PAX-3
Explosive Formulation

Provides inherent cost benefits for scale-up of Insensitive Munitions.

M141 Bunker Defeat Munition (BDM) Enabled by PAX-3

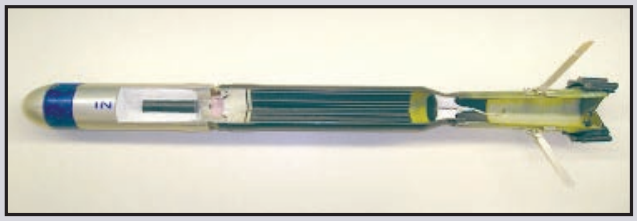
OBJECTIVE / SOLUTION

Develop and scale-up to full scale, economic production process for Picatinny Arsenal Explosive-3 (PAX-3). Previously, this explosive has only been produced in sub-scale manufacturing processes and prior efforts to scale-up have not been successful. This effort will optimize formulation processes to achieve scale-up for full scale production.

ACHIEVEMENTS

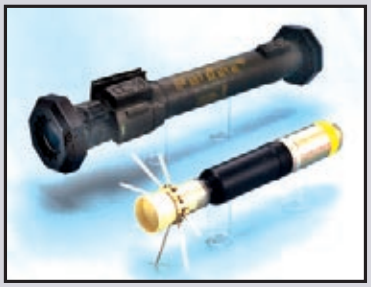
Three pilot scale manufacturing processes were investigated for the manufacture of PAX-3. Two of the three processes were slurry production methods, and the third was twin-screw mixer/extruder (TSE). The objective was to develop the three pilot scale processes and down-select to the most efficient and robust process and scale-up to a full scale production process.

The extrusion process was evaluated at RDECOM-ARDEC utilizing a 40-mm TSE. RDECOM-ARDEC developed a process to manufacture PAX-3 from PAX-2A and aluminum. Over 500 pounds has been successfully produced from the pilot-scale process.



M141 BDM

PAX-3 Explosive



M141 Bunker Defeat Munition (BDM) and Launcher

The first slurry process to be investigated was a solvent-based slurry process. Typically, water is the media for a slurry process, but to mitigate the potential for hydrogen gas generation from aluminum and water, a batch solvent (i.e. waterless) process was developed by BAE Systems, Inc. (BAE) at Holston Army Ammunition Plant (HSAAP). The process utilizes a non-reactive water simulant in place of water. Although PAX-3 can be successfully produced from this batch process, there is a high cost associated with the use of simulant.

Due to the high costs associated with the batch solvent method, a water based slurry was developed. This process was also developed by BAE, at HSAAP. Since this process involves water in contact with aluminum powder, the potential for hydrogen gas generation exists. BAE developed a process which was shown not to produce hydrogen gas. Extensive laboratory experiments did not indicate the generation of hydrogen gas, and the process was scaled-up to pilot scale. Safeguards to prevent hydrogen generation, along with hydrogen detectors, to further validate the absence of hydrogen, were incorporated into a pilot scale process. Pilot scale production runs were performed, but the process did not prove robust enough to be utilized for full-scale production.

Current efforts focus on the final prove out of a production scale PAX-3 manufacturing process via TSE.

BENEFITS

- Picatinny Arsenal Explosive PAX-3 offers a high blast performance over current explosives while demonstrating insensitive munitions (IM) enhancements
- Upon program completion, a full scale, documented, cost effective, quality, repeatable, and robust production process for fully tested and characterized PAX-3 explosive will be available to support munition production

STATUS

- PAX-3 manufacturing will be transitioned to PM Close Combat System (CCS) in January 2010

WEAPON SYSTEMS / SECONDARY ITEMS IMPACTED

- M141 Bunker Defeat Munition (BDM)

POTENTIAL COST AVOIDANCE

- Return on Investment of 6.4:1 with a cost benefit of $15.9M