Optimization of PAX- 41 Explosive Formulation and Loading Technology for SPIDER System

PROBLEM / OBJECTIVE

The Army Research, Development and Engineering Command (RDECOM) Armaments Research, Development and Engineering Center (ARDEC) created an energetic material called Picatinny Arsenal Explosive- 41 (PAX-41). It was developed as an explosive fill under the Army's Insensitive Munitions (IM) program to meet requirements that all munitions/weapons systems be designed to withstand unplanned stimuli and pass IM tests IAW MIL-STD-2105C. The objective was to optimize the PAX-41 explosive formulation manufacturing process on a production-scale as well as establish a PAX-41 loading process for the grenade bodies for the production of the XM-7 Spider munitions system.

ACCOMPLISHMENTS / PAYOFF

Process Improvement:

This ManTech project demonstrated optimized formulation, loading, assembling and packing processes that met all requirements for explosive specifications. Three 1400 lb confirmation batches were manufactured in production scale, and over 14,400 lbs of PAX-41 were produced for the Spider Grenade low rate initial production. The explosive formulation was so successful that PAX-41 reached a Manufacturing Readiness Level (MRL) of 9.

Implementation and Technology Transfer:

Production capable processes and technologies were transitioned directly to the loading plant for application in production environment.

Explosive Formulation

- Optimized Manufacturing processes for PAX-41 explosive have been implemented at Holston Army Ammunition Plan.

Explosive Loading Technology

- Explosive loading technology was transitioned to PM-CCS and industry for application in a production environment. Processes have been implemented at Milan Army Ammunition Plant.

XM-7 Spider

Expected Benefits and Warfighter Payoff:

PAX-41 was designed to replace certain melt-pour explosives whose IM characteristics are lacking. It was also designed to be more robust in performance and more environmentally friendly (removal of ammonium perchlorate) than PAX-21, a main charge IM explosive used in the 60MM HE mortars. This project increased productivity by 30%, reduced scrap rate on explosive, reduced unit cost of loading grenades and decreased the cost of PAX-41 Explosive material. The Return on Investment is projected at 1.9 to 1 with a cost avoidance of $2.7M.

TIME LINE / MILESTONE

Start Date: April 2006
End Date: June 2008

FUNDING

Army ManTech: $1.457M
PM-CCS: $0.120M

PARTICIPANTS

Army RDECOM Armaments Research, Development and Engineering Center (ARDEC)
BAE Systems
Integrated Production Service
American Ordnance
ATK
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