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MICRO HYDRO POWER GENERATION FROM SMALL WATER CHANNEL FLOW

Priyanka Jawale[1], Abhishek Dalvi[2], Suraj Belote[3], Suraj Powar[4], Ajay Khorate[5]

[1]Assisstant Professor, Department Of Civil Engineering, Dr. D.Y. Patil Institute Of Engineering, Management & Research, Akurdi, Savitribai Phule University , Pune University, Pune (MH) India. Address, Including Country.
[2,3,4,5]Student Of Final Year B.E. Civil, Department Of Civil Engineering , Dr. D.Y. Patil Institute Of Engineering Management & Research, Akurdi, Savitribai Phule Pune University, Pune(MH) India. Address, Including Country

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Abstract - Hydroelectric power plants generate energy from flowing water. This flowing water creates energy that can be captured & then turned into electricity. The most common type of hydroelectric power plant uses a dam on river to store the water into reservoir. This hydroelectric power is a renewable energy source. Hydroelectric power is important to our Nation. Growing populations and modern technologies require vast amounts of electricity for creating, building, and expanding. The main aim of our project is to generate the electricity from the water stored in the dam. This water strikes on the fan which is connected to the motor and then the electricity is generated. This electricity is then stored and then used for the future. All the components required for our project are decided after that these components are manufactured & then assembled together. After the assembly, the experimental testing was carried out and then the result & conclusion was drawn.

Key Words*: *Power Generation, CATIA, Result.

1. INTRODUCTION

Hydropower provides about 96 percent of the renewable energy in the United States. Other renewable resources include geothermal, wave power, tidal power, wind power, and solar power. Hydroelectric powerplants do not use up resources to create electricity nor do they pollute the air, land, or water, as other powerplants may. Hydroelectric power has played an important part in the development of this Nation's electric power industry. Both small and large hydroelectric power developments were instrumental in the early expansion of the electric power industry. Hydroelectric power comes from flowing water ... winter and spring runoff from mountain streams and clear lakes. Water, when it is falling by the force of gravity, can be used to turn turbines and generators that produce electricity. Hydroelectric power is important to our Nation. Growing populations and modern technologies require vast amounts of electricity for creating, building, and expanding. In the 1920's, hydroelectric plants supplied as much as 40 percent of the electric energy produced. Although the amount of energy produced by this means has steadily increased, the amount produced by other types of powerplants has increased at a faster rate and hydroelectric power presently supplies about 10 percent of the electrical generating capacity of the United States. Hydropower is an essential contributor in the national power grid because of its ability to respond quickly to rapidly varying loads or system disturbances, which base load plants with steam systems powered by combustion or nuclear processes cannot accommodate. Reclamation=s 58 powerplants throughout the Western United States produce an average of 42 billion kWh (kilowatt-hours) per year, enough to meet the residential needs of more than 14 million people. This is the electrical energy equivalent of about 72 million barrels of oil. Hydroelectric powerplants are the most efficient means of producing electric energy. The efficiency of today's hydroelectric plant is about 90 percent. Hydroelectric plants do not create air pollution, the fuel--falling water--is not consumed, projects have long lives relative to other forms of energy generation, and hydroelectric generators respond quickly to changing system conditions. These favorable characteristics continue to make hydroelectric projects attractive sources of electric power.

HOW HYDROPOWER WORKS

Hydroelectric power comes from water at work, water in motion. It can be seen as a form of solar energy, as the sun powers the hydrologic cycle which gives the earth its water. In the hydrologic cycle, atmospheric water reaches the earth=s surface as precipitation. Some of this water evaporates, but much of it either percolates into the soil or becomes surface runoff. Water from rain and melting snow eventually reaches ponds, lakes, reservoirs, or oceans where evaporation is constantly occurring.

Moisture percolating into the soil may become ground water (subsurface water), some of which also enters water bodies through springs or underground streams. Ground water may move upward through soil during dry periods and may return to the atmosphere by evaporation. Water vapor passes into the atmosphere by evaporation then circulates, condenses into clouds, and some returns to earth as precipitation. Thus, the water cycle is complete. Nature ensures that water is a renewable resource. Generating Power In nature, energy cannot be created or destroyed, but its form can change. In generating electricity, no new energy is created.

Actually, one form of energy is converted to another form. To generate electricity, water must be in motion. This is kinetic (moving) energy. When flowing water turns blades in a turbine, the form is changed to mechanical (machine) energy. The turbine turns the generator rotor which then converts this mechanical energy into another energy form -- electricity. Since water is the initial source of energy, we call this hydroelectric power or hydropower for short. At facilities called hydroelectric powerplants, hydropower is generated. Some powerplants are located on rivers, streams, and canals, but for a reliable water supply, dams are needed. Dams store water for later release for such purposes as irrigation, domestic and industrial use, and power generation. The reservoir acts much like a battery, storing water to be released as needed to generate power.

The dam creates a Ahead or height from which water flows. A pipe (penstock) carries the water from the reservoir to the turbine. The fast-moving water pushes the turbine blades, something like a pinwheel in the wind. The waters force on the turbine blades turns the rotor, the moving part of the electric generator. When coils of wire on the rotor sweep past the generator=s stationary coil (stator), electricity is produced. This concept was discovered by Michael Faraday in 1831 when he found that electricity could be generated by rotating magnets within copper coils. When the water has completed its task, it flows on unchanged to serve other needs.

Transmitting Power

Once the electricity is produced, it must be delivered to where it is needed -- our homes, schools, offices, factories, etc. Dams are often in remote locations and power must be transmitted over some distance to its users. Vast networks of transmission lines and facilities are used to bring electricity to us in a form we can use. All the electricity made at a powerplant comes first through transformers which raise the voltage so it can travel long distances through powerlines. (Voltage is the pressure that forces an electric current through a wire.) At local substations, transformers reduce the voltage so electricity can be divided up and directed throughout an area. Transformers on poles (or buried underground, in some neighborhoods) further reduce the electric power to the right voltage for appliances and use in the home. When electricity gets to our homes, we buy it by the kilowatt-hour, and a meter measures how much we use.

While hydroelectric powerplants are one source of electricity, other sources include powerplants that burn fossil fuels or split atoms to create steam which in turn is used to generate power. Gas turbine, solar, geothermal, and wind-powered systems are other sources. All these powerplants may use the same system of transmission lines and stations in an area to bring power to you. By use of this A power grid," electricity can be interchanged among several utility systems to meet varying demands. So the electricity lighting your reading lamp now may be from a hydroelectric powerplant, a wind generator, a nuclear facility, or a coal, gas, or oil-fired powerplant … or a combination of these.

The area where you live and its energy resources are prime factors in determining what kind of power you use. For example, in Washington State hydroelectric powerplants provided approximately 80 percent of the electrical power during 2002. In contrast, in Ohio during the same year, almost 87 percent of the electrical power came from coal-fired powerplants due to the area=s ample supply of coal. Electrical utilities range from large systems serving broad regional areas to small power companies serving individual communities. Most electric utilities are investor-owned (private) power companies. Others are owned by towns, cities, and rural electric associations. Surplus power produced at facilities owned by the Federal Government is marketed to preference power customers (A customer given preference by law in the purchase of federally generated electrical energy which is generally an entity which is non-profit and publicly financed.) by the Department of Energy through its power marketing administrations.

2. OBJECTIVES

- To generate the electricity from the water which is stored.
- To study the effect of water striking on the fan.
- To design a CATIA model.
- To carry out the experimental testing & draw the result & conclusion.

3. PROBLEM STATEMENT

Now a days the population is increasing day by day. So, the requirement of electricity generation is also increasing. So, to full fill the requirement of electricity this project is invented.

4. METHODOLOGY

In this project we are going to study electricity generation from the water which is stored. The model is manufactured by assembling the various components and then the testing is carried out & result & conclusion is drawn.

SEMESTER I

-We started our work with literature survey.
-Search many research papers from various articles and published journal papers.
-Reference sites:

1. http://explore.ijert.org/
2. http://www.ijetcse.com/
3. http://industrialscience.org/
4. http://www.ijist.net/

-Worked on diff. Mechanisms that can be useful for our project.
-We have done a rough 2D sketch of model in Auto-CAD.

-After getting rough model we started calculation of some components.
-We selected standard components.
-Simultaneously we have done work of report for semester I.

SEMESTER II

Actual preparation of project:
-We will complete calculations of remaining parts.
-We will purchase standard components from market.
-We will be done a rough 3D model of our project.
- Manufacturing will be done.
-Assembly will be done.
-Testing of set up will be done.
-Representation of actual theoretical report.

5. DESIGN

Computer-aided design (CAD) is the use of computer systems (or workstations) to aid in the creation, modification, analysis, or optimization of a design. CAD software is used to increase the productivity of the designer, improve the quality of design, improve communications through documentation, and to create a database for manufacturing. CAD output is often in the form of electronic files for print, machining, or other manufacturing operations. CAD software for mechanical design uses either vector-based graphics to depict the objects of traditional drafting, or may also produce raster graphics showing the overall appearance of designed objects. However, it involves more than just shapes. As in the manual drafting of technical and engineering drawings, the output of CAD must convey information, such as materials, processes, dimensions, and tolerances, according to application-specific conventions.

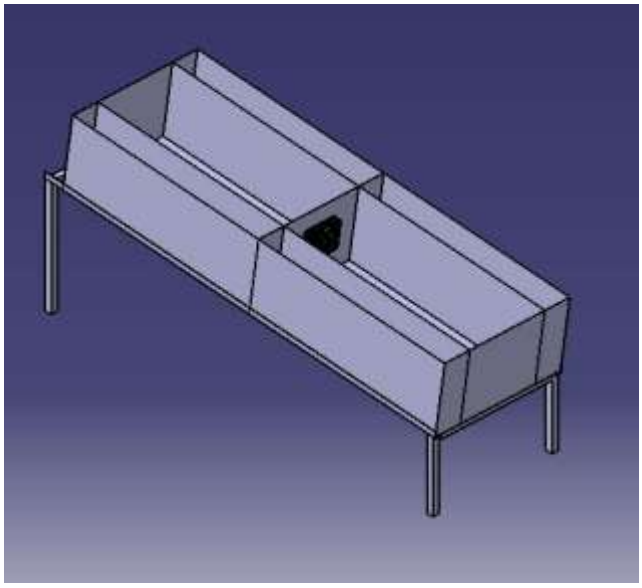

Fig. 1 CATIA model of Experimental Setup

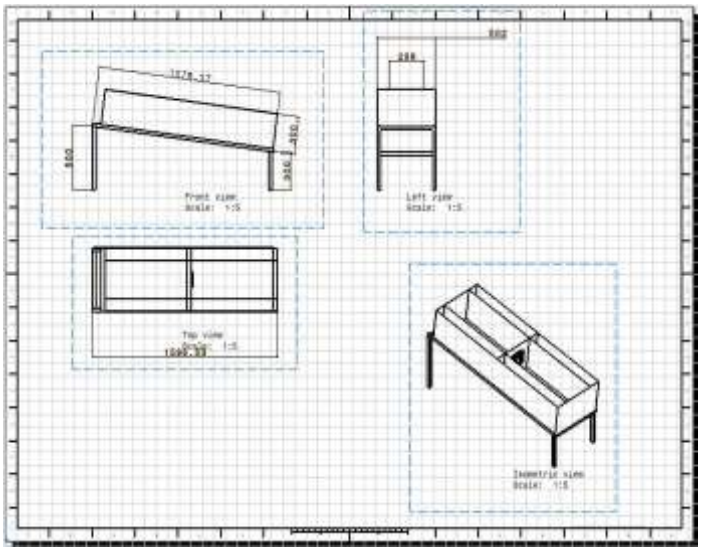

Fig. 2 Drafting of set up

6. RESULT & CONCLUSION

The electricity will be generated from the water when it strikes on the fan. The voltage obtained after testing is 1V and that of current is 0.5mA. So, the power obtained is 0.005W nearly.

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