New Housing Structure for Deep-Sea Equipment

Team 21: Chelsea Dodge, William R. Hodges, Kasey Raymo.
Advisors: Dr. Nikhil Gupta, Dr. Chiang Shih, Dr. Camilo Ordonez. Sponsors: FSU Oceanography, Ian McDonald

Introduction to tether operated vehicles (TOV)

- Purpose is for surveying and exploration
- Vehicle is dragged behind ship using tether
- Holds data collecting equipment
- Winch and pulley system control TOV altitude

Problem Statement

Florida State University's (FSU) current tether operated vehicle (TOV) has too much empty space, is too heavy, is difficult to move around, and does not tow levelly.

Project objectives

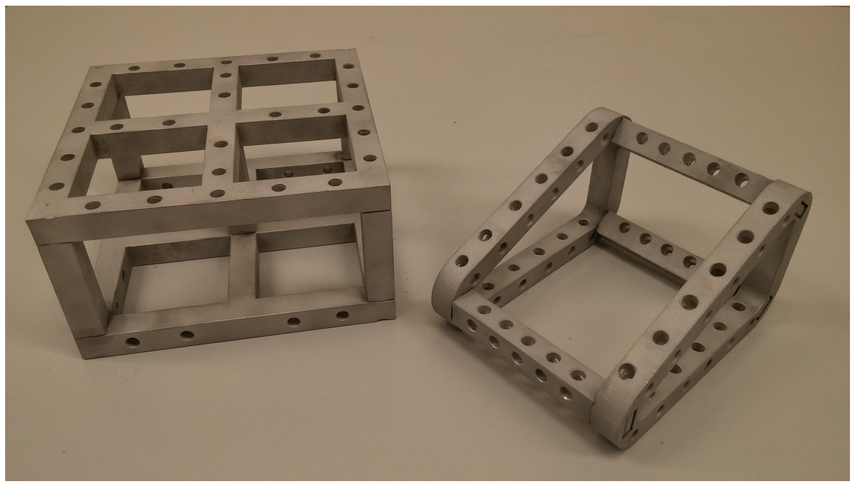
- Maximize footprint area
- Reduce weight
- Increase modularity
- Maintain level towing angle, passively
- Minimize height of new frame

Constraints

- $2,000 budget
- Corrosion Resistant
- Hold all necessary equipment
- No extra power consumption
- Modular

Material Analysis

- Materials analyzed: CFRP, Al 6061 and Mg Alloy
- Materials were excluded based on constraints of mass, ability to withstand impact and cost.
- Al6060 T-6 was select as the structure's material.



Experimental Analysis

- Features such as side surfaces, fins, and holes are added to the model throughout testing to determine best way to keep constant orientation.
- Models also made from aluminum.
- Simulated equipment weight using lead and Styrofoam.
- Cable for model: fluorocarbon line for ease of placement and attachment.
- Experimental testing will be performed in flume

What are we testing for?

System stability

- Bottom surface parallel to ocean floor
- Roll, yaw, and pitch of structure

Best placement of simulated weight distribution

- Where heavier and lighter equipment should be placed

Optimal connection site for tether connection

- Significant influence on rotational tendencies.

Future Work

- Complete model testing

Assembly

- Machining
- Attaching deep-sea equipment to frame

Final Design

- Pressure test using Civil Engineering Departments hydrostatic pressure unit
- Full in water submersion