TECHNOTES

A PUBLICATION OF THE COMPOSITES MANUFACTURING TECHNOLOGY CENTER
SPRING 2025

Composites Manufacturing Technology Center

OUR MISSION

Identify, develop, and facilitate the transition of composite, polymeric, and other non-metallic manufacturing technologies to composites fabricators and other relevant industrial facilities to reduce the cost and time to build and repair key naval platforms.

INSIDE THIS EDITION

HEADLINE ARTICLE

Resodyn OmniRAM Mixer with Custom Lid Clamping Mechanism
Learn How Automation is Evolving on Pg. 3

Managed by:

ATI ADVANCED TECHNOLOGY INTERNATIONAL ®

The Composites Manufacturing Technology Center is under Contract No. N00014-21-D-7001 to the Office of Naval Research as part of the Navy ManTech Program.
DISTRIBUTION STATEMENT A: Approved for public release: distribution is unlimited.
Document Control Number: 2024-11-6-309; Approval Date: 11/14/2024

FY24 New Projects

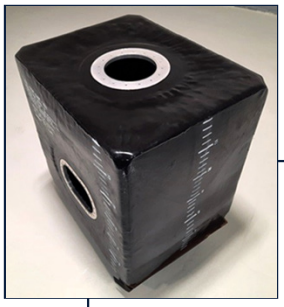
High Yield Machining of Thermal Protection Systems

Period of Performance: May 2024 - May 2026
Stakeholder: Conventional Prompt Strike (CPS)
Platform: Conventional Prompt Strike (CPS)
ManTech Investment: $3,743,000

Recently, Lockheed Martin Hypersonic Engineering and Accelerated Technologies' (HEAT) Independent Research and Development (IRAD) program demonstrated the ability to attach a head with a diamond coated wire saw to a robot for automated material processing of graphite billets in a small-scale setup. Combining existing technologies with the Lockheed Martin HEAT team's knowledge of composite machining and robotics, the objective of this project is to develop a similar but larger prototype robotic wire saw cutting system to demonstrate more efficient processing of flight shapes from raw 3DCC billets.

The wire saw process will benefit multiple hypersonic strike systems to increase yield from billets. As a secondary effect, we expect even increased yield and reduced overall raw material costs by working with 2D and 3D C/C suppliers to modify their sizes and optimize around the wire saw capability. Material and labor savings amounts to total program savings of $15.55M resulting in a return of investment (ROI) of 3.3.

Upon meeting requirements and receiving confirmation, the project shall allocate the wire saw setup for U.S. Navy and Rapid Capabilities and Critical Technologies Office (RCCTO) Conventional Prompt Strike (CPS) production as required. Information from this project will be utilized to formally approve the new process for production.



Advanced Crashworthy Self-Sealing (ACWSS) Fuel Bladder

Period of Performance: July 2024 - January 2027
Stakeholder: V-22 Joint Program Office (PMA-275)
Platform: V-22
ManTech Investment: $1,750,000
PMA-275 Investment: $11,215,000

CMTC endeavors to use modern manufacturing methods for the production of new crashworthy, self-sealing fuel bladders by focusing on incorporating the latest generation of materials into the build process to enhance low fuel permeability and resistance, structural toughness, and self-sealing performance, while reducing weight and susceptibility to damage during handling/installation.

Anticipated results will improve availability, affordability, and maintainability while reducing defects and reworks in the end-product. Projected cost savings per bladder are approximately 25%. Lead and cycle times will be improved from 6-8 weeks to under 10 days. These improvements are expected to reduce weight of fuel bladders by up to 40 percent compared with the current design. From a maintenance and installation perspective, the improved fuel bladders will be lighter, more flexible, and less prone to damage, allowing them to be more easily maneuvered into the fuel cavity for installation. Anticipated savings in production and maintenance for the Osprey V-22 platform are $22.0k per unit, equating to $87M in program savings.

After completion of all qualification testing for each bladder position, Response Technologies will need to be authorized as an approved supplier of U.S Navy / Marine Corps aviation fuel bladders. The V-22 Program Office will then execute a Production Readiness Review with Response Technology to confirm readiness / ability to manufacture their specific fuel bladder designs. Implementation is expected in FY2027.

Advanced Mixing Method for Infrared Countermeasures Project to Reduce Solvent Usage and Improve Worker Safety

Objective:

The current method for mixing hazardous materials infrared countermeasure energetics employs mixing technology that has been in production for many years. Automation is particularly critical to removing personnel from the hazardous environments. New mixing technology, Resonant Acoustic Mixing (RAM) by Resodyn, has seen significant success in mixing other energetic materials due to improved safety and reduced mixing times. RAM lends itself to automation and has been demonstrated at Naval Surface Warfare Center (NSWC) Crane and Indian Head Divisions.
This joint project with the CMTC, Energetic Manufacturing Technology Center (EMTC), and Office of the Secretary of Defense (OSD) Manufacturing Science and Technology Program (MSTP) leveraged lessons learned from the previously mentioned efforts to demonstrate the ability to scale-up and automate the RAM technology suitable for production operations. Furthermore, Chemring Countermeasures' Kilgore operation will develop the mixing process so that it is compatible with both downstream processing requirements and newly developed automation processes. Franklin Engineering will develop the automation system to add constituent materials and transfer mixed material through various stages and bowl clean-up procedures.

Payoff:

The most significant payoff from this effort will be the removal of personnel from a very hazardous manufacturing process through implementation of automation.
Secondary to this is reduced cost as a result of decreased mixing times with the RAM mixer and reduced labor through automation. Cost savings at Chemring Countermeasures' Kilgore facility for ignition composition alone are estimated to be as much as $150K per year.

Implementation:

The mixing process and automation system developed under the CMTC and EMTC project are anticipated to be capable of small-scale production suitable for ignition composition. This system may be transferred to a contract for production use. Implementation of the mixing process for ignition composition is expected to begin in FY2025.

J277-A-B Advanced Mixing Method for Infrared Countermeasures

Status:

Implemented

Performance:

May 2020 - December 2024

Platforms:

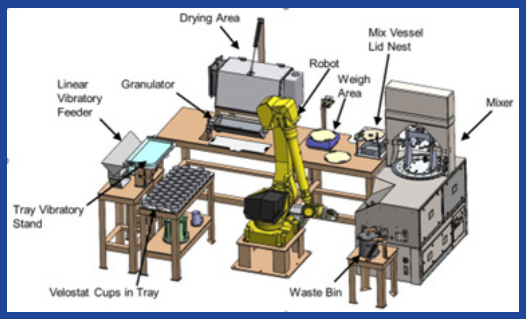
F-35 Lightning II Joint Strike Fighter (JSF)

Stakeholders:

PMA-272J, USN AECM Acquisition Program Office, Hill AFB, USAF AECM Acquisition Program Office, F-35 Lightning II Joint Program Office (JPO)

ManTech Investment:

$1,300,000 (CMTC)
$500,000 (EMTC)
$1,500,000 (OSD MSTP)



Model of the Full Automated Mixing

Composites Manufacturing Technology Center

Highlighting Technology Focus Areas

- Composites & Advanced Materials
- Complex Structures & Design
- Testing & Inspection
- Processing & Automation

Composites & Advanced Materials

- Fiber-reinforced polymeric (organic) resin composites
- Ceramic-matrix, metal-matrix, and carbon-carbon composites
- Graphite, glass, and polymeric fibers and alternate reinforcements
- Coating materials and treatments
- Engineering plastics and similar materials

Recently Attended and Upcoming Events

SubTech
May 13-15, 2025
Laurel, MD

Joint Defense Manufacturing Technology Panel
June 10-12, 2025
Fort Worth, TX

Composites and Advanced Materials Expo
September 8-11, 2025
Orlando, FL

Meet the CMTC Team

Ryan Frankart, Executive Director

Nick Melillo, Technical Director

Leslie Hill, Deputy Director

De'Andre Cherry, Project Manager

Robert Santiago, Project Manager

Tina Wade, Project Manager