Novel Initiating Explosive Provides Warfighter with Safe, Lightweight and Reliable Weapon System Initiation

PERIOD OF PERFORMANCE:
January FY2021 to September FY2025

PLATFORM:
Energetics / Special Purpose Munitions Initiation System

CENTER OF EXCELLENCE:
Energetics Manufacturing Technology Center (EMTC)

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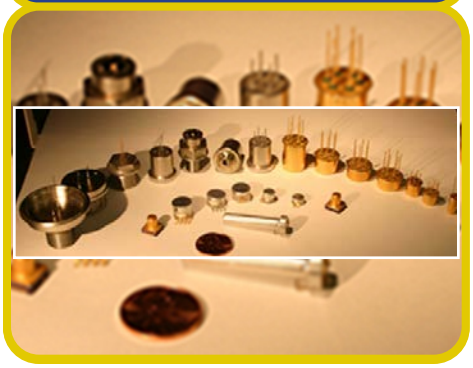
STAKEHOLDER:
Naval Surface Warfare Center (NSWC) Crane



S2920 — Industrialization of Submicron Explosive for Ultra-Low Energy Initiator (µLEEFI)

Objective

The objectives of this Energetics Manufacturing Technology Center (EMTC) project are to demonstrate and qualify a novel initiating explosive for use in ultra-low energy exploding foil initiators (µLEEFI) and then demonstrate and qualify the first µLEEFI. The warfighter needs lightweight, safe and reliable initiation systems. This technology is an enabler for future smart weapons when employed in multi-point configurations that facilitate directional, deformable and tailorable effects warheads, as well as inclusion in smaller smart munitions that may currently employ out-of-line devices and hot wire detonators. Future in-line safe initiation systems must consume less energy, volume and weight. This state-of-the-art explosive technology can meet the requirement for smaller, less energy-intensive systems.

The LEEFI is a qualified in-line initiator (ILI) permitted for use without interruption. Advancements in ILI technology is required to enable much smaller initiation systems with lower energy demands.

Payoff

Successful completion of this project will provide important benefits to the U.S. Navy in several areas, including improved cycle time, reduced cost and improved reliability.

In addition to the substantial reduction in process steps, handling and material movement, it is highly probable that this project will result in improved reliability by eliminating the current requirement for wetting and drying small particle size nitramines. Finely ground nitramines, typically agglomerate to some degree during drying. Eliminating the need for drying after shipment will result in a more consistent starting material for the mixing process.

The first program to receive this technology is unable to achieve reliable firing or consistent lot-to-lot performance using the state-of-the-art, normal LEEFI. The new µ-LEEFI technology is enabling technology that increases firing margin, allows the use of smaller and lower cost components and reduces supply chain risks. At a minimum, it is expected to save ~ $2.0M over the next five years by enabling the use of less expensive components and by guaranteeing a consistent future supply of enhanced explosives. This continental United States (CONUS) source will produce the required enhanced explosives using industrial processes with increased repeatability of quality, decreasing the material cost.

Implementation

After successful demonstration of the reproducible benefits of using the novel u-LEEFI, Naval Surface Warfare Center Crane will assess the performance of the parts produced in the EMTC project in the end application. The measures of performance include an acceptable reliability at tactical all fire based on both threshold testing and functional testing after exposure to tactically representative environments. If the device demonstrates reliable performance across those environments, the data will be compiled and submitted to the program manager for review and approval for immediate implementation into the production pipeline.