Department of the Navy SBIR/STTR Transition Program

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NAVSEA #17-436

Topic # N112-142
Advanced Structural Development for Naval Hovercraft Ramps (MSC P4151)
Materials Sciences Corporation

WHO

SYSCOM: NAVSEA

Sponsoring Program: PEO SHIPS / PMS-377

Transition Target: LCAC / LCAC100

TPOC:
(202)781-0448

Other transition opportunities: LCS well-deck / loading-ramp. JHSV stern ramp. LCU-1700 bow ramp. Army Landing Craft Platforms. Military Sealift Command RO/RO craft.

WHAT

Operational Need and Improvement: Existing LCAC aluminum ramps are highly prone to damage and surface cracks caused by harsh salt water, exposure to sand, sediment and machinery oil, and damaging stress from equipment weight during on/off loading. The accruing damage results in reduced vessel lifespan, increased operation and maintenance costs and reduced performance. Improving durability, corrosion resistance and life cycle cost of the air cushioned vehicle (ACV) ramps at minimum weight is paramount to achieving operational goals of future platforms.

Specifications Required: Composite vehicle ramp structures must meet all seaway and vehicle imposed structural requirements defined for the legacy aluminum ramp components while resulting in Total Ownership Cost (TOC) cost-savings to the Navy. Life-cycle cost savings includes considerations for reduced maintenance (superior durability / corrosion-resistant) as well as fuel-efficiency gained from weight savings.

Technology Developed: Materials Sciences Corporation in partnership with Seemann Composites Inc. have designed, fabricated and proof-tested a lightweight, durable, corrosion-resistant composite stern ramp for the Navy's Landing Craft Air Cushion Vehicle (LCAC-43). Successful proof-testing of the first-article stern ramp prototype has demonstrated the superior durability and structural performance of the composite solution while realizing weight savings projections of ~40% over in-service aluminum ramps. The MSC/SCI team is currently in the process of leveraging this successful demonstration in the development of a composite bow ramp structural solution, which pending successful prototype testing holds the potential for significant cost savings for the LCAC100 fleet.

Warfighter Value: Significant reduction in operational and support costs via the inherent corrosion resistance of non-metallics. Measured weight savings on the order of 40% have been established through a comparison of a composite stern ramp prototype and the in-service ramp that was replaced. Projected weight savings of 4,000+ lb per bow/stern ramp ship-set returns significant cost-savings as a result of enhanced fuel-efficiency through reduced platform weight. Weight savings also facilitates the transportation of additional troops, supplies, vehicles and munitions.

WHEN

Contract Number: N00024-14-C-4091 **Ending on:** May 3, 2018

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Composite Stern Ramp Preliminary Design Review	N/A	Navy approval of global composite stern ramp design and component test plan	3	June 2015
Composite Stern Ramp Critical Design Review	N/A	Navy acceptance of component testing, detailed stern ramp design and manufacturing process	4	December 2015
Composite Stern Ramp Structural Qualification Testing	N/A	Pass structural load proof-testing	7-8	January 2017
Composite Bow Ramp Critical Design Review	Low	Navy acceptance of detailed bow ramp design and manufacturing process	4	January 2018

HOW

Projected Business Model: Materials Sciences Corporation (MSC), of Horsham, Pennsylvania, is continuing to work with our manufacturing partner, Seemann Composites Inc. (SCI) of Gulfport, Mississippi in defining both LRIP as well as full-rate composite ramp manufacturing plans in support of the ~70 ship class of LCAC100 vehicles.

Company Objectives: With the transition path for insertion onto the LCAC100 platform well defined, MSC is looking to leverage the Navy STP program in an effort to investigate the potential for this technology on other Naval platforms that would benefit from durable, corrosion resistant vehicle loading systems that currently operate in a saltwater environment. Implementation of this technology is not strictly limited to vehicle loading environments and could be considered for any application where there is an opportunity for reduction in maintenance costs and/or structural weight of a legacy metallic system or component.

Potential Commercial Applications: In addition to this direct application, MSC will pursue applying the concepts developed under this SBIR to commercial applications requiring rugged, lightweight shallow-water transports

Contact: Luke Colone, Senior Engineer
colone@materials-sciences.com 215-542-8400