

Topic: N151-002

## Triton Systems, Inc.

### Light-weight Vehicle Exhaust System for Amphibious Vehicles

The USMC's call for durable, light-weight and affordable exhaust systems for amphibious vehicles is answered by Triton's light-weight, multilayered composite exhaust system technology. Designed to replace legacy and envisioned metal exhaust system technologies, initial prototype testing demonstrated that Triton's technology reduces overall weight by approximately 50 percent at approximately 55 percent of the target cost with no performance degradation. Triton Systems, Inc. specializes in developing lightweight, affordable composite products to replace heavy and/or metallic structures to resolve problems of critical importance for military and commercial customers. We seek partnerships with government organizations/test facilities to demonstrate/validate prototype system capabilities and with prime contractors to license the manufacturing and incorporation of the technology. The initial target platform for this technology is the USMC Amphibious Combat Vehicle (ACV).

### Technology Category Alignment:

Corrosion

Readiness

Maintainability/Sustainability

Manufacturing Technology for Affordability

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**SYSCOM:** MARCOR

**Contract:** M67854-17-C-6503

 Corporate Brochure: [https://navystp.com/vtm/open\\_file?type=brochure&id=M67854-17-C-6503](https://navystp.com/vtm/open_file?type=brochure&id=M67854-17-C-6503)

**WHO**

**SYSCOM:** MARCOR

**Sponsoring Program:** PM AAA

**Transition Target:** ACV 1.2

**TPOC:**

[sbir.admin@usmc.mil](mailto:sbir.admin@usmc.mil)

**Other transition opportunities:** Other ground vehicles in PEO Land Systems and air vehicles, including Hypersonics, throughout DoD.

**Notes:** Triton Systems, Inc. is a Global Business Venture company that successfully launches innovative products and solutions in emerging markets worldwide. We invest in new technologies through in-house incubation and external partnerships - creating thriving businesses from novel ideas. One area Triton specializes in is developing lightweight, affordable composite products to replace heavy and/or metallic structures to resolve problems of critical importance for military and commercial customers.

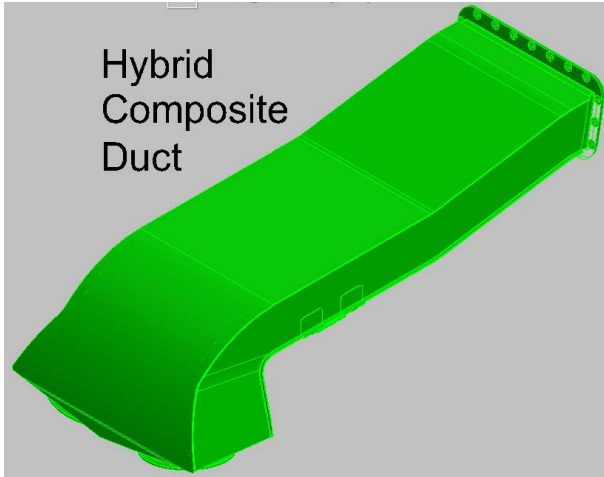


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**WHAT**

**Operational Need and Improvement:** The goal of the technology is to reduce the weight of amphibious vehicle exhaust systems. In addition to being lightweight, the exhaust will need to be affordable, durable enough to endure the harsh amphibious vehicle operating conditions, and meet additional requirements; such as, improved safety if accessible to personnel, and control the thermal signature of vehicle exhaust systems. The use of composite materials versus light weight metals allows fabrication of exhaust ducts that have significantly lower external temperatures while still surviving the high internal temperatures.

**Specifications Required:** The specifications are a robust (survivable to vehicle vibrations and wave-slap impact), light-weight (less than 500 pounds (lbs)), affordable (less than \$100K to acquire) engine exhaust system while simultaneously reducing the thermal conductivity of the vehicle's exhaust to the environment. The exhaust system must be capable of efficient operation across a range of mass flow rates from 0.5 kilogram per second (kg/sec) to 3.5 kg/sec and an overall system backpressure of less than 50 millibar (mbar). The exhaust system must withstand internal pressures of up to 6 pounds per square inch (psi). It must have the ability to function in extreme operating environments which include, but are not limited to, -25 degrees Fahrenheit (°F) to +120°F, hot desert blowing sand, full salt water immersion and immersion in petroleum-based liquids. Operation conditions up to 750 degrees Celsius (°C) engine exhaust and not suffer performance degradation including corrosion when exposed repeatedly to quenching with ambient temperature sea water.

**Technology Developed:** The technology developed by Triton is a composites of composites design to allow reduction in weight and external thermal temperature. The additional benefit is the reduction in total costs when compared to equivalent systems constructed using light-weight metals. Even when compared to light-weight metals, Triton's technology reduces overall weight by approximately 50 percent at less than 55 percent of the target cost with no performance degradation.

**Warfighter Value:** Increased vehicle survivability due to reduced thermal signature, reduced weight resulting in increased vehicle buoyancy, increased crew and passenger safety due to cooler surfaces of exposed parts, and improved affordability due to increased durability and manufacturing cost.

**WHEN**

**Contract Number:** M67854-17-C-6503 **Ending on:** February 13, 2019

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Subcomponent Prototypes Designs, Development, and Testing in Phase II Base	Med	Ability to meet the thermal and strength requirements of the engine system for ACV 1.1	4	2nd QTR FY19
If Phase II Option awarded: Full-scale Component Prototyping in Phase II Option	Med	Form and fit testing to allow mounting into ACV1.1 exhaust system	5	1st QTR FY20
If Phase II.5/Phase III awarded: On Vehicle Test Demonstration	Med	Exhaust system survives and demonstrated required performance	6	3rd QTR FY20

**HOW**

**Projected Business Model:** Through a structured, rigorous stage gate process, Triton Systems Inc. (Triton) diligently transitions products and services into successful entities through licensing opportunities, joint ventures, or spinoff companies. A similar process will be used to transition our lightweight exhaust technology being developed for the USMC. Our preferred business model is to outsource manufacturing of the composite layers and integrate the system in-house. The integrated light-weight structure will ultimately be supplied from Triton to the market through direct sales.

**Company Objectives:** Triton is an "Invention-through-Venture" developer of breakthrough technologies and products. Products developed range from cancer immunotherapies, printable electronics to composite materials. Triton's composite materials product line currently includes Polymer Matrix Composites (PMCs) for airdrop platforms and electromagnetic interference (EMI) shielded electronic enclosures, Metal-Matrix Composites (MMCs) for bearings and Ceramic Matrix Composites (CMCs) for hypersonic aerospace. Triton's objective is to continue to expand this product line by creating business opportunities in not only exhaust system components, but hybrid composite aerospace for manned and unmanned systems.

**Potential Commercial Applications:** High temperature capable materials are widely used in hot structures for power generation, industrial processing, oil exploration, and transportation systems. Metals suffer from limitations in weight, affordability, producibility, and environmental resistance. Advances in ceramic composites have resulted in their consideration for many of these hot structure applications with the global market for CMC's forecast to reach \$7.7 billion by 2023. Limitations still however exist when CMCs are operated in close proximity to lower temperature capable materials, operators or passengers. Triton's lightweight exhaust component materials are expected to have broad application where a thermally shielded, high-temperature composite is desired for operator and passenger safety and/or to extend the operational capabilities and lifetime of surrounding lower temperature capable materials.