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POWER GENERATION BY SCREW TYPE TURBINE

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ABSTRACT
India has more than 600 rivers. It is difficult to construct dams on any type of river. The farmer's residency is on the basis of river. By power derived from the potential energy and running water production of electrical power through the use of the gravitational force and electricity generated is called as hydroelectricity. Therefore the hydro-power plant is used in this type of conditions. Hydro-power plant has an important source which deals with the water flow. Hydro screw is suitable for a low head discharged which does not guide to draft a tube. Geometrical dimension of one screw blade is of the angle of 50^0 .the turbine slope variable are 20^0,30^0 and 40^0. According to experimental data, the turbine's maximum efficiency is 83%. This has an important property in which the inclination of angle is increased which results in the large amount of the flowing water and this power plant is environment friendly. This power plant was used for small rivers.

INTRODUCTION
The source of energy of Hydropower is renewable source of energy. Water energy was of great importance for sustainable because it is a clean environment friendly source of power generation. Among the energy from renewable energy sources water in mini/micro hydro power has gained the highest attraction due to its environmental friendly operation. In current scenario, India is blessed with half of million location were water mills was served for centuries. The 1500 projects based on micro hydropower has reconstructed in Jammu and Kashmir under the power of Prime Minister. The total number of installations of 950 micro hydro projects of 3 – 5 KW was adopted in Jammu and Kashmir. Currently, the total potential of India is 15000 MW in small hydro plants out of which only 2000 MW is installed. Various schemes formed by Govt. Of India, RGVVY (Rajiv Gandhi Vidyutikar Vikash Yojana), DDUGJY (Deendayal Upadhyaya Gram Jyoti Yojana) Launched in Dec, 2014 being some of them, led to the increases of the number rural householder electrified from 44%to 67% for electrifying in rural and remote parts in India. Small

hydropower program is one of the most trusted areas of generating power from renewable resource, for ministry of new and renewable energy of Govt. of India.

Basically, the power that is generated from the hydro- power plant is given by,

$$P = \eta \rho g H Q \text{ (kW)}$$

Were η is the hydraulic efficiency of the turbine, P is the mechanical power of the shaft, g is the acceleration due to gravity, ρ is the density of water, H is the effective, and Q is the mass flow rate. Higher power is generated from the head or the more the flow rate, but such a task is difficult to achieve takes longer time and lot of money used to be invested, therefore screw turbine is used in such low head sites, to get very high power energy the head should be increased up to a substantial height by making a dam .Hydro power plants should be reservoir –less or of very low head.

The all the information or idea of this project is gathered by the published journal on the similar topics like energy harvesting from hydro turbine Power Generation by Screw Type Turbine harvesting and different trends in screw turbine is different from height and angles.

Problem statement

The Screw turbine becomes inefficient if the water containing sludge stones and wood sticks which may damage the turbines which is costly for maintenance. It is essential to provide filter assemble for it which is costly again. The inclination of angle used for turbine should be perfect otherwise it cause loss of energy and continues constant water flow.

Working of the screw turbine

The screw turbine was known for the low pressure turbine. It consists of screw shaped bucket arrangement which rotates when water pressure was applied on them. This are inclined at particular angle to maintain the water pressure needed for rotation.

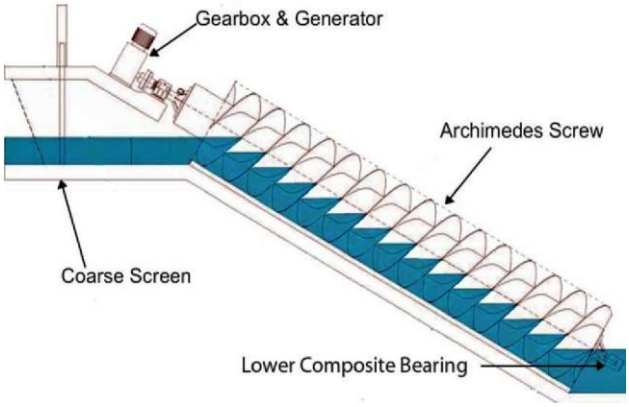

Figure 1: Screw turbine

Working of the generator

Generator is designed in such a way that the speed of the turbine generates power. It is coupled with turbine with gear drives which maintain the speed of the generator in circular manner. It rotated at constant of rated RPM which generally for this turbine is 200-2000 revolution per minute. These generators are designed for most expensive as compared to conventional one.

Figure 2: generator

Working of gear

Basically gear system was used for transmission of power or for increase and decrease in the speed of drive. Here gear is attached in between turbine shaft and the generator. The gear plays the important role they transmit the mechanical rotation with increase in speed. It helps in the improvement of the efficiency of the overall system.

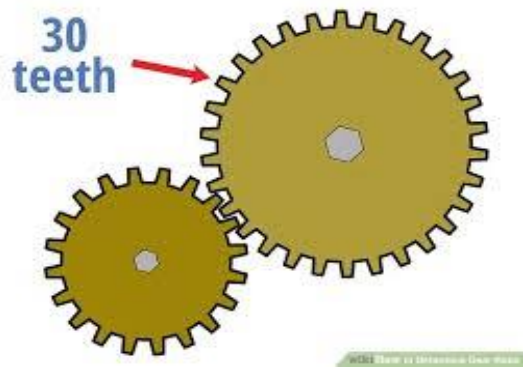

Figure 3: gear mechanism

Project output

Sr.no	inclination	Q(l/s)	Head(m)	N(RPM)	Torque(N.m)	Power(Watt)	η_m
1.	20^0	2.6	0.22	110	0.14	1.5	0.45
2.	30^0	2.6	0.38	128	0.08	1.4	0.49
3.	50^0	2.6	0.51	200	0.07	1.6	0.42

Proposed methodology

Make water turn while water moving down as the length, while Hydrostatic pressure from water flows in to the top of the screw .It has been fast using glue and covered by cylindrical casing. The diameter of shaft, screw and housing were selected according to available tools and material. Blade of screw turbine and casing made up of aluminum for easy mach inability, and shaft is made up of PVC pipe.

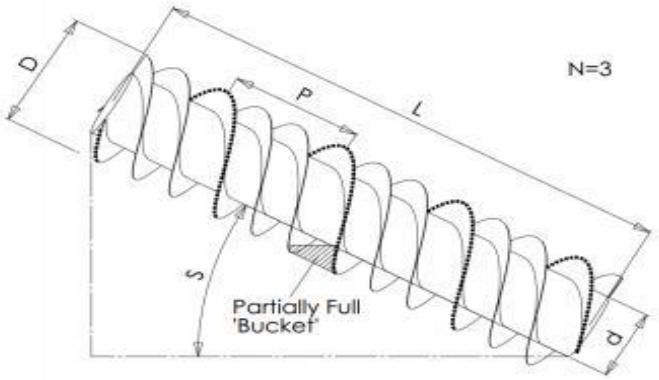

Figure 4: screw turbine dimensions

Table 2: dimension table

Sr.no	parameter	variable	Values
1.	Inner diameter	D_o	25mm
2.	Pitch	P	80mm
3.	Screw length	L	1135mm
4.	Number of screw	N	1
5.	gap width	G_w	4.5mm
6.	Flow rate	Q	2.5 L/s
7.	Slope	S	25^0,30^0,60^0

BLOCK DIAGRAM

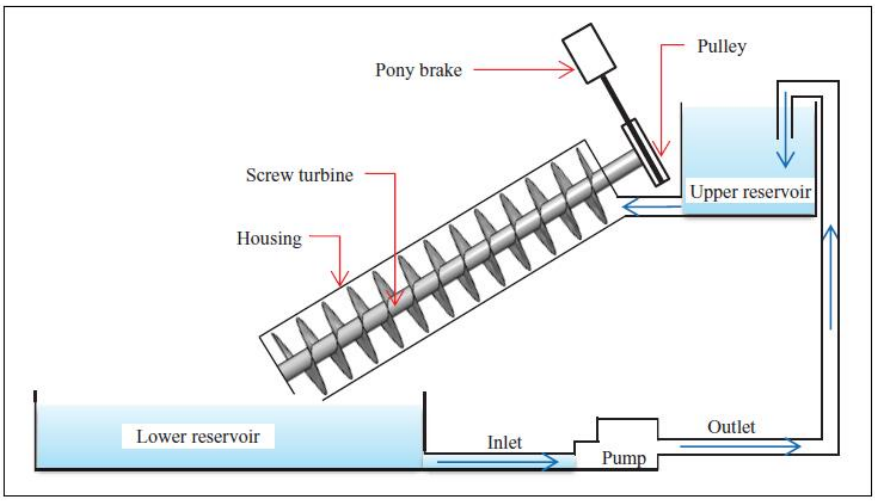

Figure 5: Block diagram

Generally, the power of water turbine is,

$$\rho_w = gQh$$

Were ρ is the density of water, g is the acceleration due to gravity (9.81 m/s^2), h is the available head of water source (m) and Q is the volumetric water flow rate (m^3/s).

The torque (T) is measured in a angular speed ω is determined by the positional power Ps. The torque is calculated by measuring the tangent force F on a pony brake with moment arm radius of pulley.

$$T = Fr$$

$$Ps = T\omega = T\frac{2\pi n}{60}$$

$$\eta_m = \frac{Ps}{Pw}$$

In this experiment, the pump water is supplied to the upper reservoir. A brake was used to determine the torque on the turbine shaft. Water flows from turbine through flexible blade construction. Water outlet is at the base of casing at lower reservoir located below the turbine and flows back to the upper reservoir with help of pump. The slopes of turbine are used to the show the relation between connection and power produced by efficiency.

WORKING

The Archimedes invented the screw pump. The rotated when water enters the screw blades, the amalgamation of potential and kinetic energy of the water forces. Hence a higher head or flow, the higher output power with the higher potential or kinetic energy. [4] Transformation to via a gearbox to the generator is relalatively slow rotational motion of the screw. Here the rotational energy is converted into electrical power, ready to use or to sell to the grid. The projects will answer yes on both questions by straight forward. The sewage treatment or hydropower plants existing the suitable outlets are placed as a dysfunction on hydropower plants overspill or fish by wash.

HARDWARE REQUIRED

- Screw turbine.
- Pump.
- Pulley.
- Pony brake.

ADVANTAGES

- The screw turbine is more efficient than that of the pelton turbine.
- Compared to other turbine and water wheels it gives Better efficiency at less than optimum flows.
- More economic and simple construction.

- Due to low speed the maintenance is easy and efficient.
- Using rational gearing system it becomes we get better rotations.
- There is no need of costly filters.
- Fish can pass through downstream safely and friendly.
- Heads can be used as low as 100 liters and flow as low as 1 meter per second.

APPLICATIONS

- It is used for River and Small River.
- Cooling water outlets from power stations.
- Water treatment inlets (Municipal and Industry).
- Replacement the types of generators and waterwheels.
- Industrial west water and process water (for example Project or steel mills).
- Water treatment outfalls (Municipal and Industry).

CONCLUSION

The Archimedes turbine based on the Micro hydropower is an eco-friendly and the deforestation is avoided as well as the displacement of the people and also harassments. As per the condition, the efficiency of plant does not vary with load, but power output and speed of this plant vary with discharge at the condition. There are no requirements of big dam, high discharge, high head and penstock. Therefore this type of micro hydropower is based on Archimedes turbine, the hydro power plant is more suitable power plant in the present as well as future.

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