CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

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Project Number

36804

Project Title

Are Angle and Size of the Buckets Keys for a Successful Pelton Water Turbine?

Abstract

Objectives/Goals

To determine if any physical characteristic of a Pelton Turbine may affect its efficiency.

Methods/Materials

Used Cura and 123D Design software to design various Pelton water turbines with 4 different tilt angles of the buckets and 2 different bucket sizes. The device was built with water jug, rare earth magnets, enameled magnet wire, foam board, wooden dowels, vinyl tubing, and brass paper fasteners. The 3D printed rotors were printed by Airwolf 3D AXIOM 3DPrinter.

Results

The angle of the buckets and size of a water turbine rotor do affect the total conversion of kinetic energy into electricity (voltage measured). The turbines with 15 degrees and 45 degrees bucket angles gave a higher average voltage.

Conclusions/Discussion

The results from the data, observations, and graphs did not support the hypothesis completely. First, the 1.5 times larger rotor/buckets did not produce 1.5 times more electricity when compared with the control. Bigger is not always better. The rotors with buckets angled to 15 degrees and 45 degrees produced the most electricity and they support the hypothesis that titling angle may affect the electricity output.

Summary Statement

I showed that Pelton water turbines rotors buckets angled at 15 and 45 degrees generated the most electricity and 1.5 times larger buckets produced the least electricity.

Help Received

I built the water turbine device using 3D printing technology. Ms. Ricart (STEM teacher) taught me how to use the software, 3D printing, and laser cutting. Dr. Ross-Viola and Mr. Harrington (science teachers) provided guidance and feedback in reviewing my work.