



# Intrepid Hardtop – Team 511

**Objective: To Improve Performance of the 409 Valor**



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## Motivation

Intrepid tasked our team with improving the 409 Valor on water performance. The excess weight of the hardtop is a current problem. Solving this issue can help satisfy the primary goal of increased performance.

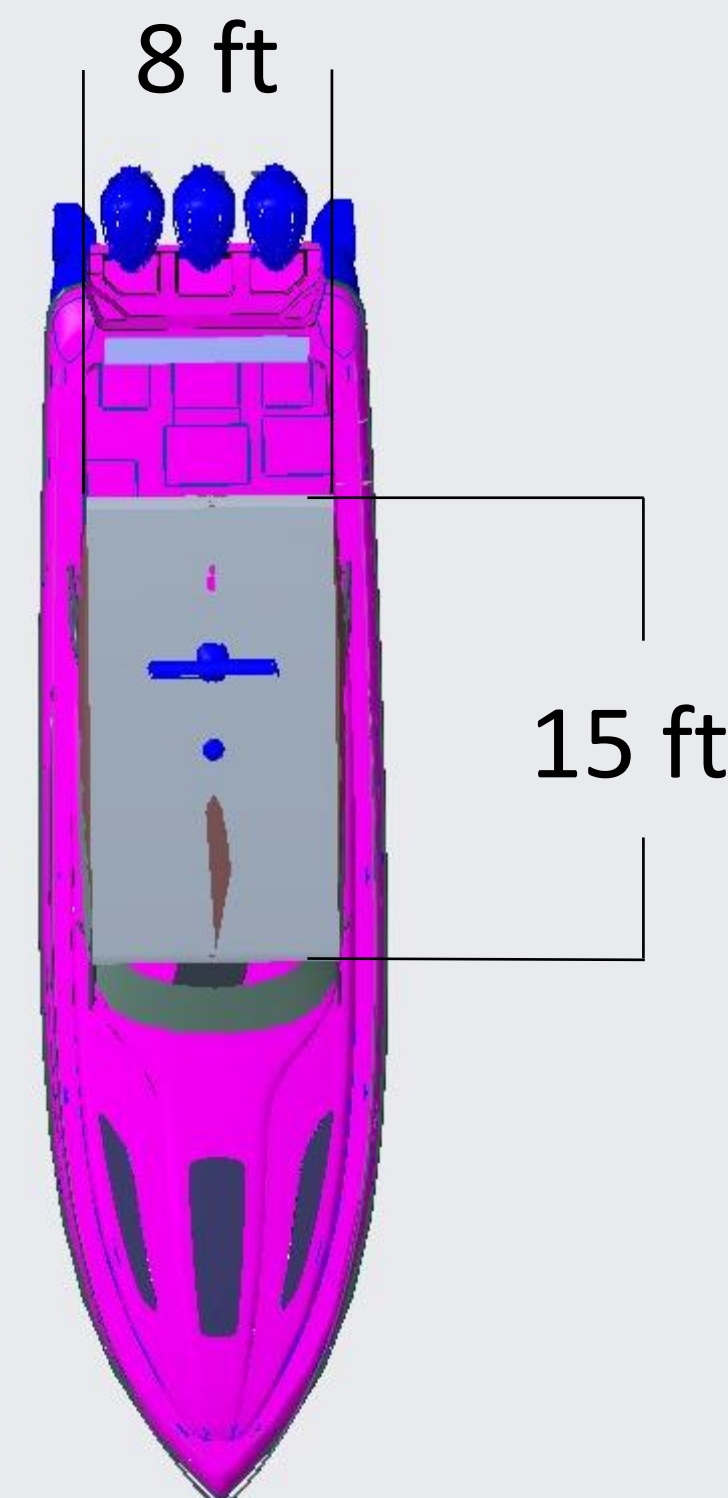


## Future Work

- Mathematical Analysis
- Material Selection
- Geometry Study
- Final Recommendations

## Background

- Intrepid is always trying to improve their boats
- Hardtop identified as heavy
- Lighten and optimize current hardtop design
- Lightening hardtop could also keep cost low and potentially save fuel
- Retain dimensions



## Key Goals

- Improve on water performance
- Improve fuel efficiency
- Analyze and enhance aerodynamics
- Keep the design manufacturable

## Concept Selection

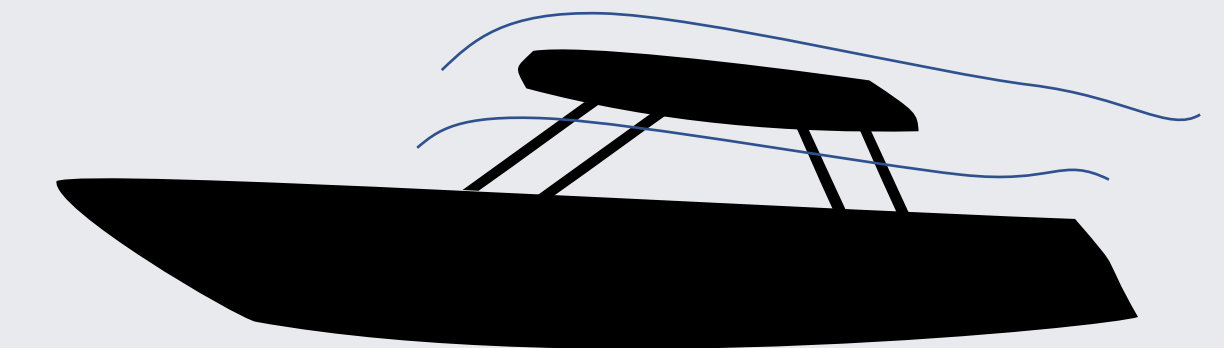
Lightweight Hardtop

Minimized Hardtop

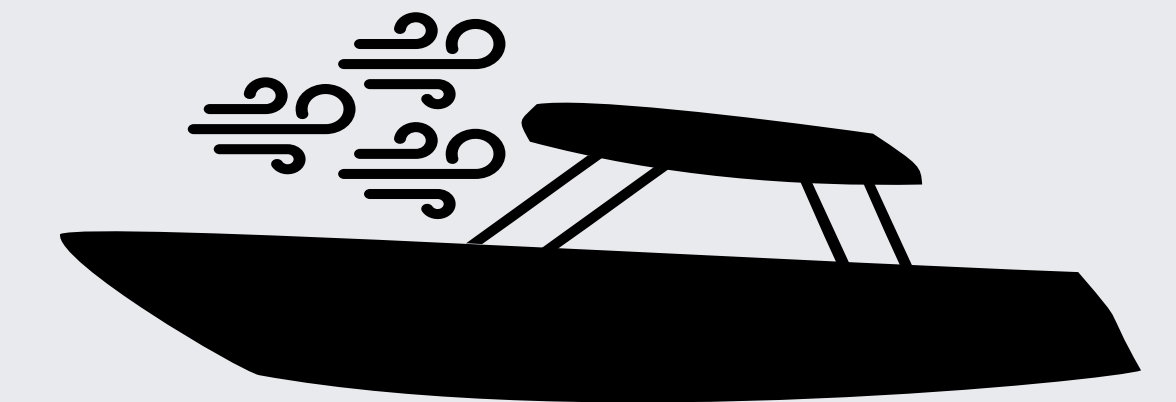
Aerodynamic Hardtop

The three above concepts were selected for analysis and while the aerodynamically improved hardtop showed the highest results during the analytical hierarchy, we decided to move forward with a design that incorporated all three concepts to meet our customer's requirements.

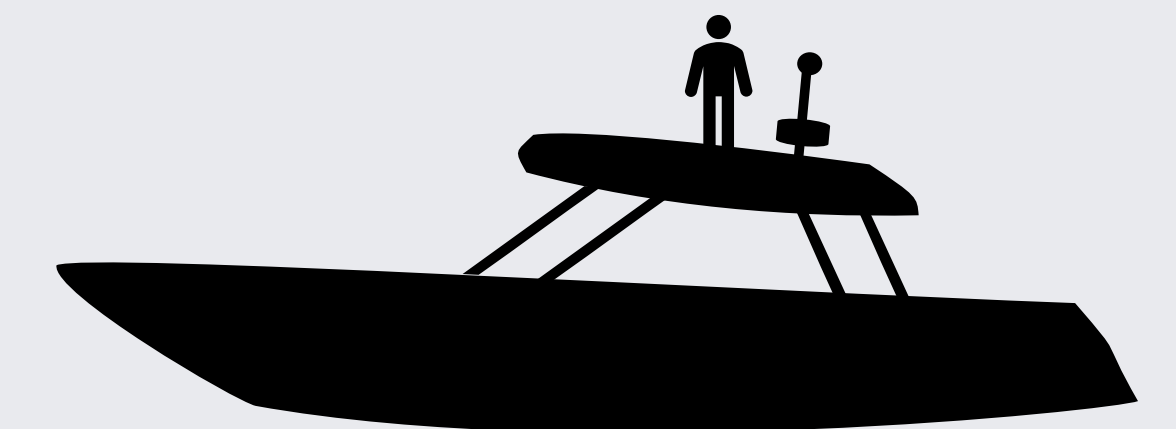
## Targets



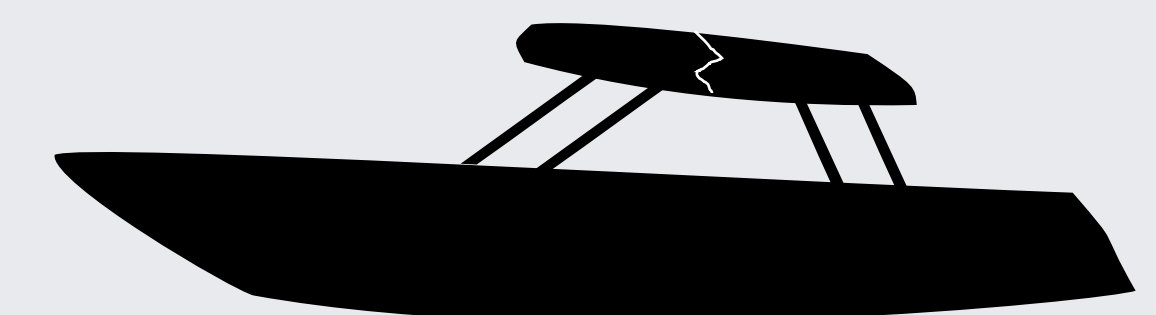
Control Airflow



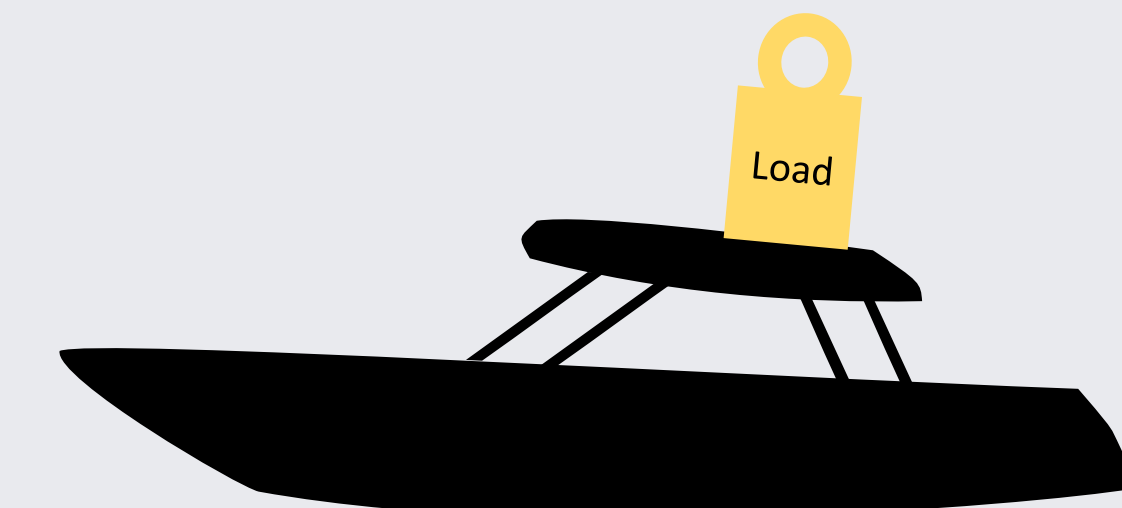
Combat Aerodynamic Loads



Support Needed Weight



Resist Plastic Deformation



Regulate Deflection Under Load