

RAM Enhances Manufacturing of Delay and Ignition Composition



SEM Image of Tungsten Delay Composition,
1x20 Magnification

PERIOD OF PERFORMANCE:
October 2017 to September 2023

PLATFORM:
Energetics / Aircrew Escape Systems
F/A-18, T-34C and AV-8

CENTER OF EXCELLENCE:
EMTC

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TOTAL MANTECH INVESTMENT:
\$617,000

A2775 — Tungsten and T-10 Delay Composition via Resonant Acoustic Mixing (RAM)

Objective

Pyrotechnic delay compositions are carefully engineered energetic materials that function to burn at a specific, known and consistent rate. The delay compositions are pressed into a delay column, which is the primary component of delay cartridge actuated devices (CADs) that are critical components of United States Navy aircrew escape systems. Delay cartridges allow for and provide timing between various sequencing of system components to ensure that all the functions of the aircrew escape system have sufficient time to occur and that the timing of events is correct for a safe, successful emergency egress event.

There are three main delay compositions used in CADs for escape systems and ejection seats: tungsten, T-10 and Z-1. This project focuses on tungsten and T-10 specifically due to the following considerations related to safety, manufacturing challenges and production demand.

The most important consideration with respect to this investigation of the feasibility of manufacturing tungsten and T-10 delays via RAM is personnel safety. All three CAD/propellant actuated devices (PAD) delay compositions are manufactured through an attended mixing process due to the current lack of capability to support remote mixing. Implementing a RAM manufacturing process would eliminate the use of attended mixing for CAD/PAD delay compositions and would benefit all three of the delay compositions and the associated end-items and platforms.

Payoff

This project will achieve the following: improved delay composition manufacturing capability; updated mixing technology (safety advancement – remote mixing); improved mixing controls; reduced processing equipment footprint; and a better product due to time, cost and quality improvements.

This project also has the potential to be the first Naval Surface Warfare Center Indian Head Division (NSWC IHD)-manufactured application to use RAM-manufactured material in man-rated devices, with the goal of using RAM technology to manufacture all CAD/PAD delay compositions and secondary ignition compositions.

Implementation

Completion of a successful first article test (FAT) in a cartridge application is required prior to full-scale production use of the RAM-manufactured delay compositions. This project will enable the production of tungsten and T-10 delay compositions with various burn times and ignition compositions to meet production needs starting in fiscal year 2023. These compositions are used to manufacture delay cartridges that are components of aircrew escape systems on F/A-18, T-34C and AV-8 aircraft.

