
HYDRO-ELECTRICITY : WATER TURBINE

Written by Lucy Ikpesu

CLASS DESCRIPTION:

In this class, students will explore how to generate electricity using water as the source of energy. Students will participate in the design process and build their own water turbines out of scrap materials that will power a LED bulb, Sound and light board.

TOTAL CLASS TIME: 120 Minutes.

CLASS OUTCOMES:

- Students will understand the basic concept of hydroelectricity.
- Students will learn about how electricity is generated using using local materials.
- Students will learn about blade design.
- Students will understand the basic components of a water turbine and how it can be converted to other forms of energy.

INTRODUCTION

A hydroelectric generator is the best thing to build to produce electricity if you have a stream flowing nearby. Building a water-powered electrical generator with plastic spoons! You use plastic spoons and other simple supplies to build a model of a simple micro-hydro system. Your model will generate a surprising amount of electricity, providing you have a supply of pressurized water, such as from a lab sink.



Machines that make electricity need some form of mechanical energy to get things started. Mechanical energy spins the generator to make the electricity. In the case of hydroelectricity, the mechanical energy comes from large volumes of falling water. The simplest way to produce the volumes of falling water needed to make electricity has been to build a dam. A dam stops the natural flow of a river, building up a deep reservoir behind it.

In this activity, you will use plastic spoons to build a model of a simple micro-hydro system. It generates surprising amounts of electricity, provided you have a supply of pressurized water. This model closely resembles real micro-hydro designs, and can produce enough electricity to light a small light bulb.

MATERIALS NEEDED

1. DC rotor
2. Hub or plate disc or Bottle cap
3. Flexible wire
4. 8 – 10 disposable plastic spoons
5. Scissors
6. Running tap or flowing water
7. LED bulb
8. Multimeter
9. Hot glue

PROCEDURES

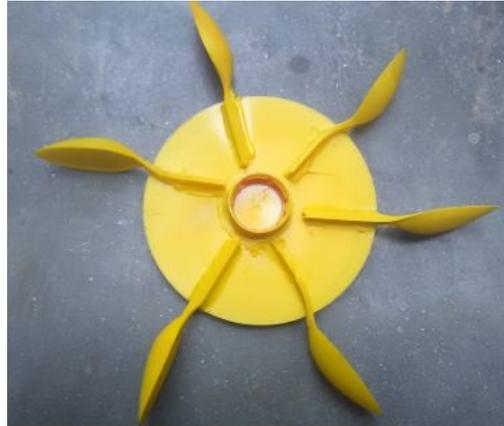
Step 1: Cut the plastic spoon to a length of 2-3 inches long.



Step 2: Make a Spoon blade: Connect plastic spoon to the hub.

If a **disc plate** is available, measure 8 - 10 lines of equal angles on the disc and glue the plastic spoons on the disc using hot glue.

If a **bottle cap** is available, drill a hole of same diameter with the plastic spoon on the bottle cap of equal angles, then insert the spoon into the hole and hold with the hot glue. Ensure the spoon is tightly held to avoid falling off when water falls on it.



Connecting spoons to a disc plate and bottle cap.

Step 3: Connect the spoon blade to the **DC rotor**. Drill a tiny hole at the center of the hub (bottle cap) using the rotor's diameter.



Step 4: Connect the Multimeter (**Voltmeter**) or **LED bulb** to the wire terminals of the DC rotor.



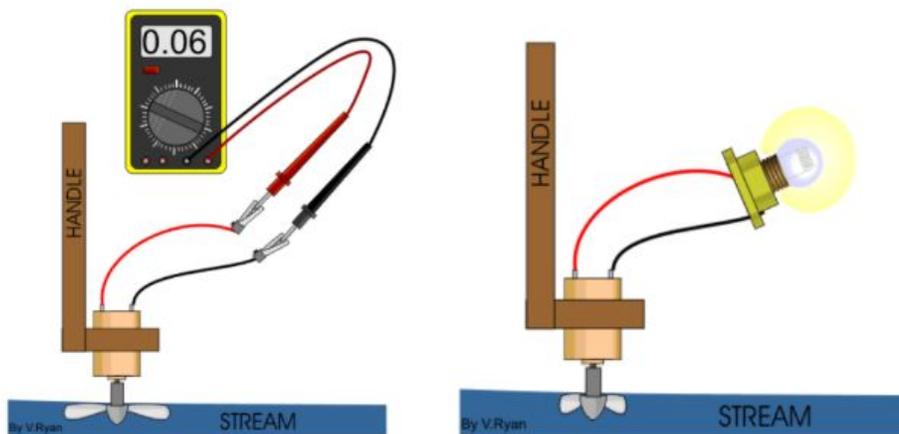
Step 4: Put the spoon blade under a flowing or running water. The water should turn the blade in a clockwise direction.



If all has gone well with your construction, this turbine should be able to produce significant amounts of electricity, depending on the speed of the water striking the spoons.

HOW IT WORKS

A small-scale hydro system usually consists of a water wheel or turbine, which is made to spin by the high velocity water. The water is taken from the stream or running tap and moved down slope to the turbine through a long pipe called a penstock. Water flowing through the penstock picks up speed, and is directed at the blades of the turbine. The turbine spins continuously, as long as there is water to drive it. The turbine is connected to an electrical generator (DC rotor), and the electricity is then available for running appliances or charging batteries



REFERENCES

<http://www.re-energy.ca/docs/hydroelectric-generator-cp.pdf>