

Department of the Navy SBIR/STTR Transition Program

Statement A: Approved for Release. Distribution is unlimited.

Topic # N112-137
Active Motion-Compensation Technology for Roll-On/Roll-Off Cargo Vessel Discharge to Floating Platforms
Advanced Technology & Research Corp.

WHO

SYSCOM: NAVSEA
Sponsoring Program: Team Ships, PMS 385
Transition Target: JHSV
TPOC: (540)653-6581
Other transition opportunities: SOF boats, patrol boats, USMC assault support boats with weapons, instruments or personnel adversely affected by rough rides. TEU-size mission modules, e.g. surgical units or electronics repair units, placed on any ship and benefiting from a high degree of stabilization against vessel motions. Motion-sensitive payloads placed on land or air vehicles. High-fidelity physical simulator for testing payloads in high-motion environments.



Image courtesy of Austal USA

WHAT

Operational Need and Improvement: JHSV (also known as EPF) is a fast, catamaran-type ro-ro ship able to perform a variety of sealift and expeditionary missions. Relative to large ships, it has a different and troublesome ship motion profile involving strong accelerations and jerk. For operation of motion-sensitive payloads on JHSV, other small craft and boats, partial or complete stabilization is needed.

Specifications Required: The system must reduce motions transmitted to a payload to “no worse” than such systems would experience on a large V-hull ship. The threshold goal is to reduce maximum accelerations on the JHSV in sea state 4 by 50% and to mitigate jerking and vibration. The system must have its own sensor set and anticipate periodic movements. Contractor must demonstrate 6 DOF motion compensation of a compact 2,000 lb payload in Phase II, and indicate a scaling path for stabilization of less compact and heavier payloads.

Technology Developed: Motion Compensation Platform (MCP) flexibly interfaces with the host ship and payload. It is a self-contained system (except for electrical power) “bolted” to the vessel and payload. The MCP mechanism handles translational and rotational movements separately. Its design is well-suited for high heave compensation and heavy payloads. Passive damping may assist with high-frequency perturbations. The controller provides real-time actuator commands and uses history to predict large movements and pre-position for them.

Warfighter Value: The MCP will enable a variety of offensive, defensive and support missions to be performed on small, fast surface platforms under challenging ship motion conditions.

WHEN

Contract Number: N00024-15-C-4021 Ending on: January 19, 2017

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Demonstrator PDR	Low	TPOC approval	3	November 2015
Demonstrator CDR	Med	TPOC approval	3	April 2016
Demonstrator delivery to NSWCDahlgren	Med	In-lab tests and QA complete	4	September 2016
Stabilization demo on motion base with payload	Med	Motion, acceleration and jerk reduction	5	October 2016

HOW

Projected Business Model: ATR is an engineering design, prototyping and manufacturing organization working to ISO 9001-2008 standards. ATR will work with Systems Integrators to adapt the technology for desired payload – vessel pairings. The technology may be transitioned as a discrete bolt-on product or as a mission system component. ATR will manufacture small and mid-scale hardware and develop operating software.

Company Objectives: ATR seeks to increase its business base and reputation in stabilization technologies. ATR desires to connect with Navy PMs and suppliers of motion-sensitive mission modules, weapons and instruments of utility for small fast vessels. ATR seeks a direct role in hardware manufacturing and control systems provision. Partnering for system integration, joint manufacturing or subcontracting are all of interest.

Potential Commercial Applications: The MCP technology is adaptable to any commercial application in which motion and shock sensitive equipment (or personnel) are to be deployed on vehicles subject to damaging or performance-degrading motions. Maritime applications, including offshore energy exploration and production, are primary, but off-road land vehicles and some aerial platforms may also benefit.

Contact: Dr. Tom Zhao, Principal Investigator
TZhao@ATRCorp.com (443) 766-7978