INTRODUCTION

The 1 Billion dollar market for underwater vehicles continue to grow. It is about time to make the costs non-prohibitive for research, and for underwater infrastructure that benefit the growing human population. Makai Engineering offered our team an opportunity to fill the market niche that they likewise serve.

Design Objective

To design a marine thruster system for underwater use that meets our customer Makai Engineering’s functional requirements, and is more affordable than the market available competitor product.

Functional Requirements

- 100 lbf of forward bollard thrust
- 60 lbf of reverse bollard thrust
- Designed to operate for 12 hours of continuous use
- RPM controlled
- 115V powered
- Rated for 1000 ft depth
- ABS compliant

Methodology

Although throughout the design process, we compared our findings to comparative thruster systems, and sought sources that are reputable, and whose products have both quality and reasonable cost.

Marine Thruster Research Project

2015

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MThruStr T-160

Designed Components

- Sourcing components (design)
- Reinforecement blocks
- Shroud design
- RPM readings

Designed Components

- Final housing design
- Invented coupler design
- RPM readings

Sourced Components

- Vetus 008 propeller
- 3HP Brushless DC Motor
- Controller

Control Circuit

As the thruster needs to be controlled by RPM, with the use of magnets, speed is sensed by hall effect. The diagram here shows the speed control design using Arduino, the AMC driver, and the sensor.

Testing

The MThruStr T-160 needs to be controlled using RPM readings. The 100A/40 driver from Advanced Motion Controls met our requirements. It has a peak current of 100A, and continuous current of 50A.

Financials

Pending our final costs, our running manufacturing costs for the actual piece is now at $4,250 for a piece, 40% less than our competitor. Alternative materials using our design will still cost less. Our current design expense to date is presented here.

Our Sponsors:

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