

Topic: N171-055

## Makai Ocean Engineering, Inc.

Methods for Measuring an Acoustic Array's Straightness and for Autonomous Mechanical Straightening to Avoid Contact with Sea Bottom Under All Operational Conditions

The SASS provides constant drag and lift that improves tow cable straightness and depth control. The SASS is completely passive, meaning power or external communications are not required. It attaches to existing tow cables with minimal modification. The SASS provides line tension even at low speeds that will expand the operational limits and speeds at which cables can be towed through the water. Makai Ocean Engineering (Makai) is well known for our work with subsea cabled systems including innovative software and hardware systems. Makai has built and is currently testing a prototype SASS. We are looking for assistance in transitioning and integrating this technology throughout all applications that use tow cables including the Navy, and oil and gas industry, among others.

### Technology Category Alignment:

Sensors

Ground and Sea Platforms

Advanced Electronics

### Contact:

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**SYSCOM:** NAVSEA

**Contract:** N68335-19-C-0296

 Corporate Brochure: [https://navystp.com/vtm/open\\_file?type=brochure&id=N68335-19-C-0296](https://navystp.com/vtm/open_file?type=brochure&id=N68335-19-C-0296)

 Tech Talk: <https://www.youtube.com/watch?v=mXwICZbgC5Y>

Department of the Navy SBIR/STTR Transition Program

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NAVSEA #2020-0465

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WHO

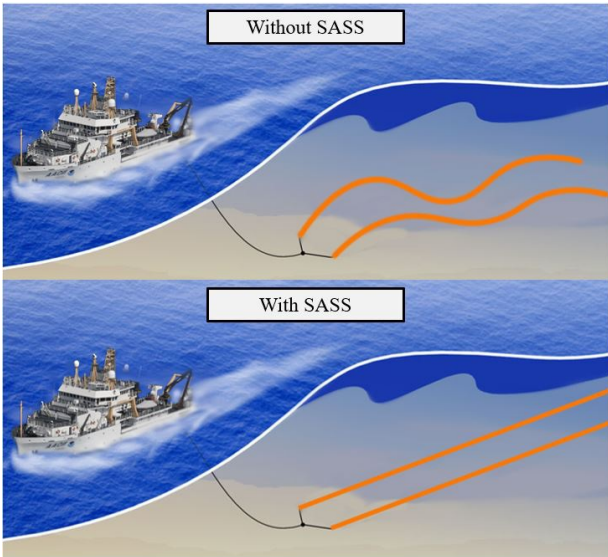
**SYSCOM:** NAVSEA

**Sponsoring Program:**

**Transition Target:** Vessels that use horizontal tow cables

**TPOC:**  
(401)832-5184

**Other transition opportunities:** Any vessels that use horizontal tow cables



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WHAT

**Operational Need and Improvement:** Tow cables are typically long, flexible, neutrally buoyant cables. Currents also cause bending and turning of the cables. The cables are currently allowed to droop at lower ship speeds, which can inadvertently damage cables from dragging on the ocean bottom.

**Specifications Required:** There exists a need to autonomously straighten horizontal tow cables linearly to within +/- 2 feet of center on each axis and protect itself from bottom damage without intervention from an operator. The system must not significantly affect tow cable performance nor increase physical vulnerabilities to fishing nets or long-lines.

**Technology Developed:** Makai’s SASS was developed to provide a controlled amount of drag and lift to the aft end of horizontal tow cables, across the operating range of tow speeds in order to improve cable straightness and depth control. SASS does this completely passively controls with no power or communications inputs.

**Warfighter Value:** By straightening the tow cables at all operational speeds, Makai’s SASS improves system operations. Additionally, eliminating tow cable entanglement and severe damage in shallow water could save the users on repair costs.

WHEN

**Contract Number:** N68335-19-C-0296 **Ending on:** April 10, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Pier-side testing of full-scale SASS prototype on short ropes	N/A	Full SASS prototype keeps short lines straight during tow operations	4	January 2020
Conduct at-sea testing of SASS on full length ropes instead of tow cables in a simulated operational environment	N/A	Full SASS prototype keeps long lines straight during tow operations	5	April 2020
Conduct at-sea testing of SASS on representative tow cables in a simulated operational environment	Low	SASS system works as expected during in-water testing	6	April 2021

HOW

**Projected Business Model:** Order volumes are expected to be limited, with orders in the tens of units total. Makai will use the trusted supply chain developed during PhII efforts to competitively source parts, assemble and calibrate equipment in-house, and deliver to the customer. Makai has worked with a local composite manufacturer in Hawaii during the Phase II to build the main SASS body.

**Company Objectives:** While Makai is already known worldwide for our subsea cable modeling software, SASS and other technologies currently being developed are allowing Makai to expand into cable related hardware systems. This program will allow Makai to expand into towed cable hardware systems.

**Potential Commercial Applications:** This program and the hardware design capabilities could be adapted to serve similar but non-military acoustic/seismic tow cable systems employed by oceanographic vessels, surveyors, and the offshore oil and gas exploration markets. Survey vessels for these industries use a range of tow cables many of which use greater than 2 lines.

Makai is confident that with some relatively minor design changes (on how the hardware is attached to the tow cables) the hardware proposed can be used by single and other multi-line tow cables which have similar problems on straightness and depth control.

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