

Topic: N17A-T019

Candent Technologies Incorporated

Reduced Cavitation, High Efficiency Outboard Propulsors for Small Planing Craft

Candent Technologies is an innovative, lean, Indiana, USA, company focused on the development of highly efficient, high power density, low cost, propulsion and power systems. Under ONR STTR sponsorship, Candent is developing an advanced technology axial flow waterjet propulsion system designed as a “bolt on” replacement for the lower unit of the existing MFE55 outboard motor used on the Combat Raiding Rubber Craft (CRRC), an inflatable boat made by Zodiac and Wing (with similar commercial versions made by them and several other manufacturers), and used by SOCOM, USMC, Navy, USCG, Army, and Air Force (AFSOC). The system incorporates a high efficiency, low cavitation impeller to reduce the acoustic signature of the system, and to provide improvements in maximum speed, range, and boat draft capability.

Technology Category Alignment:

Power Control and Distribution

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SYSCOM: ONR

Contract: N68335-18-C-0705



Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N68335-18-C-0705

Department of the Navy SBIR/STTR Transition Program

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ONR Approval #

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WHO

SYSCOM: ONR

Sponsoring Program: Code 33

Transition Target: Combat Rubber Raiding Craft (CRRC)

TPOC:

Dr. Steven Russell

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Other transition opportunities: In addition to the Combat Rubber Raiding Craft (CRRC), there are other similar inflatable boats of different sizes, also used by DoD Components, which are compatible with the advanced propulsor and would realize similar benefits from the technology. The DoD inventory also has are many other small rigid hull craft which use outboard motors that could use the Candent waterjet propulsor technology and accrue the same benefits. Likewise, those boats are used by non-Federal government entities, primarily in Law Enforcement and Search & Rescue, as well as in commercial entities, and they too can certainly benefit from the technology.



Candent Technologies CAD Rendering - 55MFE with CTI Lower Unit

WHAT

Operational Need and Improvement: Small outboard motors are used throughout all DoD Components and the USCG on small water craft, in particular the Zodiac Combat Rubber Raiding Craft (CRRC). The capability of the boat can be improved for better performance in the more challenging missions: This can be accomplished by developing an advanced technology propulsor with better efficiency and lower vibration characteristics, resulting in higher thrust and lower fuel consumption, which will improve the speed, payload, and range capability of the CRRC, while reducing engine and propulsor vibration.

Specifications Required: It is desired to improve boat top speed to 35 kts at the unloaded condition, and up to 25 kts at a maximum payload of 2,700 lbs. In addition, it is also desired to reduce propulsor (typically a propeller) vibration by 30-40%. A further requirements is that the new propulsor must be a "bolt on" replacement for the Lower Unit (propulsor) on the Evinrude 55MFE outboard motors currently in use by the DoN.

Technology Developed: Candent Technologies is utilizing advanced waterjet technology experience from previous programs in order to design, build, test, and develop a truly advanced, high efficiency, low cavitation, axial waterjet propulsor unit, intended as a bolt on replacement for the standard propeller and pumpjet lower units on the Evinrude 55 MFE outboards currently in use throughout the DoN and other DoD Components. Because of the Candent propulsor configuration, the draft capability of the boat will improve by over 12 inches compared to current systems, enabling the boat to operate in very shallow waters. In addition, the technology is scalable to smaller and larger outboard motors.

Warfighter Value: The Candent propulsor system will provide higher thrust and efficiency than the current systems in use, resulting in higher speed and range capabilities at higher loadings for the CRRC, as well as much lower vibration and shallow water operation capabilities. These improvements translate into faster insertion and extraction of teams, reducing exposure time and risk of detection, as well as enhanced versatility and capability for expanded operational theaters and variety of missions.

WHEN

Contract Number: N68335-18-C-0705 **Ending on:** March 27, 2020

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Propulsor System Design	Low	Design Validated by Analysis and Simularion	4	2nd QTR FY19
Hardware Fabrication	Med	All Hardware Delivered	4	3rd QTR FY19
Propulsor Tank Testing	Low	Performance Assessment Satisfactory	5	4th QTR FY19
CRRC Testing	Low	Performance Improvements Verified	6	3rd QTR FY20
Further Development and User Testing	Low	Design Improvements and Performance Verified	7	3rd QTR FY21
Transition to Fleet via GSA	Low	Propulsor Qualified and Available through GSA	8	4th QTR FY21

HOW

Projected Business Model: Candent has designed the advanced technology propulsor to maximize use of existing, current production hardware, and to outsource the manufacturing of unique parts, leaving assembly and test for Candent to complete in-house. As with similar "aftermarket" propulsors, such as the pumpjet currently used on the Evinrude 55MFE outboard, we are working with the Prime, proposing that they offer the Candent propulsor as a catalogue option for their outboards, and in addition, we will offer Lower Units via the GSA to all Government agencies. Note that the technology is not limited to a single outboard manufacturer, and similar lower units can be developed for other brands of outboard motors, an option that we will pursue as well.

Company Objectives: Candent's primary objective for the STP Forum is to present the technology to interested parties and decision makers within the DoN and other DoD Components. In the short term, we would like to see program managers and end users attend the STP presentation, and to be able to make contacts with these individuals so that we can follow on with in depth discussions about their requirements and how our technology can provide the best solutions. In the long term, we would like to develop good relationships with the acquisition managers and end users in order to ensure eventual transition to the end users

Potential Commercial Applications: Beyond the DoN end users and other DoD Components, as well as the USCG, the Zodiac and other similar boats are in use by literally thousands of Search and Rescue agencies throughout the USA, Canada, and throughout the world. The ability to operate in shallow water, or flooded areas with submerged obstacles (vehicles, fences, traffic signs, fallen trees, etc.) without an exposed, rotating propulsor make our waterjet Lower Unit highly desirable to those agencies, and provide a ready market of significant proportions. Other Allied Military entities also use these boats and can use the technology as well, further expanding the market potential. Moreover, the technology is also applicable to rigid hull small craft using outboard motors, which also provides additional market possibilities. Because the technology is applicable to other brands of outboard motors, the design can be customized for different motors and power ratings, further expanding the market potential.

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