

Background and Objectives

IQT Labs is interested in understanding the parameters that drive underwater glider design. Underwater gliders do not require external propulsion, instead relying on a change of buoyancy/density of the vehicle to traverse.



They are useful for deployable, semi-persistent maritime monitoring. However, the options available today are expensive, ~\$150,000, and many hobby equivalents are not capable of operations outside a backyard pool.

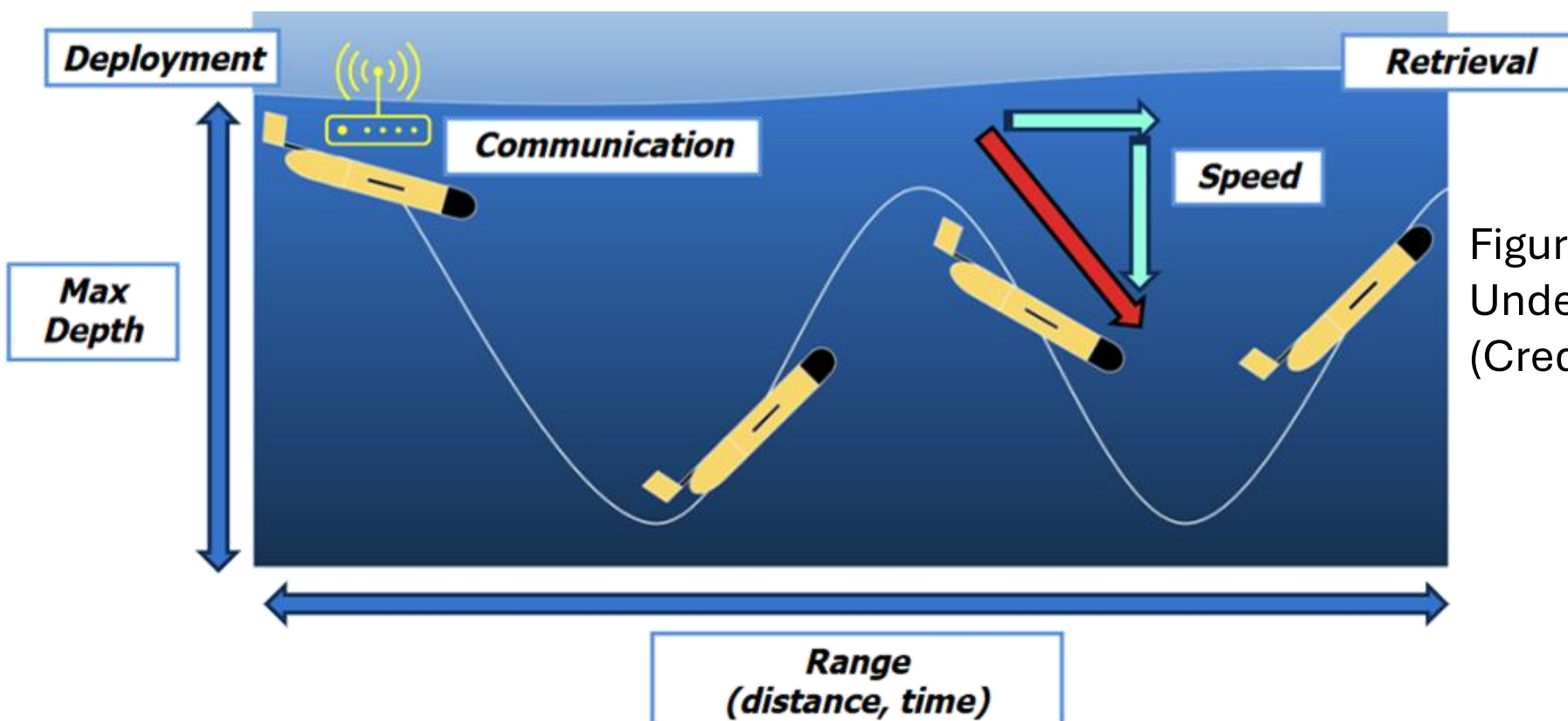


Figure 1: Stocum Underwater Glider (Credit: Stocum)

The main goal of this project are to bridge the gap between the "makerspace" and commercial designs, developing a pathway towards cost-efficient glider design, accessible by everyone with access to simple hand tools. The specific technical targets are below.

- Mission Length: 1 Month**
- Glide Speed: 1 Knot**
- Max Depth: 200 Meters**
- Payload:**
3x3x3" Cube
150 Grams
0.05 W
- Size & Weight:**
Operable by 2 crewmembers

Trade Space Analysis

As requested by IQT, a trade space analysis was performed where a study of current technologies and key design and performance relationships was developed to inform and guide the design of prototypes for the glider.

Design parameters were analyzed to determine the effects of different physical constraints on the performance of the glider on a month-long mission, guiding our design.

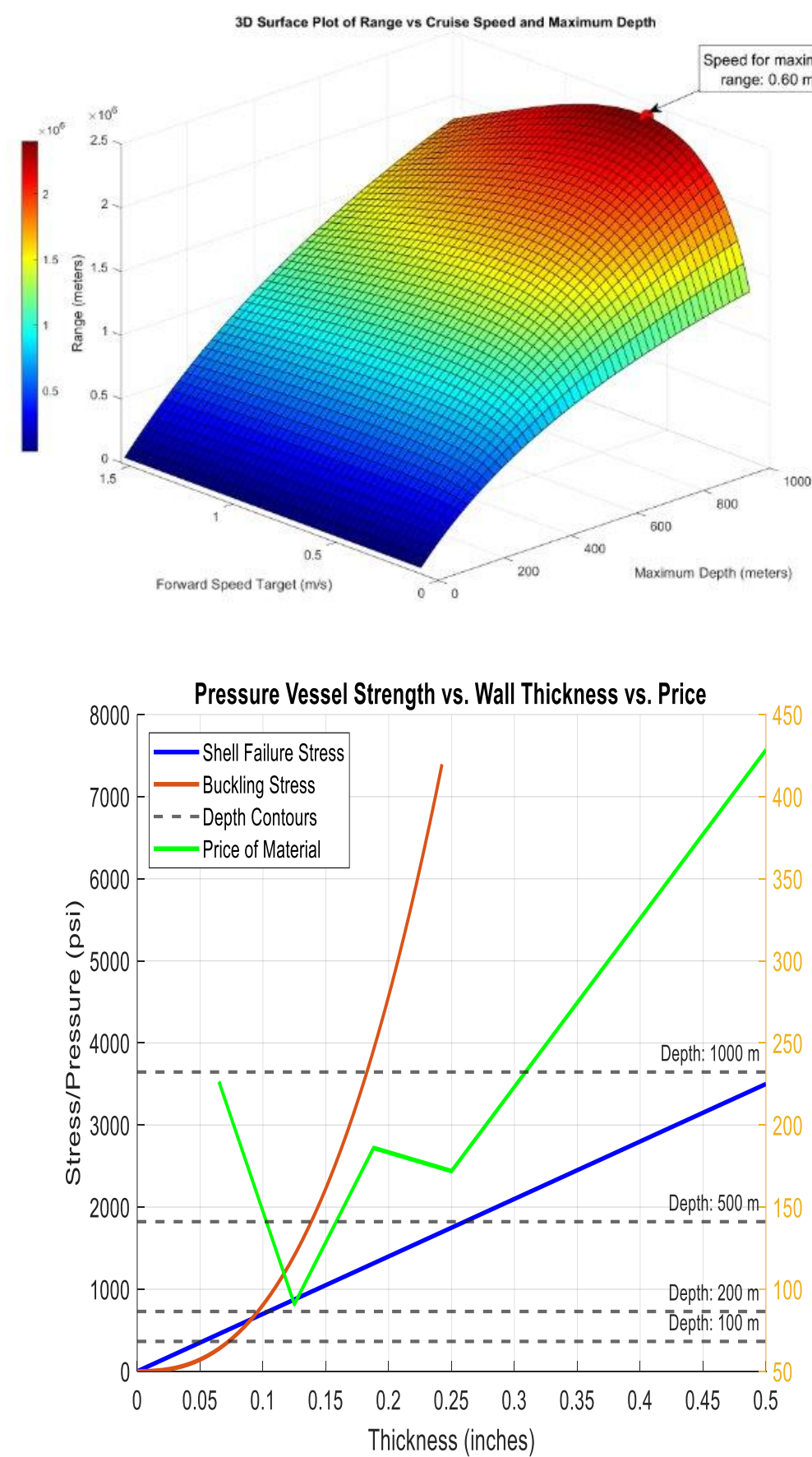
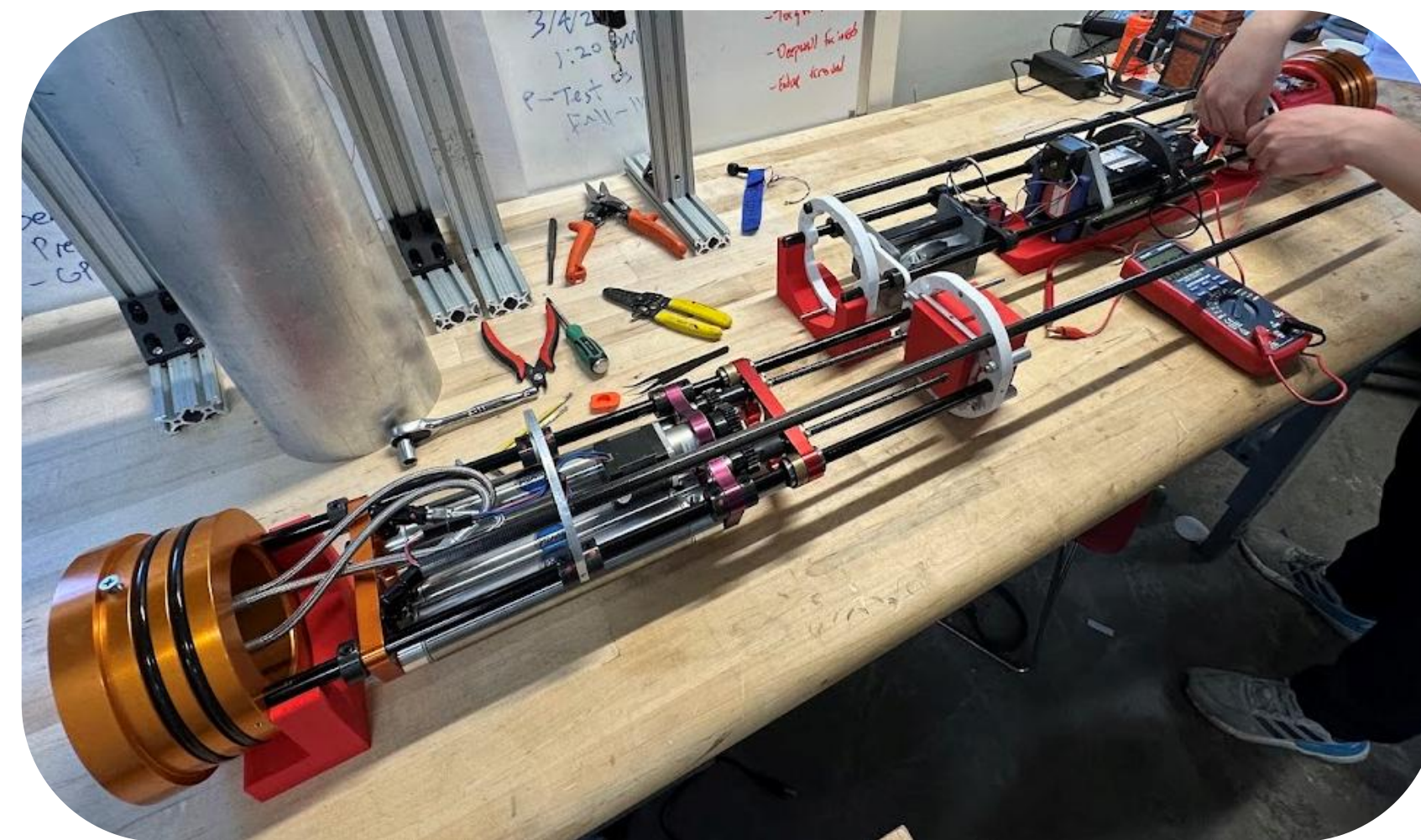


Figure 7: Trade Space Plots (Credit: IQT25)

Four Subsystems:
Pressure Vessel/Wings: external components of glider
Buoyancy Engine: change buoyancy of glider
Pitch/Roll Control Unit: control heading of glider
Avionics: powers all systems and navigation



Design

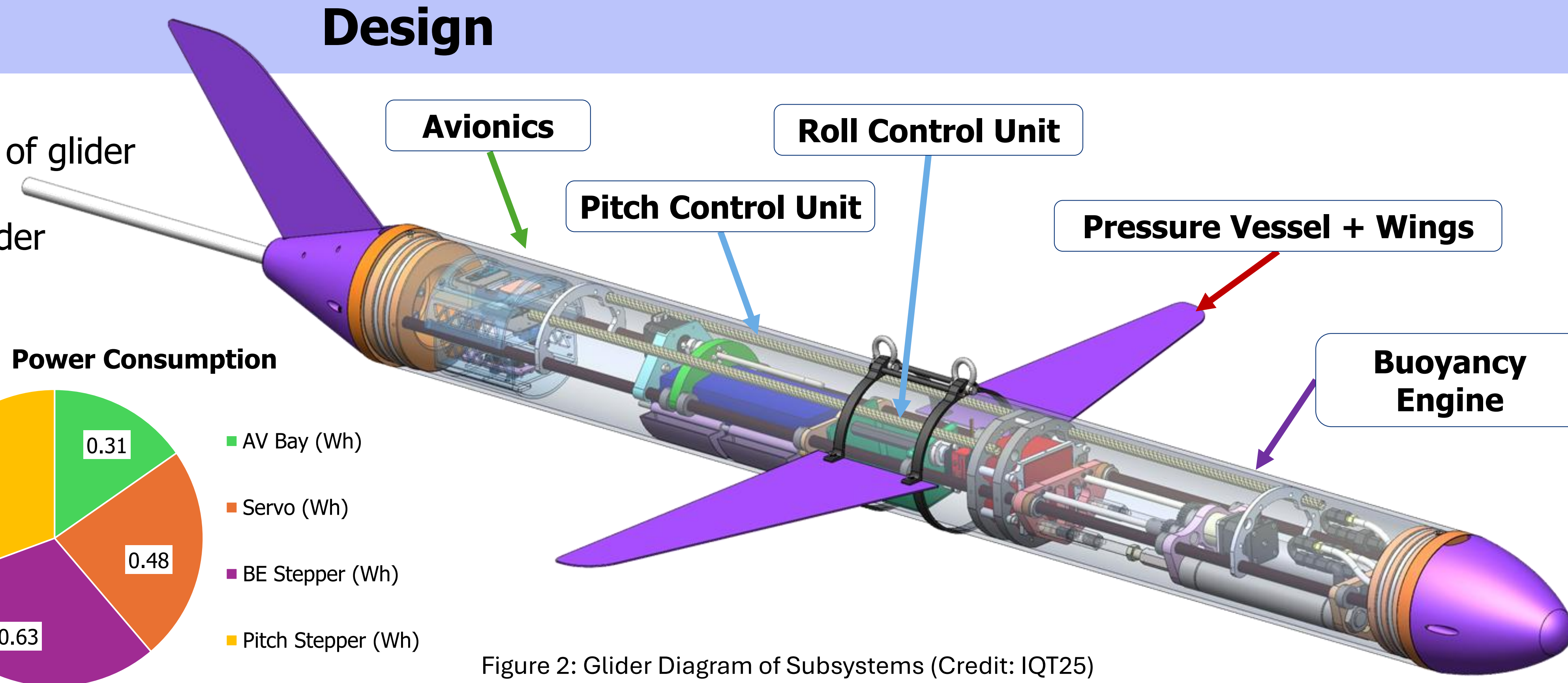


Figure 2: Glider Diagram of Subsystems (Credit: IQT25)

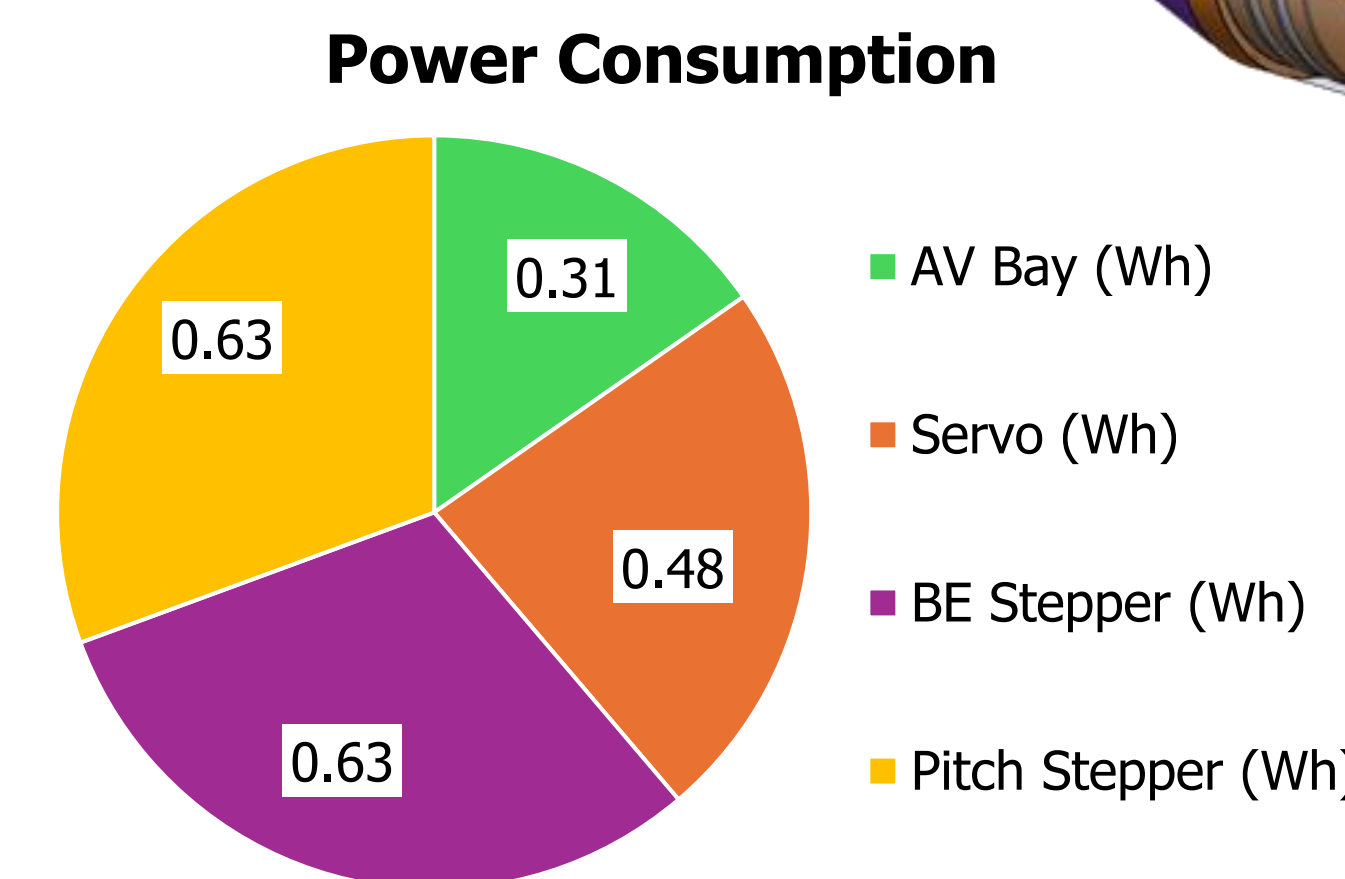


Figure 3: Team with the Glider (Credit: IQT25)

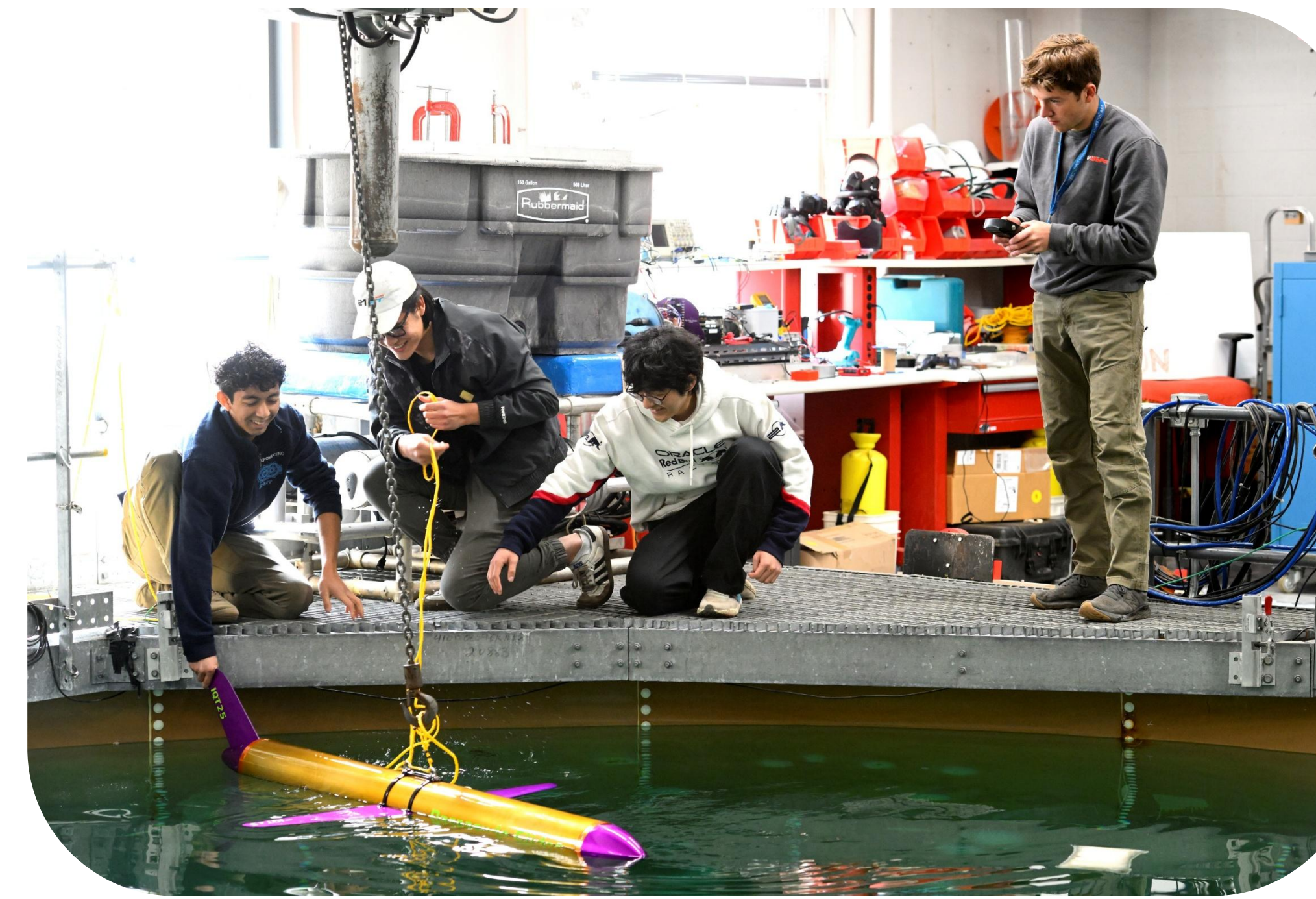


Figure 4: Tank Testing (Credit: IQT25)



Figure 5: Open Water Testing (Credit: IQT25)

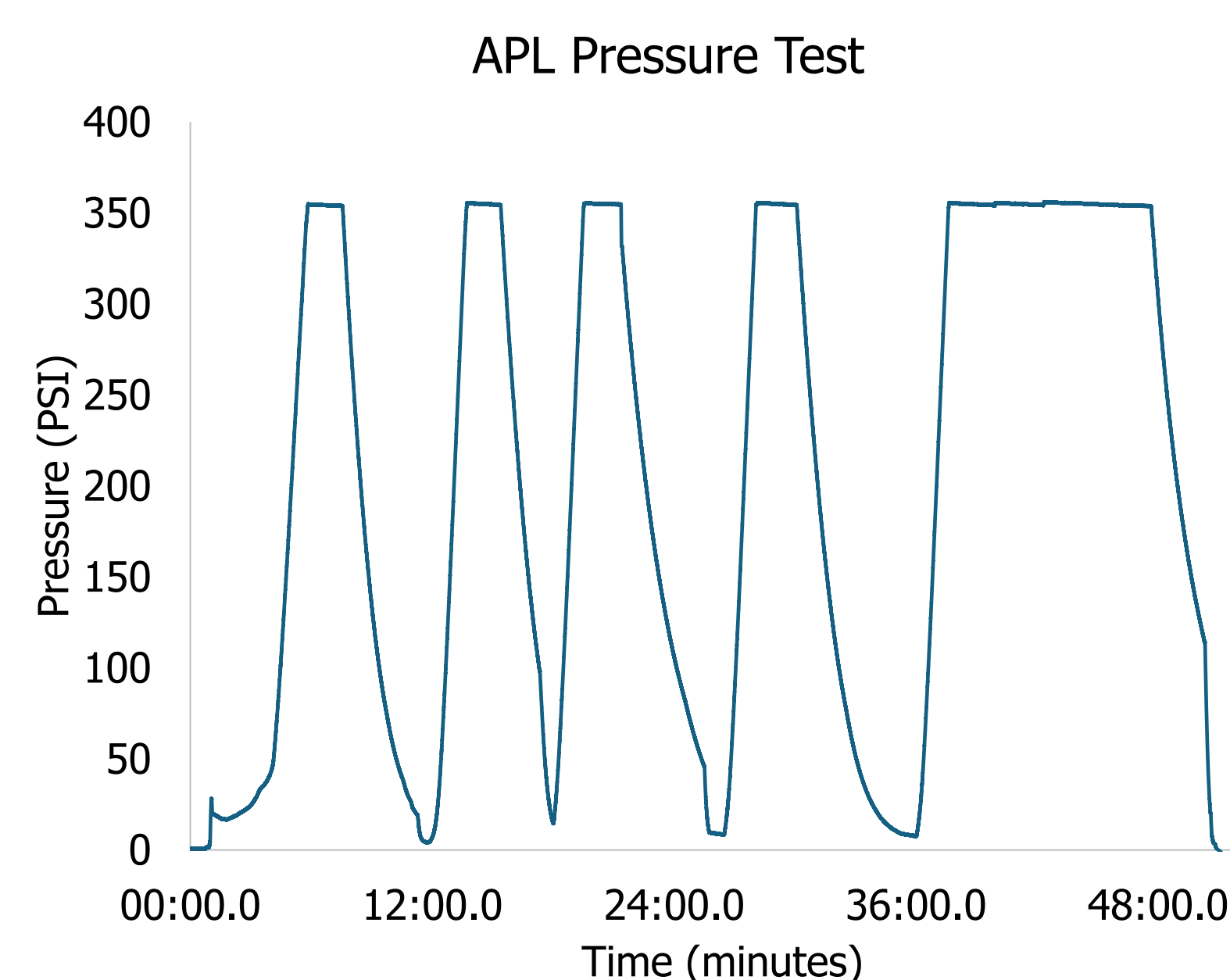
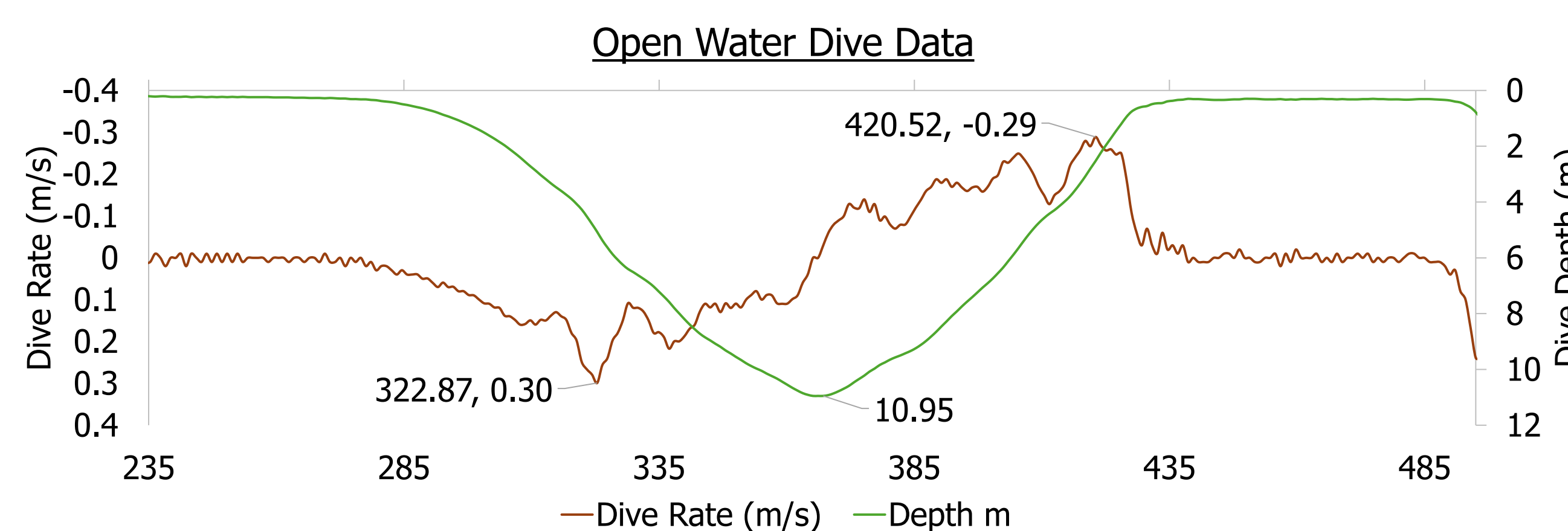
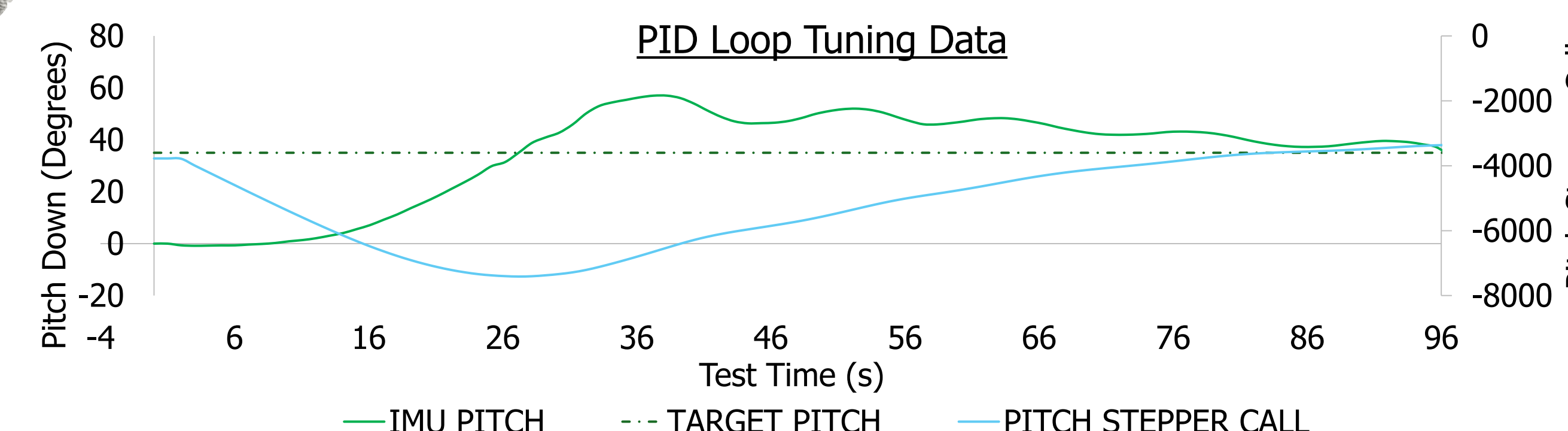


Figure 8: APL Navy Pressure Test Data (Credit: IQT25)



MET ALL REQUIREMENTS THROUGH TESTING

FINAL KIT COST: \$5,025
Significantly beating the glider market on performance/\$

REPRODUCIBLE AND SCALABLE, MODULAR FOR ANY SENSOR PAYLOAD

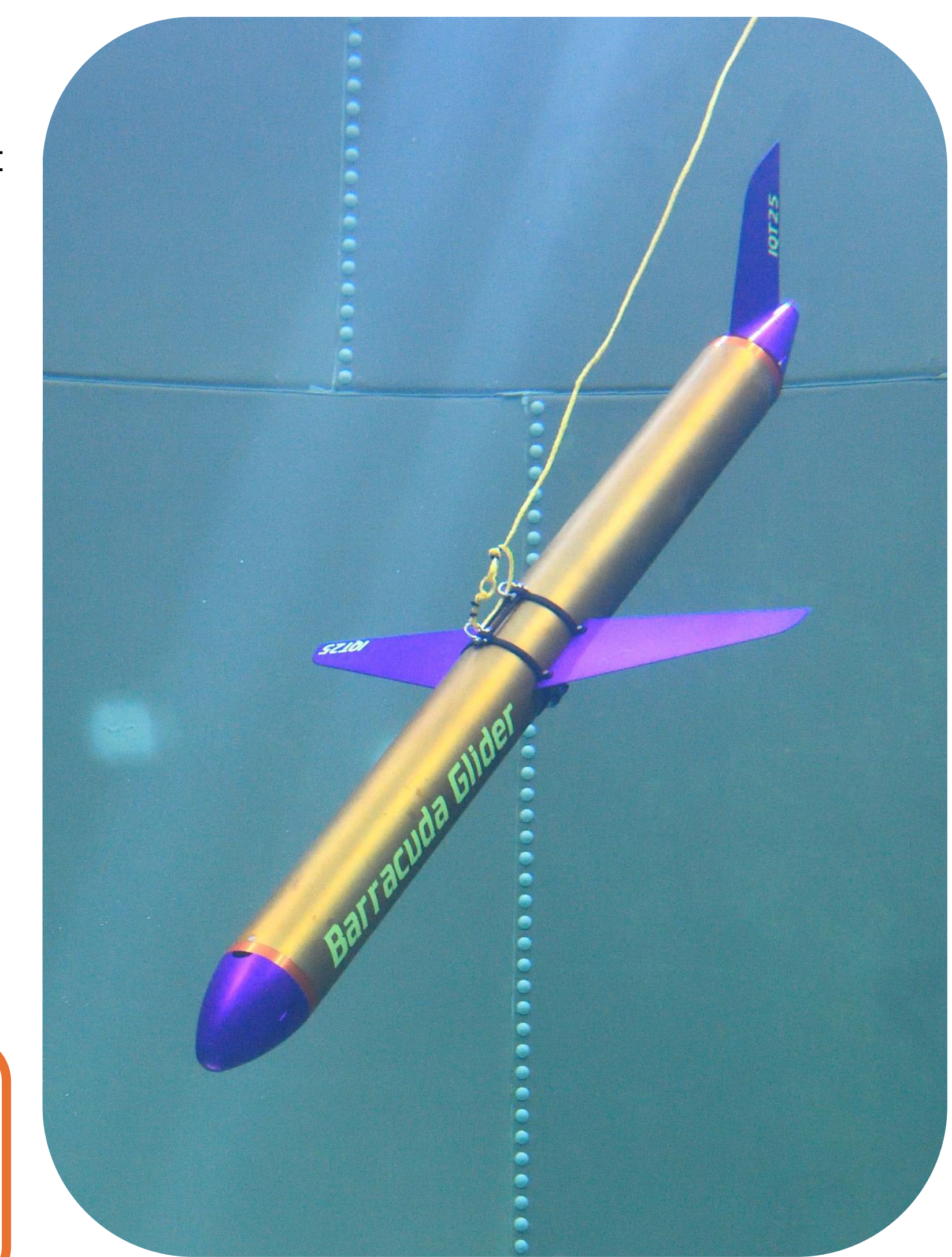


Figure 6: Glide in Tank Testing (Credit: IQT25)