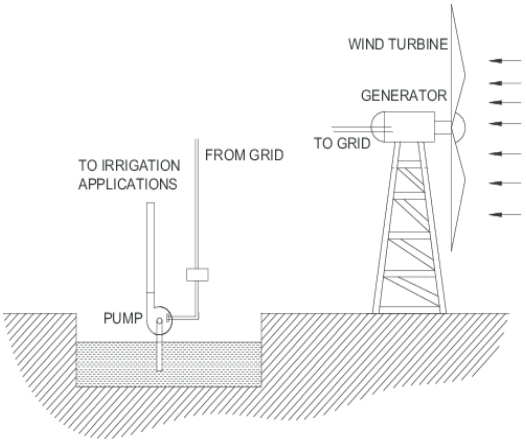
WORKING:

Water-pumping windmills are simple devices. I always enjoy pulling the sheet-metal cover off the gearbox and letting folks see just how a windmill works. I encourage them to spin the hub and watch the internal parts interact. I've heard the action of a windmill motor described as "using a big wheel for leverage, like the steering wheel on a big pirate ship." People also liken it to "a big jack that lifts water. No matter how you describe it, the water-pumping windmill is a simple machine that uses mechanical advantage in multiple ways. It's a direct-drive device that transfers energy via gears, rods, simple valves, and a piston in a cylinder—and uses high torque to move water. In contrast, wind-electric turbines use electrical generators coupled to high-tech airfoils that require high speed to do their job.

This difference becomes evident when you compare the eighteen or so large blades on windmills to the two or three sleek blades on wind-electric turbines. The wide blades on the water-pumper are designed for low start-up wind speeds and slow-speed operation, as opposed to the electrical generator's thin blades, which are designed to run at higher rpm.

The blades of the windmill wheel catch the wind—just like the sails on a sailboat—which turns the wheel (rotor). The wheel is attached to a shaft by long arms. The shaft has small pinion gears at the other end, inside a gearbox. The pinion gears drive larger bull gears, which move pitman arms. The pitman arms push a sliding yoke up and down, above the bull gears (much like a crankshaft, connecting rod, and piston in a standard vehicle engine). The moving yoke lifts and drops the pump rod to do the work down below.

The pump rod goes down the tower through a watertight seal at the top of the well's drop pipe, and to the pump cylinder, the part that moves the water. The cylinder is attached to the bottom of the drop pipe below the water level, and has a simple piston and two check valves. As the piston rises, water moves up the pipe above it. At the same time, water is sucked through a screen and the lower check valve below the piston, into the lower section of the pump cylinder. When the pump rod reverses and begins to descend, the lower check valve closes and the piston check valve opens. This allows water in the cylinder to pass through, and the water that is trapped above the piston to be pushed up out of the cylinder and ultimately to its final delivery height. One might think of the pump as a cup with a trap door in the bottom that opens when the cup falls and shuts when the cup rises. This cycle is constantly repeated as the wind wheel turns to move the pump rod up and down.



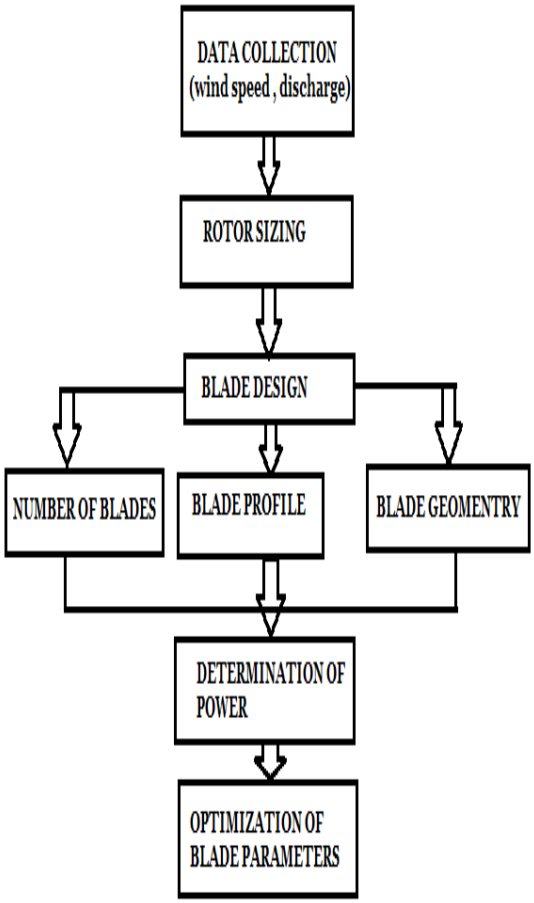
If the wind wheel is moving, the pump piston is moving. As the wind speed increases, the speed and frequency of the piston stroke increases, so more water is pumped. But the windmill's efficiency drops because the airfoil is not optimized for higher wind speeds—it doesn't make as much use of the cubic effect of wind power as a wind generator does. (The power available in the wind is proportional to the cube of the wind speed.) But then, water needs do not increase in proportion to the wind speed either, so this is not a major impediment. In fact, water pumpers do the job they are designed for efficiently and well.

The wind energy water pumping consider the components such as wind turbine blades, tail, slider crank plate, rotating dick, PVC pipe, connecting rod, and piston.

The wind blades, slider crank and tail are fixed in series. The wind blades connected to the slider crank, other end of the slider crank is connected to the piston with the help of on connecting rod. The piston is placed inside a pipe which is already placed at ground water level by using bore. The wind energy is very much important to operating the pump. When the wind with higher energy is subjected to the wind blades it rotates. The rotation of the wind blades is clock wish direction.

The piston is also operated by the slider crank mechanism with the help of connecting rod. When the slider crank operates initially the piston moves upward. at this process the vacuum is created by the piston, further the piston moves in a down-ward direction due to the pressure created between the water comes out. The water to come for the bore based on the pressure. The water is passed through the storage tank. Then water to be used all the usage.

METHODOLOGY:



PARTS DETAILS:

Wind Turbine Blades:

A **windmill** is a mill that converts the energy of wind into rotational energy by means of vanes called sails or **blades**.

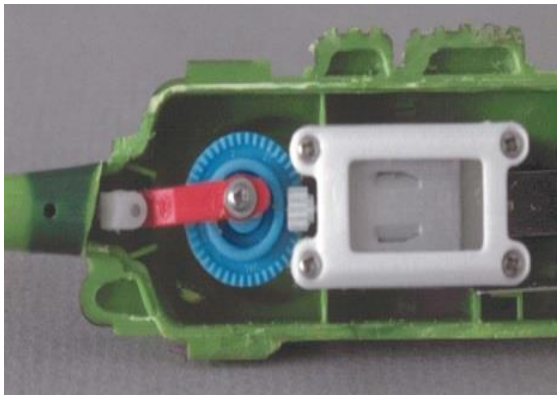
Centuries ago, **windmills** usually were **used** to mill grain, pump water, or both. Thus they often were gristmills, wind pumps, or both. The wind turns the blades, which spin a shaft, which connects to a main shaft and to change the kinematic energy into high pressure energy.

Tail:

The wind mill tail are used to changing rotating direction of the wind. The wind to active on the any direction the tail to change the wind mill direction based on the wind direction**.**

Slider Crank:

The **Slider-crank mechanism** is used to transform rotational motion into translational motion by means of a rotating driving beam, a connection rod and a sliding body. In the present example, a flexible body is used for the connection rod. the sliding mass is not allowed to rotate and three revolute joints are used to connect the bodies. while each body has six degrees of freedom in space, the kinematical conditions load to one degree of freedom for the whole system.



A **crank** is an arm attached at right angles to a rotating shaft by which reciprocating motion is imparted to or received from the shaft. It is used to convert circular motion into reciprocating motion, or vice versa. The arm may be a bent portion of the shaft, or a separate arm or disk attached to it.

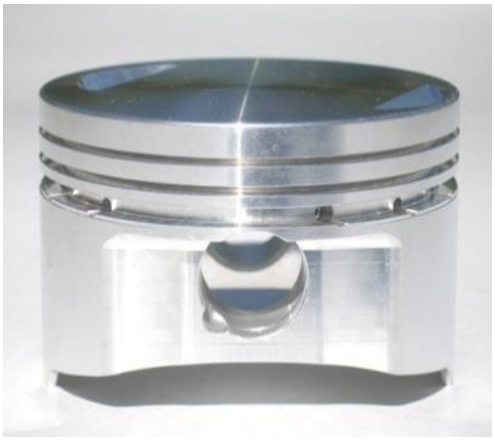
Rotating Disc:

The material of rotating disc is mild-steel. Rotating disc is used to transfer motion from main shaft to slider crank plate. The rotating disc take required diameter and required thickness plate to using for this project.

Piston:

In an engine, its purpose is to transfer force from expanding gas in the cylinder to the crankshaft via a **piston** rod and or connecting rod. In a pump, the function is reversed and force is transferred from the crankshaft to the **piston** for the purpose of compressing or ejecting the fluid in the cylinder. It is the moving component that is contained by

a cylinder and is made gas-tight by **piston** rings. In an engine, its purpose is to transfer force from expanding gas in the cylinder to the crankshaft via a **piston** rod and/or connecting rod.



Piston Pumps:

A piston type of pump is normally used for deep wells, the pumps being located the bore pipe directly underneath the windmill and bellow the water level. The positive displacement type piston pumps are used to pump the water from river and lakes commonly used in conjunction with types of rotor, for pumping from open or tube wells.

Hand pump is a main part in windmill operated pump. This is a small scale water pump. This pump is connected to the slider plate in a other side of a slider crank mechanism. In hand pump one side is connected to the section port and other side is connected to the directly or outlet port.

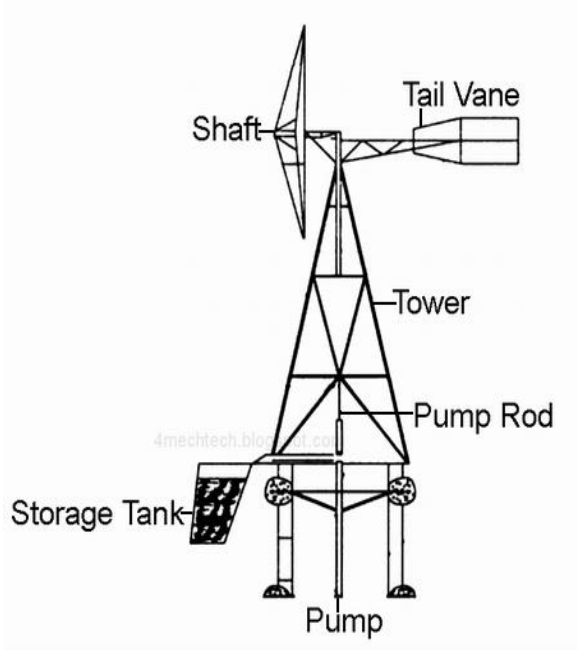
Storage Tank:

The water pumped from wind and there is generally stored in tanks. Keep in mind that your storage tank needs to be big enough to store several day's supply the water in case of breakdowns or poor pumping condition (unfavorable weather).

A water tank is a container for storing liquid. ... Various materials are used for making a water tank: plastics (polyethylene, polypropylene), fiberglass, concrete, stone, steel (welded or bolted, carbon, or stainless). Earthen pots also function as water storages.

FRAME STRUCTURE:

Frame structure is base of wind mill structure frame is made with mild-steel material. The mild-steel material rod is joined by using arc welding. Frame is main component on which total weight. Some base is stronger than others. Base is important in the construction of the windmill because not only to they must also be subjected to their own weight ant the drag of the wind. If a weak tower is subjected to this element, then it will surely collapse**.**



ADVANTAGES

The advantages of wind energy water pumping system is much more than the disadvantages.

1. There are several reasons why we would choose a vertical axis wind turbine over a horizontal windmill.
2. Uses tidal energy, which is a clean and renewable source of energy.
3. Low running cost and Initial cost is low
4. There are several reasons why we would choose a vertical axis wind turbine over a horizontal axis windmill.
5. They are mounted lower to the ground. Making it easy for maintenance if needed.
6. Higher power utilization -20% higher than HAWT.
7. Lower noise level-only 27-37 DB.
8. Wind energy (horizontal windmill generator) is renewable, so it will never run out.
9. Implementing windmills on ship we can save land.
10. Life time can exceed 50 year, except for the piston pump which required maintenance every 1 to 2 years.

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