ENERGY GENERATION THROUGH WATERFLOW SUSTAINMENT

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Theory

Our design features a mechanical and pneumatically-driven underwater vessel that harnesses falling water's potential energy to generate power. The system incorporates three distinct piston types along with two dual mirrored bait and tackle pulley systems. Our objective is to develop an underwater energy generation device that could harness the potential energy of falling water.

Purpose

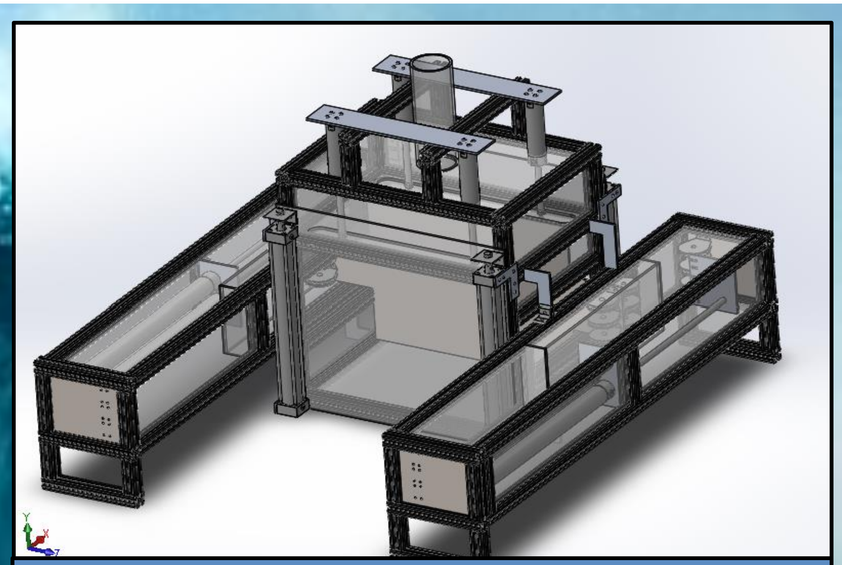
This device demonstrates how sustained underwater waterflow can be harnessed as a renewable energy source. By utilizing water's gravitational potential energy to power a generator, a continuous power generation system can be created.

Objectives

1. Capable of withstanding submersion in water.
2. All piston subsystems function autonomously.
3. Establish and maintain a continuous flow path from the inlet tube to the void tank.
4. Ensure the consistent circulation of water into and out of the system.
5. Ensure the air inflow rate exceeds the combined frictional and drag forces acting against it.

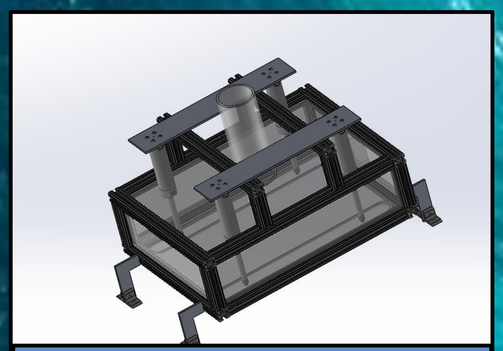
Device Specs

- Total Weight: 220lbs
- Total Volume: 4362.82in^3
- Flow Rate: 13.89 ft^3/s (@ 5.0' depth)
- Cycle Rate: 2.98s (@ 5.0' depth)
- Output Force: 1860lbs (@ 50psi)
- Microcontroller: Arduino MEGA 2560
- Electrical Source: QTY: 2 12 V Rechargeable batteries.
- Air Source: 13.5 CFM air compressor
- Power Output(Theoretically): 2.65kW (@ 5.0' depth

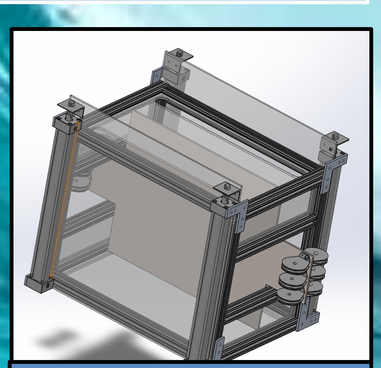


CAD Model of Device

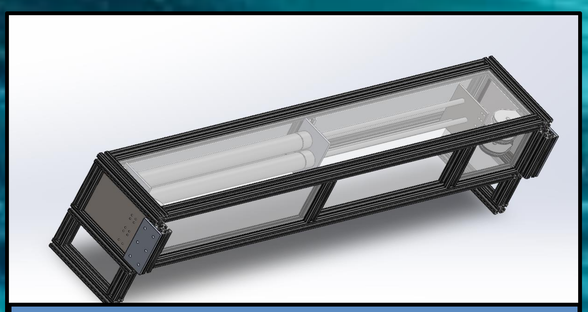
Device Components



Void Tank



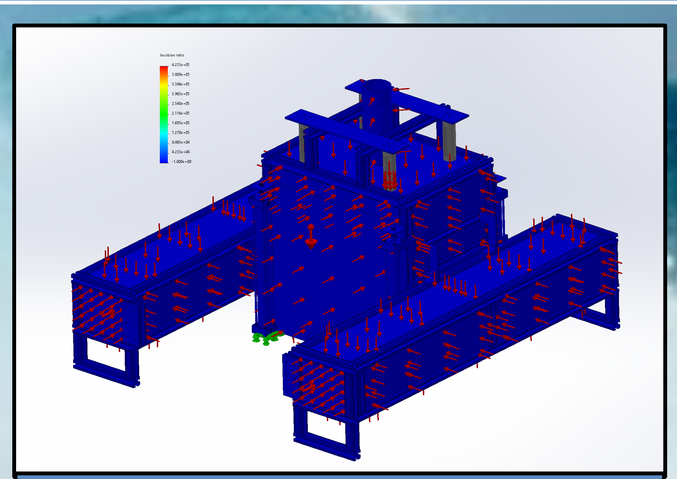
Exhaust Tank



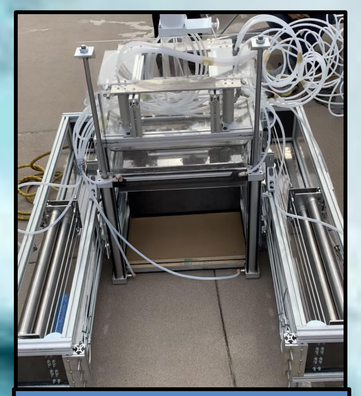
Piston Casing

Solenoid Tower

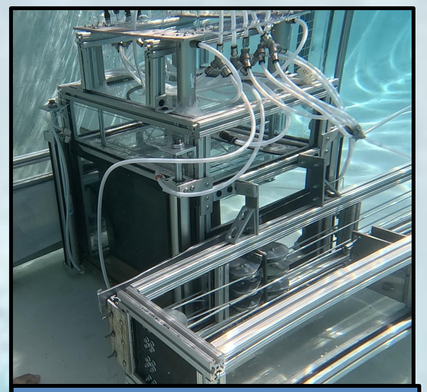
Testing



Static Load Simulation



Dry Testing Phase



Wet Testing Phase

Results

Testing was conducted both with the device at surface level and fully submerged in a pool at a 5.0' depth. The system demonstrated successful operation of its mechanical systems in both dry and wet conditions, achieving internal water movement when supplied with compressed air at 100 psi. This was achieved with the device being fully automated using pre-loaded code.

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