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STUDY ON SOLAR BASED WATER PUMP SYSTEM

Jugendra Singh	Department of Mechanical Engineering, IIMT College of Engineering, Greater Noida, UP, India.
Ram Kr. Rawal	Department of Mechanical Engineering, IIMT College of Engineering, Greater Noida, UP, India.
Shamshad Ali	Department of Mechanical Engineering, IIMT College of Engineering, Greater Noida, UP, India.
Rustam Ali	Department of Mechanical Engineering, IIMT College of Engineering, Greater Noida, UP, India.

ABSTRACT Providing clean, environmentally safe water for livestock in sufficient quantities continues to be a major concern for farmers and ranchers. Abundant water in remote locations in needed to insure that grasslands are grazed evenly. A solar powered water pumping system designed for remote locations was operated to determine the performance and reliability of the system and components. The system began pumping water (0.474 L/min Daily water volumes pumped ranged from a high of 682.6 L/day to a low of 504 L/day and average 620 L/day.

Solar water pumping system operates on direct current. The output of solar power system varies throughout the day and with changes in weather conditions. Current gain by the solar panel is stored in a dry battery. Photovoltaic module, the power source for solar pumping, have no moving parts, requires no maintenance and last for decades. A properly designed solar pumping system will be efficient, simple and reliable. Solar powered pumping systems are used principally for three applications town and city water supply, livestock watering and irrigation.

KEYWORDS : Photovoltaic module, Solar, Weather conditions, Solar panel

Introduction:

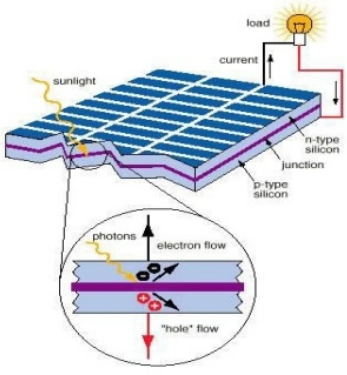
A solar powered pumping system methods needs to take account of the fact that demand for irrigation system water will vary throughout the year. Peak demand during the irrigation system seasons is often more than twice the average demand. This means that solar pumps for irrigation are under-utilized for most of the year. Attention should be paid to the system of irrigation water distribution and application to the crops. The irrigation pump system should minimize water losses, without imposing significant additional head on the irrigation pumping system and be of low cost. There are several technology alternatives for supplying power or lift to groundwater systems including wind turbines, windmills, generators, solar arrays, and hand powered pumps. The main driving factors for selecting the appropriate technology are regional feasibility, water demand, system efficiencies, and initial and long term costs. Other factors often include the need for power and water reserves in the form of batteries and storage tanks. Solar-powered systems are often considered for use in developing countries instead of other forms of alternative energy because they are durable and exhibit long-term economic benefits.

Solar powered water pumping has been recognized as suitable solution for grid-isolated rural locations in poor countries where there are high levels of solar radiation. Solar powered water pumping systems can provide drinking water without the need for any kind of fuel or the extensive maintenance required by diesel pumps. Photovoltaic (PV) solar panels are often used for agricultural operations, especially in remote areas or where the use of an alternative energy source is desired. In particular, they have been demonstrated time and time again to reliably produce sufficient electricity directly from solar radiation to power livestock and irrigation watering systems.

Solar water pumps may be especially useful in small scale or community based irrigation, as large scale irrigation requires large volumes of water that in turn require a large solar PV array. As the water may only be required during some parts of the year, a large PV array would provide excess energy that is not necessarily required, thus making the system inefficient. Solar PV water pumping systems are used for irrigation and drinking water India.

STUDY:

1.Solar panel



Solar panel refers to a panel designed to absorb the sun's rays as a source of energy for generating electricity or heating. Solar modules use light energy (photons) from the sun to generate electricity through the photovoltaic effect. The majority of modules use waferbasedcrystalline silicon cells or thin-film cells based on cadmium telluride or silicon. The structural (load carrying) member of a module can either be the top layer or the back layer. Cells must also be protected from mechanical damage and moisture. Most solar modules are rigid, but semi-flexible ones are available, based on thin-film cells.

Electrical connections are made in series to achieve a desired output voltage and/or in parallel to provide a desired current capability. The conducting wires that take the current off the modules may contain silver, copper or other non-magnetic conductive [transition metals]. The cells must be connected electrically to one another and to the rest of the system. Externally, popular terrestrial usage photovoltaic modules use MC3 (older) or MC4 connectors to facilitate easy weatherproof connections to the rest of the system.

A solar powered water pumping system is composed of several PV (photovoltaic) panels. Solar cells are the building block for solar panels. Each solar cell has two or more specially prepared layers of

semiconducting material (generally silicon) that produce direct current (DC) electricity when exposed to sunlight. The DC current is collected by the wiring in the panel. This DC current is converted to AC current by using an inverter and this AC current is used to run an AC pump which pumps water whenever the sun shines and the excess water could be stored in an overhead water tank for the later usage.

SPECIFICATION

- POWER - 10WATT
- DIMENSION - 18 cm.*28cm.
- OUTPUT VOLTAGE - 12 TO 14 VOLT

2.DRY BATTERY

A Dry cell is a type of electricity-producing chemical cell, commonly used today for many home and portable devices, often in the form of batteries. It was developed in 1886 by the German scientist Carl Gesner.

A dry cell uses a paste electrolyte, with only enough moisture to allow current to flow. Unlike a wet cell, a dry cell can operate in any orientation without spilling, as it contains no free liquid, making it suitable for portable equipment. By comparison, the first wet cells were typically fragile glass containers with lead rods hanging from the open top and needed careful handling to avoid spillage. Lead-acid battery did not achieve the safety and portability of the dry cell until the development of the gel battery.

A common dry cell is the zinc-carbon cell, sometimes called the dry Leclanché cell, with a nominal voltage of 1.5 volts, the same as the alkaline cell (since both use the same zinc– manganese dioxide combination).

3.DC GEAR MOTOR

A gear motor is a specific type of electrical motor that is designed to produce high torque while maintaining a low horsepower, or low speed, motor output. Gear motors can be found in many different applications, and are probably used in many devices in your home. Gear motors are commonly used in devices such as can openers, garage door openers, washing machine time control knobs and even electric alarm clocks. Common commercial applications of a gear motor include hospital beds, commercial jacks, cranes and many other applications that are too many to list.

Basic principle of operation

Gear motors are primarily used to reduce speed in a series of gears, which in turn creates more torque. This is accomplished by an integrated series of gears or a gear box being attached to the main motor rotor and shaft via a second reduction shaft. The second shaft is then connected to the series of gears or gearbox to create what is known as a series of reduction gears. Generally speaking, the longer the train of reduction gears, the lower the output of the end, or final, gear will be.

4.WATER Pump

A **WaterPump** is a device that moves fluids (liquids or gases), or sometimes slurries, by mechanical action. Pumps can be classified into three major groups according to the method they use to move the fluid: *direct lift*, *displacement*, and *gravity* pumps.

Pumps operate by some mechanism (typically reciprocating or rotary), and consume energy to perform mechanical work by moving the fluid. Pumps operate via many energy sources, including manual operation, electricity, engines, or wind power, come in many sizes, from microscopic for use in medical applications to large industrial pumps.

Mechanical pumps serve in a wide range of applications such as pumping water from wells, aquarium filtering, pond filtering and aeration, in the car industry for watercooling and fuel injection, in the energy industry for pumping oil and natural gas or for operating cooling towers. In the medical industry, pumps are used for biochemical processes in developing and manufacturing medicine, and as artificial replacements for body parts, in particular the artificial heart and penile prosthesis.

Conclusions:

The system began pumping water (0.474 L/min Daily water volumes pumped ranged from a high of 682.6 L/day to a low of 504 L/day and average 620 L/day. During the project experiment we get the delivery head about to 8-10 feet. This project is much cost efficient when compared to its working constraints.

Further, it find its uses in rural irrigation with much cheaper annual costs at lower load. It can also be used to power low load irrigation requirements like lawn farming, sprinkle irrigation systems etc. Having powered through PV solar cells it is also eco-friendly.

Its efficiency can be increased by increasing the efficiency of solar grids or by using better photoelectric element to increase average number of positive photon reception on the PV grid

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