Department of the Navy SBIR/STTR Transition Program

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Topic # MDA12-025

Affordable Reinforced Polymer Composite Structures with Embedded Electrical Interfaces

Taylor & Lego Holdings, LLC (TLH) / Rapid Composites

WHO

SYSCOM: ONR

Sponsoring Program: MDA12-025

Transition Target: Coyote 3B future manufacturing development

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Other transition opportunities: Advanced composites, components, assemblies or sub-assemblies with improved consistency, reduced weight, EMI/RFI shielding, thermal management and substantially better cycle times in minutes rather than days or hours can be applied to missiles, drones/unmanned aerial (UAS/UAV), ground (UGV/AGV), water surface (USV/ASV) and underwater (UUV/AUV) systems, optical benches, target illuminators, and rugged electronics.

https://www.aoml.noaa.gov/wp-content/uploads/2018/11/Coyote_in_flight_cropped.jpg

Notes: TLH has demonstrated that it can produce now over 60 rugged handheld devices, The FLIR MLR Aka/Recon 5 (recently passed government testing), transit cases, drones to include the Coyote, along with control surfaces and complex fuselage assemblies with greater repeatability and substantially better cycle times. We demonstrated the ability to produce tubular fuselage components for MDA with embedded electrical interfaces in minutes instead of days on an earlier Phase I contract.

WHAT

Operational Need and Improvement: Existing unmanned air land and sea based vehicle fuselages, control surfaces, lift surfaces, chassis, bulkheads, and other internal structures can in most instances, be easily transitioned to advanced composites. The materials and processes employed by TLH have demonstrated better consistency/repeatability, reduced component weight, improved the EMI/RFI and/or thermal properties, and reduced the cycle times across the entire Coyote assembly.

Specifications Required: SWAP-C improvements to the platform are a direct benefit from the extremely fast-processing speeds and unique ability to offer in many instances more sophisticated, tailored structural, lightweight materials than more conventional 2x2 twill style composites, often used. There are many instances where heavier aluminum structures were transitioned into 3-D oriented, discontinuous carbon materials. Even bulkheads with complex geometry (with ribs, gussets, etc.) is capable of being molded in five minutes or less, eliminating laborious machining processes and hours of work, substantially improving the cost, weight and functionality.

Technology Developed: There are both pre-existing and newly envisioned construction methodologies that have been utilized for the Coyote 3B program. These include materials science applications (existing and post technologies), construction methodologies (existing and post technologies), fabrication techniques (existing and post technologies), unique tooling approaches and technologies (existing and post technologies), robotic composite molding work-cells (exclusively owned by TLH). These technologies can be applied to a wide array of military and commercial products that can benefit from better consistencies, reduced part counts, lighter materials, and faster cycle times.

Warfighter Value: Lighter parts for a drone can improve flight times and increase payload capacity. Better material selection and processing techniques improve production consistency. There is a more linear/iterative approach to the structural design process, making fine-tuning structural enhancements more predictable. Better manufacturing methods make the products more reliable and the mid to high volume process ensures that the supply can meet demand expectations.

WHEN

Contract Number: N00014-17-C-1036 **Ending on:** January 15, 2020

Milestone	Risk Level	Measure of Success	Ending TRL	Date
R&D Material Solutions	Low	Determine material options	5	4th QTR FY19
Candidate Test Articles	Low	Meets or exceeds requirements	5	4th QTR FY19
Integration of Components	Med	Fit and function	5	4th QTR FY19
Flight Testing	Med	Performance SWAP-C improvements	6	1st QTR FY20
Test Report	Low	Compiled Data	6	1st QTR FY20
LRIP- Articles for Program Integration	Med	Production TBD	7	2nd QTR FY20

HOW

Projected Business Model: Taylor & Lego Holdings, LLC (TLH) offers a wide array of services including industrial design, mechanical engineering, electrical engineering, software engineering, prototyping, tooling, carbon fiber molding and production. We specialize in developing products from the ground up and are capable of executing a “start to finish” process entirely under one roof. TLH will manufacture any selected and approved Coyote production components that pass the government sponsored testing. Any/all fuselage components can be produced by TLH in a short-run capacity now. TLH can in most cases modify existing tooling for increased production capacity to a pre-production level of 100 units/month now. 250 units/month can be accomplished in 16-22 weeks time.

The company typically manufactures its tooling in as matched aluminum or steel core/cavity molds using its proprietary formulas and methods. Volume capacity depends largely on the work-cell the tooling is designed around and, number of cavities and the base material, i.e. steel vs. aluminum, etc. Typically steel may be stable for 10,000 or more cycle/shots and aluminum after being Ni/plated maybe stable for 200 to only 500 cycle/shots.

Company Objectives: In the short term, TLH seeks to transition this technology into future Coyote development as well as any other mission critical harsh environment products that can benefit from the technologies. Long term, TLH will be adapting forms of this technology and material variances to new programs that require composite expertise and unique construction methodology.

Potential Commercial Applications: Improved composite manufacturing techniques and electrical interface methods will serve as enabling technologies for automotive, commercial aerospace, infrastructure, other Department of Defense Agencies, etc. Examples include: structural automotive load bearing components, commercial marine (boat) applications, electrically conductive applications, dielectric applications, thermally conductive components, structural reinforcements, composite hardware, and induction welding applications, whereby, eliminating Methyl Methacrylate epoxies.

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