

Topic: N142-103

Piasecki Aircraft Corporation

Innovative CH-53K Cargo Floor System

Piasecki Aircraft Corporation (PiAC) is a research and development company focused on developing innovative technology for the rotary wing and UAS markets. PiAC's AeroSteel stainless steel cargo floor uses advanced structural design, material and manufacturing processing to make panels that are as lightweight as composite panels but with improved stiffness, corrosion resistance, durability and lower cost. The panels utilize an additive construction method that allows the use of premium materials (i.e. Inconel) while reducing material and production costs. By orienting stainless steel sheet in an efficient and innovative configuration, AeroSteel panels are strong, stiff, light with open, accessible cells that are easily inspected, cleaned, and repaired when necessary. PiAC plans to transition AeroSteel to Government/Commercial applications to include floors, pallets, structural frames, and other applications requiring improved weight, stiffness, durability, repairability and lower cost.

Technology Category Alignment:

Rotary Wing Vehicles

Structures and Protection

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SYSCOM: NAVAIR

Contract: N68335-16-C-0094

 Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N68335-16-C-0094

Department of the Navy SBIR/STTR Transition Program

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NAVAIR 2016-765

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WHO

SYSCOM: NAVAIR

Sponsoring Program: PMA-261

Transition Target: CH-53K
Helicopter Cargo Floor

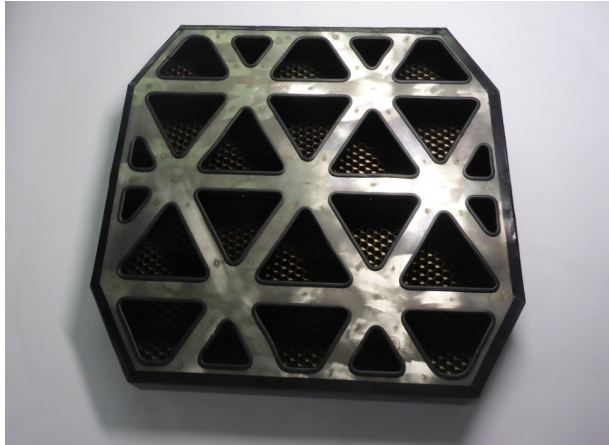
TPOC:

301-342-5872

Other transition opportunities:

Floor Reinforcing Load Spreaders
Drop-In Replacement Floors
Fully-Integrated Customized Floors
Built-In Features (Rollers, D-Rings,
Ballistics Protection, and more)
Higher Load-Capacity Pallets
Stackable/Collapsible Containers
New Vehicle Primary Structure
Vehicle Panels/Frames/Chassis
Accessories for All of Above

Notes: Customizable, Lightweight,
Impact Resistant Panels/Pallets for
Retrofit and New Applications.
Operable in Extreme
Thermal/Corrosive Environments.



AeroSteel Manufacturing Proof Panel, Copyright, 2015,
Piasecki Aircraft Corporation

WHAT

Operational Need and Improvement:

Existing cargo floors are heavy, with limited durability, which impacts missions and increases costs. The CH-53K King Stallion requires a cargo floor system with improved durability, operational capability, reliability, maintainability, manufacturability, and affordability at a reduced weight.

Specifications Required: 300 lb/sqft for palletized cargo with 3 g's vertical acceleration; 5,000 lb per axle for vehicles with 2g vertical acceleration; 400lb point load; 200lb corner box drop from 15in; Environmental testing (i.e. salt fog) per FAR 23, AR-56, and AR-86.

Technology Developed: AeroSteel panels are made from brazed Inconel sheet metal. These panels are more durable than composite and aluminum panels and 40-50% lighter weight. AeroSteel panels enable the CH-53K King Stallion to internally transport a fully loaded HMMWV. The panels enable the CH-53K to support heavier passenger loads (400 lb vs. 250 lb) than standard. Reduced CH-53K floor from ~3.9 lb/sqft to ~2.3 lb/sqft, over 350lb for additional payload or fuel.

Warfighter Value:

Lightweight: High-Grade Metallic Panels with Competitive Strength-to-Weight to Composite Panels
Low Production Cost: Low Material Costs; Brazing Process Ideal for Low-Cost Bulk Production
Low Assembly Risk: Novel Self-Fixturing/Locking Installation is Efficient with High Reliability
Durable: Material is Ductile with High Toughness and Known Material fatigue/corrosion properties
No Coating/Paint Required: Corrosion Resistant/Non-Reactive, Consistent in Extreme Environments
No Added Hardware: Fused Solid in a Brazing Process
Fail-Safe: Rip-Stop Architecture allows Full Functionality with Moderate Damage
Field Repairability: Standard Field Repairable (Riveted Doubler)
Open Cell Construction: Visually Inspectable with Accessibility to All Surfaces
Drainage: Open Bottom Prevent Debris and Liquids from Collecting
Stiff Construction: Natural Frequency exceeds 500 Hz for 18"L x 18"W x 2"D Test Panels
Customizable Grid Design: Custom Configurable to Accommodate Specific Applications/Hard Points

WHEN

Contract Number: N68335-16-C-0094 **Ending on:** December 7, 2016

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Manufacturing Proof Panel Fabrication	Low	Achieve Continuous Braze Joints Throughout All Adjoining Sheet Metal Components	3	April 2016
Braze Joint Shear Coupon Tests	Low	Lap Shear Tests Quantify Braze Shear Strength	4	May 2016
Brazed Beam Bending Tests	Low	Beam Bending Tests Quantify Bending Strength and Demonstrate Failure Modes	4	May 2016
Pilot CH-53K AeroSteel Test Panel Fabrication	Med	Acceptance Testing to CH-53K Cargo Floor Test Requirements	5	September 2016
Official Testing of at least 5 CH-53K Test Panels	Med	Pass Box Drop, Steel Roller, and Static Loads Testing Performed at NAVAIR	6-7	October 2016

HOW

Projected Business Model:

PIAC plans to produce AeroSteel Panels internally. Initial production is planned to fully support the CH-53K Cargo Floor. PIAC also plans to internally produce other AeroSteel-related cargo products. AeroSteel production infrastructure will initially support 100-200 panels per month. Infrastructure is scalable and able to support increased production to support demand. PIAC is willing to license the panel technology to those capable of performing the required processes. Licensed AeroSteel Fabricators will receive the process and technical assistance required for production. Technical support is available through a maintenance framework within the licensing agreement.

Company Objectives:

Short Term Objective: Complete Panel Qualification and Commence AeroSteel Production.
Initial AeroSteel Product: CH-53K King Stallion Cargo Floor.
Long Term Objective: Develop and produce additional engineered AeroSteel products.
PIAC is exploring all applications that require following AeroSteel's attributes:
High Durability, High Strength, High Stiffness, Lightweight Metallic Panels at an economical price.

Potential Commercial Applications:

Cargo Applications for Air, Ground, and Sea freight industries.
Potential AeroSteel Cargo products include Pallets, Load Spreaders, Pods, Panels, and Accessories.
Permanent, Semi-Permanent, and Temporary Modular Building applications.

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