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2.00AJ / 16.00AJ Exploring Sea, Space, & Earth: Fundamentals of Engineering Design  
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# The Winged Avenger

Team: Los Aguamaestros

2.00A Final Project 2009



Gathering data at the Sailing Pavilion



Rodrigo checking to see if our data makes sense

**Purpose:** To construct an ROV that can measure the Temperature, Salinity, Pressure, and Light in a body of water.

## The Design Process

### Design Constraints:

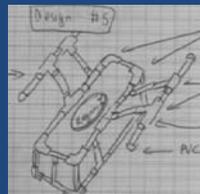
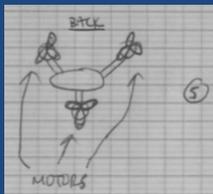
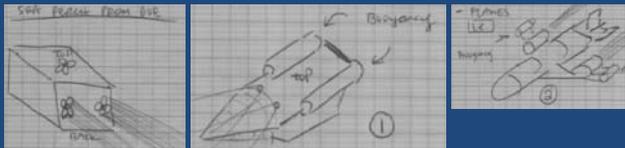
- Submerge at least 20 ft. under water
- Max Dimensions: 50 cm x 50 cm x 50 cm
- Must contain:
  - 2 Light Banks
  - One Video Camera
  - One full sensor package

- Maximum of Three Motors

### Goals:

- Tapered/Pointy Front
- Curved Edges
- Wings
- Structurally Stable
- Big Surface Area Parallel to Ocean Floor
- Flames
- Laser Beams

## Preliminary Designs



## Failures/Improvements

- Buoyancy
- Propellers
- Sensor Package
- Motors
- Camera Placement

## Predicted Strengths

- Hydrodynamic Wings
- Structurally Stable (Compact)
- Stable in Water (Big Surface Area)
- Motor Placement/Ability to Turn Easily

## Predicted Weaknesses

- Weight of ROV
- Waterproofing

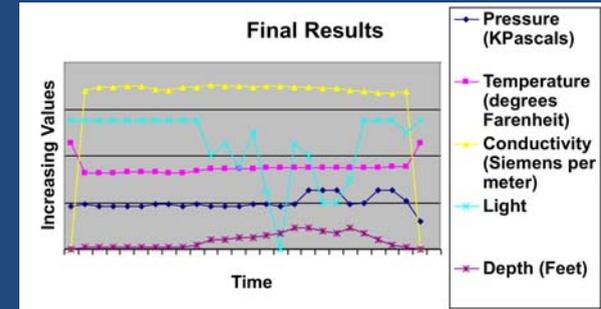
## Final Design

- Hydrodynamic Wings
- Structurally Stable and Stable in Water
- Neutrally Buoyant

## Motor/Propeller Testing Table

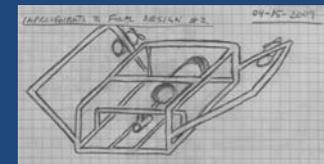
Propeller	Motor (GPH)	Force (g)	Voltage (V)	Current (A)
3 Blade	500	120	9.5	4.5
3 Blade	500	140-200	12	4.5
2 Blade (Black)	500	14	10	4.5
2 Blade (Black)	750	100	2	2
2 Blade (Black)	750	150	3.6	3
2 Blade (Black)	750	200	4.6	4
2 Blade (Black)	750	230	4.5	5.5
2 Blade (Gray)	500	60	4.4	2
2 Blade (Gray)	500	80	5.4	2.5
2 Blade (Gray)	500	150	7.5	3.5
2 Blade (Gray)	500	200	9.7	4.5
2 Blade (Gray)	500	40	3.2	1.5
2 Blade (Gray)	500	120	8.5	8.5
2 Blade (Gray)	500	200	7.5	3.5
2 Blade (Gray)	500	270	10	4.5
2 Blade (Gray)	500	270	10	4.5
2 Blade (Gray)	750	250	4.5	5

## Final Results Graph & Analysis



## Performance Analysis

- Unbalanced Horizontal Motors
- Problematic vertical motor
- Neutrally Buoyant
- Very quick, agile, & maneuverable
- Got all the data we needed!



## Reflections & Conclusions

- Overall Success
- Wish we Knew Buoyancy Before Pool Run
- Disappointed with Motor/Propeller Performance
- Time Wasted Waiting for Parts
- Wings Worked Out Great for Stability
- Sensor Package Difficult to Waterproof
- Not Enough Time to Waterproof Frame