Team #44 Single-Handed Steering System for RIB

Austin Aucoin, Brandon Davenport, Johnnie Driver, Marc Fournet, John H. Wilson

Objective

To design and construct a single-handed steering and throttle system with an external shifting device that is ergonomic, durable, and enables safe operation of a rigid inflatable boat.

Background

The RIB is an 11.5’ AB Inflatable with an aluminum hull and a Yamaha 15 horsepower tiller handle engine. Two custom made seats are located in the boat to seat up to 4 people. The RIB is used to taxi between a sailboat and shore in remote sailing locations. When stored, the engine is removed and the boat is hung on the rear or side of the sailboat. Challenges present include the obvious safety concern of steering and throttling with on hand, but also creating a space efficient system which is easy to maintain and remove when the RIB is stored.

Functional Requirements

Steering	Throttle	Gear Shift
Fully Turn RIB	Accelerates Boat	Shifts between Forward, Neutral, and Reverse
Easy to Push & Pull	Incorporated into steering arm	Accessible from operator’s seat
Push Arm – Turns Left Pull Arm – Turns Right	Maintain Speed without hand on throttle	

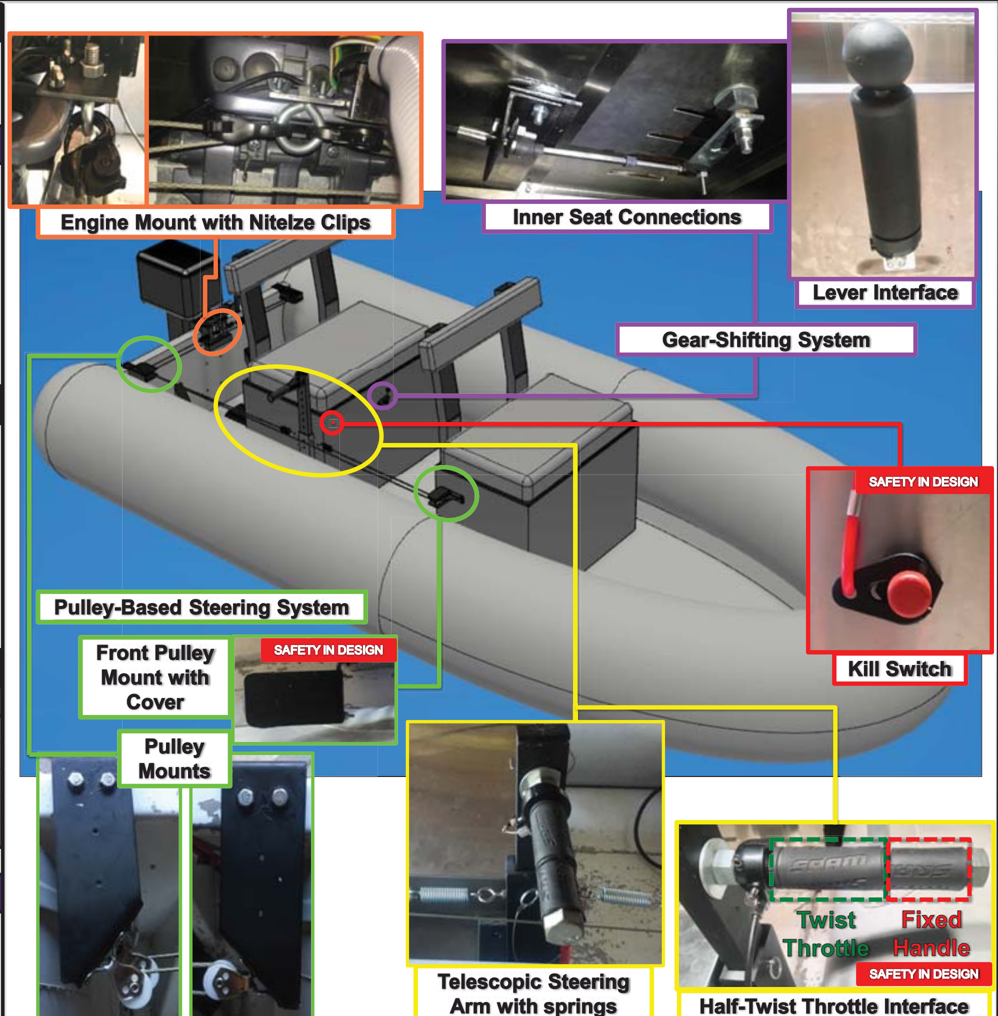
Engineering Specifications

Quantitative	Qualitative
Max tilt = 63°	Easy to attach/detach
Turn radius = 45°(←)/40°(→)	Corrosion resistant
Steering = 15 lbf	Functioning Kill Switch
Shifting = 15 lbf	Easy to maintain
Throttling = 13 lbf-in	No hydraulics

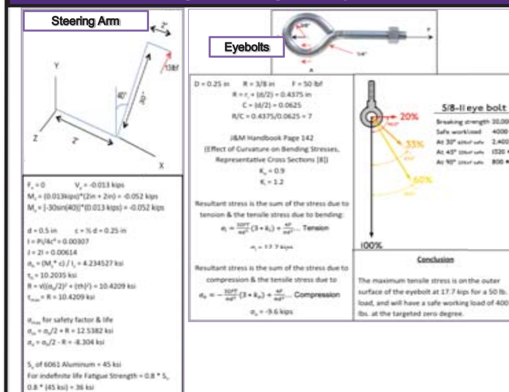
*Tilt & Turn Radius are Yamaha Manufacturing Specifications

Embodiment

Our unique design, while customized to this specific RIB, provides an ergonomic system that can be adapted to a variety of boats. It combines aspects of a tiller handle engine, stick steer system, and small center consoles, allowing the operator to face forward and steer, throttle, and shift the vessel safely and effectively.



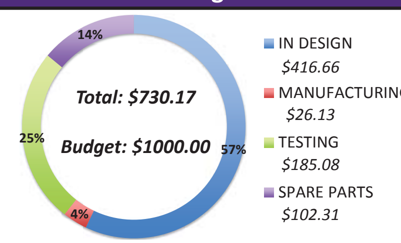
Engineering Analysis



Testing & Validation

Component Tested	Result	E-Spec
Pushing steering arm	10.7 lbf	15 lbf
Pulling steering arm	11.3 lbf	15 lbf
Required Throttle Torque	6 lbf-in	13 lbf-in
Gear-shifting force	14.4 lbf	15 lbf
Corrosion Testing	Pass	Pass
Kill Switch Functionality	Pass	Pass
Full turn radius	Pass	45°(←)/40°(→)
Full engine tilt	Pass	63°
Easy to attach/detach	5:27	5-8 minutes

Budget



September	October	November	December	January	February	March	April
• Concept Generation, Evaluation, & Selection	• Engineering Analysis • Material Selection	• Prototype Modeling • Manufacturing Plans	• Procurement of Raw Materials & Parts	• Fabrication of Steering Arm & Pulley Mounts	• Steering, Throttle, and Shifting Assembly	• Subassembly Testing • Performance Analysis	• System Optimization • Final Testing

Sponsor: Craig Robnik

Advisor: Dr. Shengmin Guo