

A prototype of a Hydropower plant

Report

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The aims behind developing a prototype of a hydropower plant, that we set and realised were:

- The development and construction of a mock-up, which we used for receiving electricity from the power of falling water
- Experimenting with the dependencies between the power of electricity, the amount of falling water and the number of segments of the wheel
- The selection of appropriate parts, that would support easy dismantling and building of the system, as well as it being firm and safe for transportation.

The main components of the prototype were:

1. A water tank – we decided to use a thrash bin, to which we attached a water tap
2. A water turbine – a wheel with toy-shovels for kids, which was attached to the lid of the water container with a pivot, so that it's able to spin
3. A small and a big wheel with a groove to put a belt in. This belt is to be transmitting the circular movement from the water wheel to the electrical generator. The big wheel we set up at the pivot of the water turbine, and the little one at the pivot of the generator, in order to increase the resulting frequency of the circular movement of the water wheel.
4. A generator for the transformation of the mechanical energy of the spinning movement into electrical. We used a small electrical engine, connected in the opposite direction.
5. A container for gathering the fallen water with a tap for its draining. We used a container with a lid, to which we attached all the parts. Those can be dismantled and transported easily in the container.
6. A device for measuring the voltage and the electrical power, delivered by our Hydropower plant.

With our prototype, we managed to deliver a voltage of around 1 Volt and electrical power of approximately 8 to 10 milli-amperes (mA). Those values, however are not enough to light up an electrical bulb. To do that, we would need higher parameters for the wheel and the force of the falling water. We were not able to realise those as part of our project, because it would make the transportation, dismantling and reassembling of the device difficult, and, in our case, where we also had to confine with a specific size of the system, impossible.

As a result of the experiments we conducted, with our prototype of a hydropower plant, we had the following findings:

- With the increasing of the water pressure in the water container, which would be achieved by using a bigger volume of water and having it falling from a bigger distance, the electrical power delivered is higher.
- Increasing the height of the waterfall, means increasing the electrical power.

Dictionary:

Hydropower Plant

Water Turbine

Electrical generator

Electrical engine

Volt-meter

Ampere-meter

Milli- ampere

Volt

Voltage of the electrical power

Power of electricity