

WHO

SYSCOM: ONR

Sponsoring Program: Office of Naval Research

Transition Target: Unmanned Maritime Systems Program Office (PMS 406) and LCS Mission Modules Program Office (PMS 420)

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Other Transition Opportunities: Unmanned Surface Vessels



Image courtesy of Big Metal Additive, 2020

Notes: - Image of a 21-inch diameter UUV that Big Metal Additive designed, produced, and basin tested.

- Multiple pressure vessels (PVs) have successfully passed hydrostatic proof testing up to 1,040 psi.
- 95% faster PV production than traditional manufacturing.
- Currently producing metal products for commercial customers in multiple industries.

WHAT

Operational Need and Improvement: Unmanned Vehicle (UxV) manufacturability. This topic will define and develop modular UxV system fabrication and assembly technologies and conduct related materials research for UAVs, USVs or UUVs. This includes use of low cost additive manufacturing technologies and abilities to fabricate close to the point-of-need. This includes manufacturing technologies that support full ocean depth capable UUVs, expendable and reusable UxVs, as well as short and medium endurance UAVs and payloads. These systems must be rapidly reconfigurable to enable conversion of payloads to meet time critical mission needs.

Specifications Required: The Navy has been developing unmanned underwater vehicles (UUVs) for many years to perform a wide range of mission objectives. Sustainment of industrial capacity for technology innovation for next-generation deployable Naval systems has been identified as a key risk. Manufacturing of UUVs must be reconfigurable to enable the deployment of payloads to meet time-critical mission needs. Large-scale metal hybrid additive manufacturing has been demonstrated as having suitable methods and materials to meet Navy needs for reconfigurable UUV hulls and pressure vessels. Hybrid additive manufacturing can be used to produce pressure vessels that provide rapid reconfigurability for time-critical mission needs. In addition, hybrid additive manufacturing can produce advanced geometric features that conventional manufacturing cannot produce, enabling new performance features such as cable pass-throughs and pressure wall geometries that maximize pressure performance. Scope includes full development from concept to preliminary design and prototype production and testing, to critical design and production with full-scale testing to validate the final design.

Technology Developed: Big Metal Additive has developed and validated a robust engineering and manufacturing capability to provide PVs and hulls at 95% shorter lead times and 63% lower cost.

Warfighter Value: - Significantly reduced lead times – 95% faster than traditional manufacturing.

- Cost competitive – 63% lower cost than traditional manufacturing.
- Rapidly reconfigurable – innovative, mission-specific designs.
- Rapid deployment of mission-critical assets

WHEN

Contract Number: N68335-21-C-0314 **Ending on:** Oct 11, 2022

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Critical Design Review	Low	TPOC approval of Critical Design for production	4	1st QTR FY22
Production	Low	7 pressure vessels additive manufactured	5	2nd QTR FY22
Hydrostatic Testing	Low	7 pressure vessels passed hydrostatic testing	6	3rd QTR FY22
Test at Sea	Medium	Completion of additive manufactured component test at sea	7	4th QTR FY22

HOW

Projected Business Model: Big Metal Additive will produce UUV structures as a supplier to prime contractors where rapid production and reconfigurability of medium and large-class UUVs will provide significant benefit to the warfighter. We also offer value-added engineering services for design, optimization, test, and analysis.

Company Objectives: Our objective is to solve supply chain problems for UUV prime contractors with rapid, on-demand production from a digital inventory.

Potential Commercial Applications: UUV and USV hulls, pressure vessels, and pressure-containing valve bodies.