

HYDRO-GENERATION USING WAVE ENERGY

MANISHA BHENDALE¹, ANIRUDDHA PATIL², JANHAVI MORE³, TANUJ MHATRE⁴

¹Department of Instrumentation Engineering, Bharati Vidyapeeth College of Engineering, Navi Mumbai

²Department of Instrumentation Engineering, Bharati Vidyapeeth College of Engineering, Navi Mumbai

³Department of Instrumentation Engineering, Bharati Vidyapeeth College of Engineering, Navi Mumbai

⁴Department of Instrumentation Engineering, Bharati Vidyapeeth College of Engineering, Navi Mumbai

Abstract - Energy is needed currently over ever thanks to growth, industry and modernization that increase the requirement of renewable energy supply like hydro energy. Today most of rural areas in developed and developing countries use the hydropower for manufacturing electricity, because it is affordable and effective. The essential parts of the hydropower system are rotary engine, generator and diversion system. Generators convert the mechanical (rotational) energy made by the rotary engine to voltage.

Key Words: Renewable supply¹, Generator², Turbine³, Diversion system³.

1. INTRODUCTION

Hydropower derives from moving water then may be a clean energy supply with the sole pollution occurring throughout the development of the electricity plants. No water is consumed within the method, however rather electricity is created from the kinetic movement of the water's flow. The hydro-generator transforms the energy of water in movement into electricity. It works with associate inexhaustible energy: the wind, and so the force exerted by the water throughout navigation and preserves the atmosphere. The hydro-generator reloads the batteries of our sailing ship and brings electrical autonomy so as to make sure security and luxury on board. The electricity created by the hydro-generator are transmitted to the batteries through the regulator to urge associate optimized current/voltage combine for batteries. Early models towed associate blade on an extended line behind the boat, that was hooked up to associate generator on board, however their trailing impellers were usually bitten off by massive fish and that they oftentimes snarled once fouled or if not retrieved properly. The aim of this project is, because the human population and activities are increasingly developing, it's most bound that the demand for energy worldwide is increasing moreover, and this trend is possibly to continue within the future. The number of electricity a hydro-generator will turn out depends on the amount of water passing through a rotary engine. Among varied renewable energy sources, little hydro power generation is taken into account as a reliable possibility in grid connected mode of operation. This paper can contain associate info concerning the paradigm of hydro-generation employed in boats together with designing, construction, kind of rotary engine, pressure nozzle and approx. output of the system.

2. HYDRO TURBINES

The turbine is the heart of hydropower system, where water power is converted into rotational force that drives the generator. They are generally classified as Impulse turbine and Reaction turbine.

2.1 Impulse Turbine

A rotary engine (turbine) may be a turbine that's driven by high speed jets of water or steam from a nozzle directed on to vanes or buckets hooked up to a wheel. The ensuing impulse (as delineate by Newton's second law of motion) spins the rotary engine and removes K.E. Before reaching the rotary engine, the fluid's pressure head is modified to speed head by fast the fluid through a nozzle. This preparation of the fluid jet means no pressure window sash is required around an turbine. Most kinds of rotary engine exploit the principles of each impulse turbines and reaction turbine.

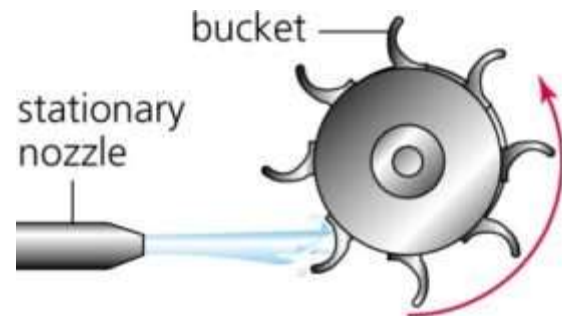


Fig -1: Impulse turbine

However, a few, such as the Pelton Turbine, use the impulse concept exclusively.

2.1.1 Type of Impulse Turbine

1. Pelton Turbine

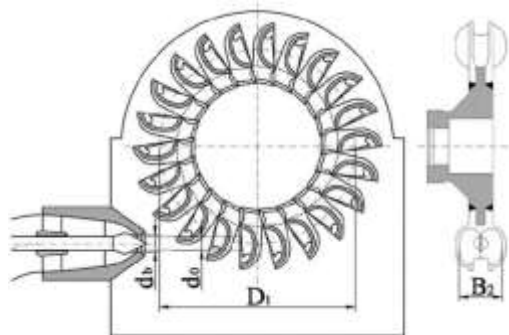


Fig -2: Pelton turbine

2.2 Reaction Turbine

A rotary engine (turbine) could be a kind of turbine that develops torsion by reacting to the pressure or weight of a fluid. The operation of reaction turbines is delineate by Newton's third law of motion (action and reaction are equal and opposite). in a very turbine, in contrast to in Associate in Nursing turbine, the nozzles that discharge the operating fluid are hooked up to the rotor. The acceleration of the fluid going the nozzles produces a reaction force on the pipes, inflicting the rotor to maneuver within the wrong way to it of the fluid. The pressure of the fluid changes because it passes through the rotor blades. In most cases, a pressure sash is required to contain the operating fluid because it acts on the turbine; within the case of water turbines, the casing conjointly maintains the suction imparted by the draft tube. Or else, wherever a casing is absent, the rotary engine should be absolutely immersed within the fluid flow as within the case of wind turbines. Francis turbines and most steam turbines use the turbine construct.

2.2.1 Types of Reaction Turbine

1. Francis turbine

The hydroelectric turbine may be a form of turbine, a class of rotary engine within which the operating fluid involves the rotary engine below huge pressure and also the energy is extracted by the rotary engine blades from the operating fluid. A section of the energy is given up by the fluid thanks to pressure changes occurring within the blades of the rotary engine, quantified by the expression of degree of reaction.

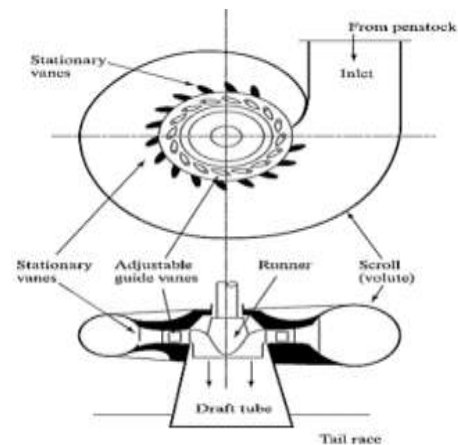


Fig -3: Francis turbine

Difference between impulse and reaction turbine

The basic and main distinction between impulse and turbine is that there's pressure amendment within the fluid because it passes through runner of turbine whereas in turbine there's no pressure amendment within the runner, thus it uses K.E. likewise as pressure.

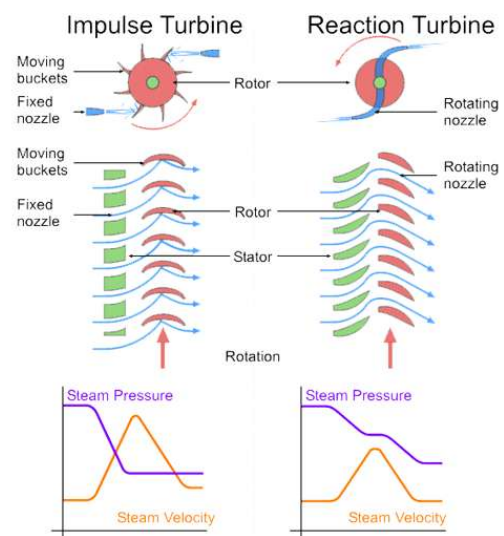


Fig -4: Difference between impulse & reaction turbine

3. HYDRO GENERATOR

Generators convert the mechanical (rotational) energy made by the rotary engine to current. The principle of generator operation is sort of simple: once a coil of wire is stirred past a field, a voltage is evoked within the wire. Because the rotary engine blades flip, the rotor within the generator conjointly turns and current is made as magnets rotate within the fixed-coil generator to provide current.

4. DIVERSION SYSTEM

Diversion System refers to the means that to “divert water” from the supply and transport it to rotary engine. A water diversion system serves 2 primary purposes: to supply deep enough pool of water to make sleek, air liberated to the pipeline and to get rid of dirt and scrap. There are numerous ways for diverting and transporting the water, however diversion systems are often classified into 2 basic types: closed and open systems. Matching the right form of diversion system to a specific sort of pico-hydro rotary engine is important to the best performance of the rotary engine.

5. WORKING

The generator, turbine and diversion system are the main components of the hydro-generator. It works on the RMF principle, which is a rotating magnetic field that has moving polarities in which its opposite poles rotate about a central point or axis. Ideally, the rotation changes direction at a constant angular rate. It will be placed at the bottom of the ship. As the ship moves forward cutting the edge of the water. It will enter inside the diversion system and hits the impulse turbine resulting in rotations. And converts the kinetic energy of the water into electrical energy.

Table -1: Classification of Hydropower by size

Sr No.	Classification	Rated Power
1	Large hydro	>100MW
2	Medium hydro	15-100MW
3	Small hydro	1-15MW
4	Mini hydro	100KW-1MW
5	Micro hydro	5KW-100KW
6	Pico hydro	<5KW

6. FUTURE SCOPE

- Designing of pressure nozzle.
- Use of lighter material for turbine to speed-up the rotations.
- Try to implement in hilly areas by changing the piping arrangement.

7. CONCLUSION

As we all know that existing hydropower plants are large in structure, it needs an outsized space. The projected system not solely overcome this drawback however additionally improves the moveableness. As compared to existing hydropower plants it needs less maintenance. It indicated that hydro could be a cornerstone of the electrical generation station that is achieved nice significance for the world industrial, economic and environmental considerations.

REFERENCES

- [1] S.O.Anaza1, M.S.Abdulazeez, Y.A.Yisah, Y.O.Yusuf, B. U.Salawu, S.U.Momoh, “Micro Hydro-Electric Energy Generation- An Overview”, American Journal of Engineering Research (AJER) e-ISSN: 2320-0847 p-ISSN : 2320-0936 Volume-6, Issue-2, pp-05-12 www.ajer.org
- [2] A.H.Elbatrana, Mohamed Walid Abdel-Hameda, O.B. Yaakobb, Yasser M. Ahmedb, M. Arif Ismailb, “Hydro Power and Turbine Systems Reviews”.
- [3] Ved Prakash Verma, Viveksheel Verma, Umesh C. Rathore, “An Overview of Small Hydro Power Generation Scenario in India”, International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering ISO 3297:2007 Certified Vol. 5, Issue 10, October 2017.
- [4] https://www.daviddarling.info/encyclopedia/R/AE_reaction_turbine.html
- [5] https://www.daviddarling.info/encyclopedia/I/AE_impulse_turbine.html