

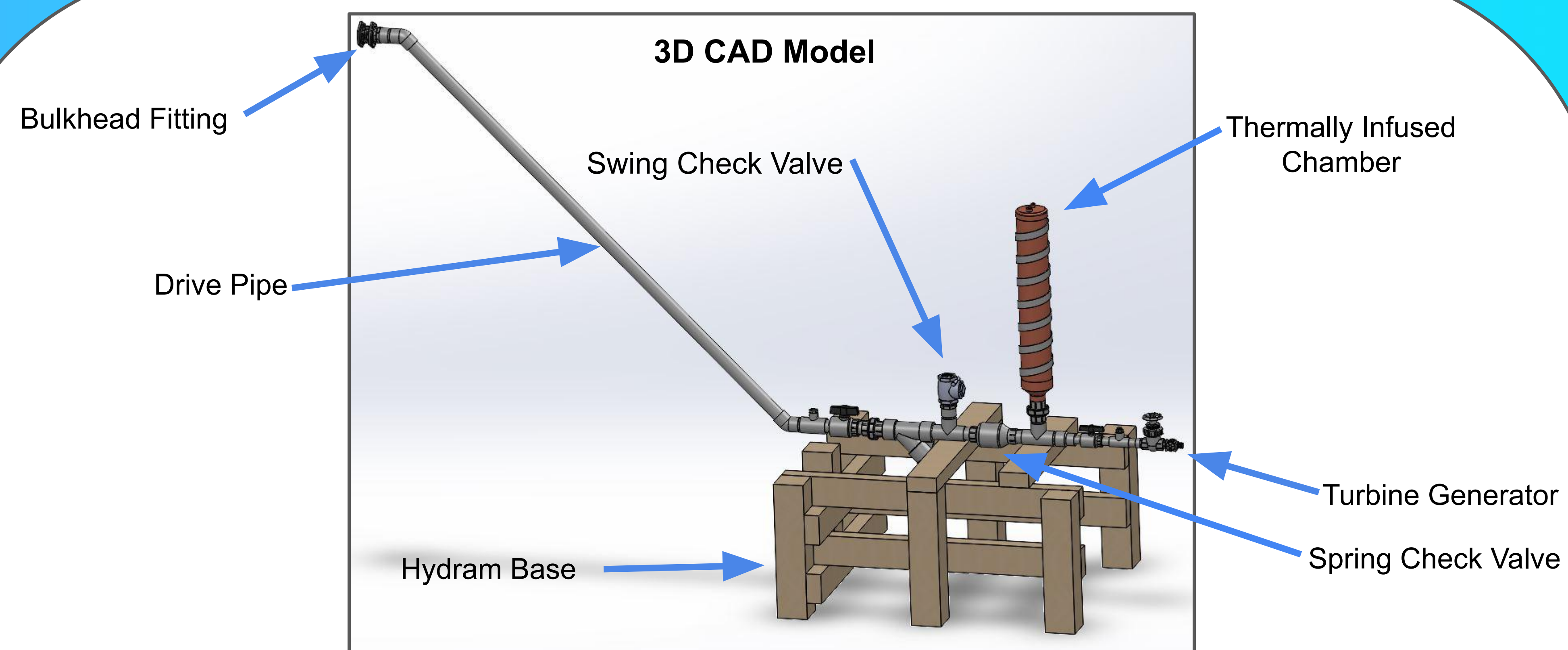
Power Production Using Innovative Hydrum

Background

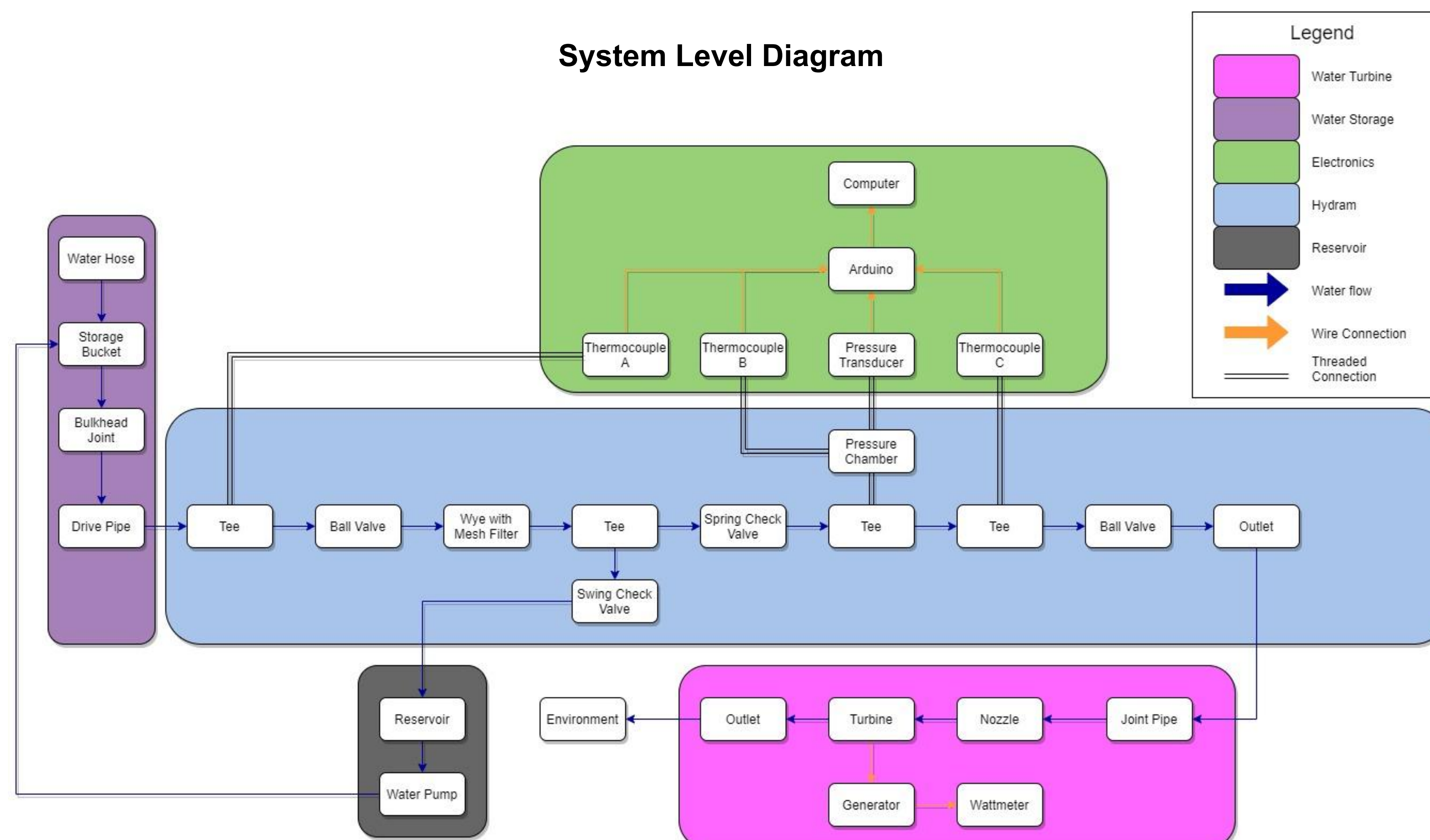
Last year, the Hydraulic Hitters designed an innovative hydrum that utilized the water hammer effect and thermal infusion to increase its efficiency. The project sponsor, Dr. Beyene, hypothesized that this could now be used to generate power. The objective of this project is to use the Innovative Hydrum to generate power as well as to make additional renovations to further increase the hydrum efficiency. Throughout the year, RamPo has explored numerous design, manufacturing, and testing possibilities to best increase system efficiency and power production.

The power production through this Innovative Hydrum design is great for little to no maintenance pumps. When applied out on the field, power harvesting from continuously flowing water sources like rivers and waterfalls would be advantageous where an individual may be off the grid.

Design



System Level Diagram



Team Members



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Max Umland



Cash McCormick



Jesse Richard



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Manufacturing

Upper Reservoir

Greater storage volume with less leakage



Bulkhead Fitting

Thermal Insulation (Pressure Chamber)

Thicker insulation for better thermal efficiency



2nd layer of insulation protects people from fiberglass cuts

Spray, Fiberglass, and Foil Insulation

Hydrum Base

Hydrum base supports bottom of hydrum and walls of wastewater basin



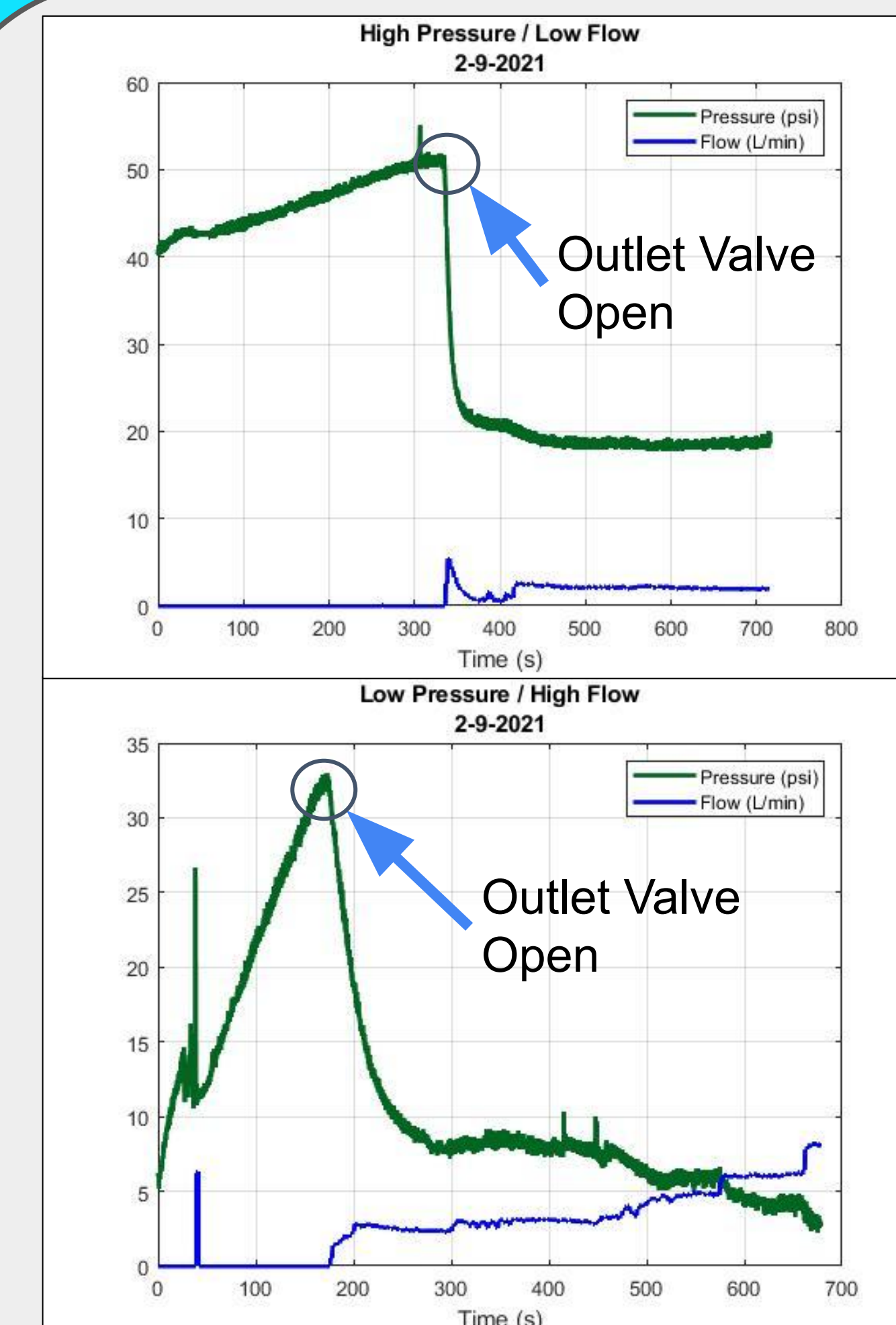
Hydrum Base Wastewater Basin



SAN DIEGO STATE UNIVERSITY

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Results



With thermal infusion of the pressure chamber, low pressure and high flow conditions, and 6 ft of head, 613 mW of power was generated.

Conclusion

Conclusion

- Generating constant power using a powerless hydrum is possible with constant flow
- Thermally infusing the pressure chamber increases the outflow potential energy, but requires an impulse style turbine for best utilization

Limitations

- A hydrum generator is better suited with a turbine that prefers high pressure, low flow conditions. Since these are not available in small-scale conditions, we used a low pressure, high flow turbine