Topic: N161-038

Triton Systems, Inc.

Shipboard Additive Manufacturing (AM)/3D Printing

The US Navy is looking to rapidly manufacture parts while at sea, specifically develop qualified materials and an Additive Manufacturing (AM) methodology to produce defect free parts and maintain geometric tolerance in a shipboard environment. With over 25 years' experience, Triton Systems Inc. (TSI) is a technology incubator that develops materials and systems applications. Currently, TSI is developing non-halogenated flame retardant thermoplastic feedstocks for use in additive manufacturing of polymeric components in a closed environment, where the risk of fire and smoke are especially critical. The goal of this Phase II effort, hopefully the feedstock and fabricated components will meet the stringent Navy Flame, Smoke, and Toxicity (FST) requirements. TSI is looking for a partner to help commercialize the feedstock to be used in a variety of 3D printers.

Technology Category Alignment:

Ground and Sea Platforms
Materials & Manufacturing Processes

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SYSCOM: NAVSEA
Contract: N00178-17-C-9004

Department of the Navy SBIR/STTR Transition Program

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Triton Systems, Inc.

WHO

SYSCOM: NAVSEA

Sponsoring Program: NAVSEA 05P

Transition Target: LPD 17 Class Ships

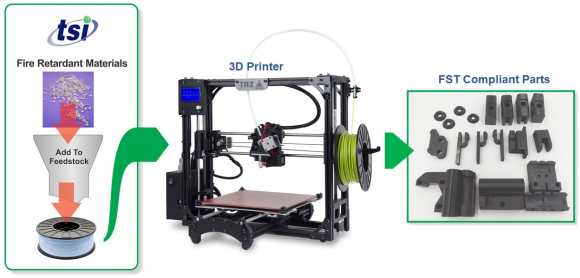
TPOC:
(301)227-5144

Other transition opportunities: All ships, submarines, and aircraft

Notes: FST - Flame, Smoke, and Toxicity

FDM - Fused Depositon Modeling

ULTEM 9085 - Brand name of polyetherimide



WHAT

Operational Need and Improvement:
To enable shipboard additive manufacturing, feed-stock materials must be developed which meet the NAVSEA's stringent Flame, Smoke, and Toxicity (FST) requirements. This applies to both the additively manufactured component and the raw feed-stock spools in storage. In addition to meeting the FST requirements, the feed-stocks developed must be printable in commercially available FDM printers and mechanically strong.

Specifications Required:
1) A manufacturing methodology that is not adversely affected by the shipboard environment
2) Produces ready-to-use final component parts that pass NAVSEA FST requirements
3) Final products could include:
- a material that can pass FST requirements and be used in existing AM systems,
- a material storage and processing methodology for non-metallic materials that ensures material quality throughout the build regardless of the surrounding environment.

Technology Developed:
We have incorporated a mixture of flame retardant additives into polycarbonate and demonstrated:
1) Improved flammability performance of materials, however; current NAVSEA FST requirements have not been achieved but significant improvement over unmodified feed-stock has been achieved
2) They are 3D printable on an FDM printer
3) Higher strength

Warfighter Value:
Our development will allow for improved warfighter effectiveness and safety at sea. Instead of awaiting resupply at sea or returning to port, NAVSEA vessels can additively manufacture needed components shipboard. Additionally, the materials used to fabricate the components will not present an FST risk to all personnel aboard.

WHEN

Contract Number: N00178-17-C-9004 **Ending on:** October 31, 2018

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Demonstrate improved FST performance of modified polycarbonate	Med	ASTM E1354 & E1678	5	November 2018
Demonstrate improved FST performance of modified ULTEM	Med	ASTM E1354 & E1678	5	November 2019

HOW

Projected Business Model:
After successfully developing improved additive manufacturing materials as feedstocks in FDM printers, we will approach the market using several parallel paths:
1) Direct sales to users
2) Licensing to FDM printer makers for use in their tools
3) Sale of pellets of the materials to filament manufacturers

Company Objectives:
Our objective is to develop specialty FST compliant materials for use in additive manufacturing tools. We are initially focusing on FDM-type printers, but intend to develop materials for other technologies as well.

Potential Commercial Applications:
Any commercial application which requires safe, fire-tolerant materials could be a potential user of our developments. Initially we will focus on commercial aircraft and ships.

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