Development of the Next Generation of Demolition Explosive

S2900 — Fastpack Demolition Explosive (FPEX)

Objective

Joint Service Explosive Ordnance Disposal (JSEOD) Notional Concept 17-004, "Advanced Explosive Ordnance Disposal Energetics," documents the need to update the field of disposal energetics with a new demolition energetic that overcomes Composition C-4 (MIL-C-45010) operational limitations and will allow for low-temperature flexibility and high-temperature stability while matching or exceeding C-4 detonation characteristics. M112 C-4 Demolition Block (DODIC M023), the most widely used plastic explosive demolition charge, contains 1.25 pounds of C-4 and therefore, experiences the same operational limitations. The focus with this Energetics Manufacturing Technology Center (EMTC) effort is to address the JSEOD need by developing a new generation of demolition energetics, referred to as Fastpack Demolition Explosives (FPEX), which utilize a one-step, solvent-free Resonant Acoustic Mixing (RAM)-based manufacturing process.

Payoff

The FPEX RAM-based manufacturing process decreases processing time, reduces/eliminates processing solvents, eliminates process wastewater, reduces/eliminates plasticizer requirements (longer shelf life), provides a biologically inert binder system that reduces health-related hazards and reduces manufacturing hazards associated with the use of mechanical mixers by performing high-speed mixing through vibration. In addition, this new demolition energetic material will help address the current operational limitations encountered by C-4 under extreme climates. FPEX will enable warfighters to perform demolition tactics, techniques and procedures under all-weather/environmental conditions.

The annual demand for M112 C-4 demolition block is estimated to be $2.9M. If 1.25 pounds of C-4 is substituted with FPEX, $13.17 savings per block are expected for total annual cost savings of $39.5M. Assuming three shifts per day, a total of four RAM 55 units will be required. Buying and installing four RAM 55 units are estimated to cost around $40M, and the qualification effort is estimated to cost $1M. Taking into account the ManTech investment of $597,000, the return on investment (ROI) will be achieved in approximately two years and the five-year ROI is 3.74:1.

Implementation

The fiscal year 2021 effort focused on the modification of FPEX formulation to match or exceed C-4 performance. During this phase, FPEX was manufactured via LabRAM and the optimum operational parameters were evaluated as well. Once the performance requirements have been met, FPEX formulation will be manufactured via RAM 5 to simulate a medium-scale production operation, which will take place during fiscal year 2022. FPEX manufacturing and all required testing will be carried out at Naval Surface Warfare Center Indian Head Division.

Left: FPEX demonstrating pliability characteristics
Right: FPEX packed and formed into a shape charge

PERIOD OF PERFORMANCE:
June 2020 to December 2022

PLATFORM:
Energetics / M112 C-4 Demolition Block

CENTER OF EXCELLENCE:
EMTC

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TOTAL MANTECH INVESTMENT:
$597,000