Topic: N161-017

Texas Research Institute Austin, Inc.

Efficient On-Aircraft Composite Repair Process Requiring Minimal Support Equipment

This technology will streamline composite repair processes on aircraft and other vehicles. The approach could potentially transform additional composite fabrication areas. The majority of high performance thermoset resins have two-components and require thermal curing to achieve acceptable properties. The resin system developed by TRI/Austin can be supplied as a one component system that can be cured at ambient temperatures. Without post-cure the resin will provide a glass transition temperature in excess of 350 °F (177 °C). The implications of this development are significant in terms of the ease of use and elimination of procedural steps. While the resin system was developed specifically for vacuum bagging, it is expected to be viable for other composite fabrication methods including resin transfer molding (RTM) and vacuum-assisted resin transfer molding (VARTM). The resin system can be cured at ambient temperatures in approximately one hour. However, if higher cure speeds are desired it can also be cured thermally.

Technology Category Alignment:

Air Platforms
Maintainability/Sustainability
Materials & Manufacturing Processes
Structures and Protection

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SYSCOM: NAVAIR
Contract: N68335-18-C-0012

Department of the Navy SBIR/STTR Transition Program

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WHO

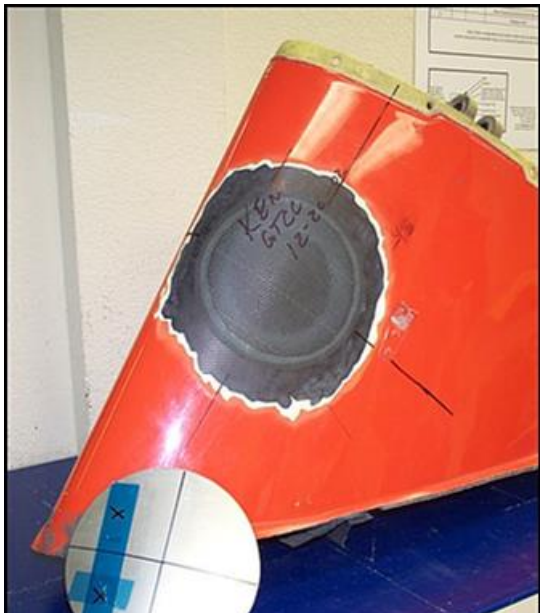
SYSCOM: NAVAIR

Sponsoring Program: NAVAIR PMA-275

Transition Target: H-1 Helicopter, V-22

TPOC:
(301)342-2181

Other transition opportunities: The anaerobically curing composite material developed will have immediate applications in the repair of a large variety of DoD aircraft and other vehicles. Along with composite repair capabilities the resin system has potential for use in composite manufacturing applications.



WHAT

Operational Need and Improvement: More efficient on-aircraft repair processes are needed for structural organic-matrix composite components. In response to this need, Texas Research Institute Austin (TRI/Austin) is developing new matrix resins that provide elevated Tg, and high fiber strength translation. Matrix resins have been formulated to achieve glass transition temperatures of > 330°F, and to restore structural capabilities of damaged aircraft components. The one-component ambient temperature curing system will eliminate mixing of multiple components and the need for heating equipment to achieve cure. The less labor intensive process will reduce costs currently associated with composite repairs.

Specifications Required: The program objective is development and demonstration of aircraft composite repair systems that will reduce training, labor, and ancillary equipment requirements. The developed process will be specifically designed for on-aircraft repair of organic-matrix composite materials to restore load-bearing and functional capabilities of structural components.

Technology Developed: TRI/Austin demonstrated a new composite matrix resin technology that will streamline composite repair processes on aircraft and other vehicles. Most high performance thermoset resins have two-components and require thermal curing to achieve acceptable properties. The resin system developed by TRI/Austin can be supplied as a one component system that can be cured at ambient temperatures. Without post-cure the resin will provide a glass transition temperature more than 350°F(177°C).

Warfighter Value: The resin systems developed during Phase I have the potential to achieve the desired rapid composite repair, with negligible support equipment required. The single bag materials and process eliminate the need for box or dome tools, heating blankets, and thermal control units (hot-bonders). The unique composite repair materials that TRI/Austin is developing can reduce repair times by 50 percent or more. The matrix resin technology demonstrated during the Phase I effort is based on an anaerobic curing approach that will potentially transform not only composite repairs, but several composite fabrication areas in general.

WHEN

Contract Number: N68335-18-C-0012 **Ending on:** January 1, 2021

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Final Resin Down select	Low	Resin meeting all properties required	5	January 2019
Validation Testing	Med	Resin meets all internal requirements	5	May 2019
Perform Simulated Repairs	Med	Meets repair guidelines	6	December 2019
Conduct in field repairs	Med	Satisfies end users expectations	8	April 2021
Commercialization	High	Industry ecceptance	9	April 2022

HOW

Projected Business Model: TRI/Austin will both manufacture and sell the product directly though various distribution channels, independent Rep networks, and an interim sales force.

Company Objectives: TRI/Austin is looking for programs of interest, teaming partners, potential distributors, and end users of the Anaerobic composite repair resin.

Potential Commercial Applications: There are many applications for these resins beyond the scope of DoD aircraft repair. Any situation that requires a quick curing polymeric patch or tooling fabrication could benefit from this product.

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