

Topic: N142-103

SciMax Technologies

Innovative, Lightweight, Durable composite CH-53K Cargo Floor

Current CH-53K aluminum floor panels provide required durability, they are heavy and limit mission range and impact operational support cost. The objective of this project is to develop a light-weight Thermoplastic composite floor panel where the materials and design are tailored for durability-damage tolerance to meet the specified static and dynamic load requirements for the CH-53K and integration of the Cargo handling system. The floor panel materials and design are validated by analysis, and tests via building-block approach. SciMax Technologies has extensive knowledge and experience in the design, analysis and Fabrication of advanced composite structures for Navy aircraft with high durable, impact damage tolerant resistant structure. SciMax Technologies Goal is to integrate the Thermoplastic floor panel design into the CH-53K and other Navy/DOD cargo aircraft.

Technology Category Alignment:

Fixed Wing Vehicles (includes UAS)

Rotary Wing Vehicles

Fixed Wing Vehicles (includes UAS)

Structures and Protection

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SYSCOM: NAVAIR

Contract: N68335-16-C-0095

 Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N68335-16-C-0095

Department of the Navy SBIR/STTR Transition Program

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NAVAIR 2017-769

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WHO

SYSCOM: NAVAIR

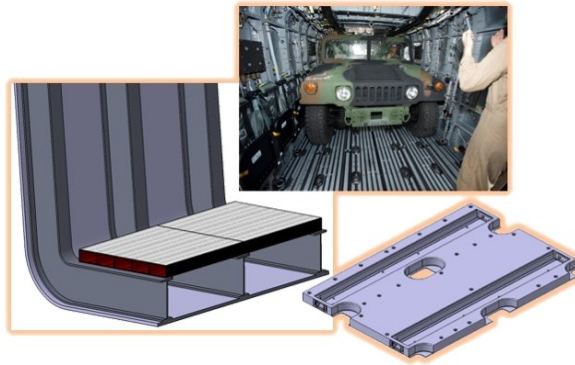
Sponsoring Program: PMA-261

Transition Target: CH53K

TPOC:

(301)342-5872

Other transition opportunities: V-22 Osprey, Future Cargo Rotorcraft and Aircraft, Marine/Naval Ship-decks requiring impact resistance and corrosion free environment



TP Floor Panels (LMC.Com Image & SciMax Copyright 2017)

WHAT

Operational Need and Improvement: Current floor panels provide basic durability & damage tolerance. They are heavy and reduce payload & mission range + impacts operational cost. The objective/need is to develop a floor panel where the material and design configuration is tailored for durability/damage resistance & meet static and dynamic load requirements with integration of its handling systems, at a significant lower weight, and a corrosion free environment.

Specifications Required: The Thermoplastic composite floor panel is configured with materials and design tailored for durability/ damage tolerance, while meeting the air vehicle specification in static & dynamic load requirements for the CH-53K Cargo floor system, with the integration of the Cargo handling system, as well as operations and environmental requirements.

Technology Developed: Developed an Innovative CH-53K Cargo Floor panel design using advanced composites to maximize material tailor-ability & configuration to achieve a durable/damage tolerant design that is significantly lighter than the current design. The selected design consists of AS4/PEEK Thermoplastic consolidated box stringers (back-to-back C-section adjoined at the tips) re-consolidated with deltoid filler and the upper and lower facesheets in a matched tooling assembly. Thermoplastic was selected due to its inherent impact damage resistance and high specific strength and stiffness to weight ratios, AS4/PEEK is also an industry qualified material. The Box-section stringers with the deltoid fillers creates a balanced overall panel stiffness, with the desired concentric vertical load path & weight optimization, thereby eliminates crushing, delamination at the corner radii, as experienced with previous applications.

Warfighter Value: Added payload capability & range KPPs affordably over the life of the vehicle with enhanced durability & damage tolerance. The floor panel design also enables integration of ballistic protection within its assembly construction as unitized structure; increasing the safety/survivability of the aircrew & vehicle while performing its mission.

WHEN

Contract Number: N68335-16-C-0095 **Ending on:** December 20, 2018

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Detail Design and Analysis	Med	Design, Analysis, Weight & Cost, Durability, & Impact via FEA	3-4	February 2015
Integrated tool & Fab Dem/Val	Med	Fab. of panel, Dem/Val of tooling & mfg.	4	December 2016
Durability & Impact Damage Tolerance	Med	5 panels, tested: static, durability-wear & impact	5-6	March 2017
impact damage/Durability Verification	Med	4 Pnls for static, durability-wear & impact	6-7	December 2017
Form, Fit, Functional, + durability/ impact damage tolerance Qualification	Low	Treadway Pnl as Form-Fit&Function+Static, Durability-wear & Impact.	7-8	December 2018

HOW

Projected Business Model: SciMax Objective is the design and fabrication a robust cost and weight effecting Thermoplastic Composite Flooring Systems to the US Navy and the aerospace industry. We are concentrating with our technical team to achieve an optimized design that will yield an effective production ready product. SciMax has plans for a productionization set up for the floor panels in conjunction with the current floor system supplier or the US Navy.

Company Objectives: SciMax concentrates on design & Fabrication of efficient & cost-effective solutions with Advanced Composites to meet challenges:

1. Working with the Navy SBIR/STTR Transition Program (STP) setting to facilitate contact with the Government & the Industry/OEM decision makers for the purpose of transitioning the new technology into Phase-III, and essentially have the flooring system ready for initial production via a smooth transition, which includes machinery & equipment in place ready for LRIP.
2. SciMax Envisions other DoD programs that will benefit from the impact resistance TP flooring as well as other flight vehicle structural components, including V-22 and cargo hauling aircraft, leading edges of wings, empennages, engine intakes etc. The TP flooring can also buy its-way onto the deck of Navy vessels requiring corrosion free robust deck structure.
3. Thermoplastic Structure with Ballistic protection as an integrated single structural element (not parasitic), ready for implementation, as proposed by SciMax Technologies.

Potential Commercial Applications: Commercial cargo Air-Vehicles utilizing heavy cargo, can benefit from a cost-effective TP structural application reaping identical advantages in weight savings, increased payload, range & operating efficiency.

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