

SMALL HYDRO POWERPLANT IN BUILDING WATER TANK

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Abstract: The main motive of this project is to generate dc power by the use of kinetic energy of water in tank. Water is an essential requirement for human being as like air, food etc. It is used for many purposes but it has one more advantage is, it is used for domestic power generation for other uses. Consumer wants to reduce the electricity bills so we use this type of power generation. Hydropower is renewable energy source that doesn't cause global warming because it does not release dangerous greenhouse gas. Also reducing the use of electricity generated by thermal powerplant will ultimately reduce the pollution.

Keywords: Small Hydro PowerPlant, Pelton Turbine, Impulse turbine, Francis turbine.

1. INTRODUCTION

Hydro power is a renewable, non-polluting and environmentally source of energy. Moving water fall on turbine the turbine spins a generator and electricity is produced. It is like the oldest renewable energy technique known to the mankind for mechanical energy conversion as well as electricity generation. In this work, by using micro hydro turbine with dc generator generate electricity and it distributes to the domestic use. It consists of water storage tank, pipe, nozzle, turbine, dc generator, battery etc. Tank is placed on the multi storey building at height 11.25 meters. The various turbines are available out of which we use the pelton wheel turbine. The water from the pipe moves vanes of the turbine, then turbine rotates and it provides it's mechanical output to generator. This generator converts mechanical energy into electrical energy and produced electrical energy stored into battery.

2. LITERATURE SURVEY

Vergila Dadu et al [1] paper presents the innovative concepts and technical solutions that were applied on three small hydropower developments on Sebes River, Romania. The new concepts have been applied at: the hydraulic structures of the intakes.

Mose Rossi et al [2] Pump-as-Turbine (PaT) technology is taking the field in different small-hydro or energy recovery applications. These machines can be installed in water distribution grids to have pressure levels adjustment and electrical energy production. A PaT working in turbine mode has a different best efficiency point due to a variation of the fluid-dynamic operating conditions.

Scott Gladstone et al [3] Dartmouth Humanitarian Engineering's Hydropower Project seeks to implement small-scale "pico" hydropower in remote communities around the world. These smaller systems produce under a single kilowatt (kW) of power, and are capable of charging car batteries that can be distributed to community members.

Prawin Angel Michael et al [4] The best possible remedial measure in this scenario is to make use of the natural resources available to generate electricity. In an endeavour towards this end, the paper has been formulated for the electrification of valara village in Iduk district of Kerala.

Sitzenfreia et al [5] Small hydro power systems (SHPS) are increasingly installed in water distribution systems (WDS). With only minor adaptations in the existing system, pressure surplus can be utilized. But often in such systems a water surplus is also available. This water surplus can be utilized e.g. with Pelton turbines.

Bilal Abdullah Nasir.[6] The design procedure of micro hydro power plant was implemented by matlab Simulink computer program to calculate all the design parameters. The choice of the turbine depending mainly on the site and head flow rate. The turbine power and speed were directly proportional with site head.

Mahmut Temel Ozdemira et al [7] an experimental system has been designed in order to use for education of the technical staff at this important plants. The implemented system has included realistically whole the parts of a micro hydro power plant (MHPP). MHPP has been controlled by PLC. The reason why PLC has been

chosen is to try the new control methods and its durability

M. Kramer et al [8] new and innovative concepts of energy recovery which use micro-hydro impulse turbines in drinking water systems, more sophisticated turbine designs become essential to improve energy recovery efficiency.

Mahdi Ahmadi et al [9] This paper is an introductory prospect and experiment of generated force measuring of applying two-phase nozzle and an impulse turbine design for trilateral flash cycle heat engine. In this concept of trilateral flash cycle (TFC), pressurized working fluid (Isopentane) being heated by low temperature hot water and pumped through a two-phase nozzle to impact the impulse turbine blade.

A. Gagliano et al [10] This article evaluates technical and economic feasibility of the repowering of one of the oldest Sicilian hydro power plant currently abandoned and disused. The reactivation of the Catarrate hydropower plant allows producing energy from renewable source contributing to the energy independence of the local community, with an energy yearly production of about 220 MW.

Roberto bini et al [11] The paper will describe an innovative solution that has allowed to increase the number of stages from traditional 2-3 to at least 5 without leaving the effective cantilever arrangement keeping the concept of rigid rotor (i.e. operating below the first flexional natural frequency), with very low measured vibration.

M. Sinagra et al [12] hydraulic machines today face the challenge of flexibility. The electricity markets short-term issues together with the development of versatile wind and solar energies are demanding the hydropower plants to provide more and more flexibility.

Sirichai Dangeam [13] This paper presents the design of the single phase induction generator for hydro turbine that driven by waterfall power. By the principle, when the water from the waterfall flows along the 1 inch pipe until to the nozzle, after that the nozzle directs water jet along a tangent to the circle through the center of the buckets.

Erinofi ardi et al [14] Potential energy from fluid flow of small rivers or irrigations could be extracted become electricity by using screw turbine. This turbine is promising because the advantages of ultra-low head and fish friendly. Experimental performance of screw turbine for ultra-low head hydro resource is presented in this paper.

Jean Nganhoua et al [15] The implementation of that project can be a suitable contribution for a sustainable development of that rural locality with Site Recognition and topographic Analysis Electricity demand in the locality

Shashi Chichkhede et al [16] The present work reports CFD based investigation of the effect of design parameters on the flow velocities of a cross flow turbine (CFT). Best described as an impulse type turbine with partial admission of air, cross flow turbines meet the demand for an efficient turbine to run at low head that is also easy to manufacture.

S. Barbarella et al [17] method using statistical and numerical model for selecting a pump running as turbine in micro hydro plant. The data of the site (head and capacity) allow calculating two coefficient C_Q and C_H ,

which identify pump to be successfully as turbine in that place.

Pierre-Louis Viollet.[18] Hydraulic machineries today face the challenge of flexibility. The electricity markets short-term issues together with the development of versatile wind and solar energies are demanding the hydropower plants to provide more and more flexibility services.

Reza Aghaei tog et al.[19] the potential energy hidden in water resources is becoming more and more a significant economic value. The value of the hydroelectric energy is often magnified by the proximity of the turbine to pumps or the other energy sinks owned by the same water manager

Priyono Sutiknoan et al [20] Analysis and optimization of the blade cascade is conducted with Numerical studies of two optimized turbines by achieving a maximum efficiency of over 91%.

Yulianus Rombe Pasalli et al [21] Energy from the flowing/falling water used directly by machines to avoid the efficiency losses of the generator Hydraulic potency of planned micro-hydro power plant for Hink River with 8.6 m of head, the maximum potency is about 25.2 kW.

Srikanth Allamsetty et al [22] Comprehensive review on VCM applied to Hydro Generating Equipments (HGE) and the future prospectus of VCM used in hydro power stations with Vibration condition monitoring (VCM)

Jessica Hanafi and Anthony Riman.[23] many rivers in the islands, hydropower plants become the best renewable energy source for these remote areas. This paper aims to assess the life cycle of a mini hydro power plant in Simalungun, Indonesia. Life cycle inventory data were collected and impacts were assessed using SimaPro software.

Ravi Kumar and S.K. Singal.[24] In this paper, an attempt has been made to evaluate the performance of some existing SHP plants considering the parameters like generation cost, operating cost, maintenance cost, shortage of generation and percentage variation in generation to select best operating plant. Multiple Attribute Decision Making (MADM) method has been used for evaluation of the plant performance and selection of the best operating

P.N. Darde.[25] Experimental study for area near the intake was kept silt free to maintain the head by adopting siphoning techniques.

Alexandre BORGA et al [26] The most interesting conclusions of this study are with respect to the internal optimization of these new energy converters and elimination of as much of the expensive control systems with CFD analysis Viability analysis.

K. M. Senthil Kumar et al [27] Setup can be installed in every home to generate their own power which can ultimately increase the power generation by renewable source which will reduce the pollution.

Abhijit Date et al [28] Theoretical performance analysis of a split reaction water turbine for ultra-low head hydro resource is presented in this paper. The split reaction water turbine has shown good potential to be used for low head micro hydro-electric installations. The main advantage of this turbine is its simplicity to manufacture and reasonable energy conversion efficiency of about 65-70% (hydro to mechanical energy).

Roberto bini & Davide colombo.[29] New 5 stages axial expanders family targeting both the heat recovery and the

high efficiency with Increase no of stage from 2-3 traditional to atleast 5 without leaving the effective cantilever arrangement.

P. Cruza et al.[30] A mixed-integer linear programming approach is addressed for the optimal scheduling and operation of a pumped-hydro system with a wind farm with Problem Formulation.

K H Motwani et al.[31] Application of PAT is recommended at the maximum efficiency point in pico/micro hydro range for power generation in rural, remote and hilly areas with Implementation of pico hydropower plant.

Zhang Yicheng et al.[32] Detection rate of crack near to edge (thickness of blade is 20mm) is high and cracks whose length is more with Reliability experiment.

CONCLUSION:

In societies the water is stored on the terrace of the building. Most of the buildings use pump system to lift water from the bore well to the top of the building. The pump of 2hp power will do the required job efficiently but it takes a lot of time to fill the tank completely. So pump of 6hp power is generally used instead of 2hp pump. This lifts the water with lot of force and the tank is filled in less time. But as 6hp pump is used instead of 2hp pump it results in requirement of more energy but it also results in more power and force of water jet at the outlet of pipe. This force of water jet can be utilized and directed onto a Pelton turbine to generate direct current. So the literature survey has been done regarding efficiency of Pelton turbine, reutilization of power etc. and objective has been set to generate electricity from the excessive pump power. In the next semester the parameter selection and actual machining operation will be done.

Future Scope:

Since, renewable energy is the future of the power generation as electricity to all by Shri Narendra Modi. A small micro hydro turbine and dc generator set should be developed so that it can be fixed in water pipe line like this sets fixed on each floor of multi storey buildings.

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