

# RAM Technology provides Safer and Cheaper Manufacturing of Energetic Materials



RAM-5 and existing production mixer

## PERIOD OF PERFORMANCE:

July 2014 to December 2017

## PLATFORM:

Energetics

## AFFORDABILITY FOCUS AREA:

Not Applicable

## CENTER OF EXCELLENCE:

EMTC

## POINT OF CONTACT:

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## STAKEHOLDER:

PEO (IWS)

## TOTAL MANTECH INVESTMENT:

\$1,489,000



## A2575 — Energetics Production Utilizing Resonant Acoustic Mixing (RAM)

### Objective

Resonant Acoustic Mixer (RAM) uses a novel mixing technology developed for the U.S. Army under a SBIR project and patented in 2007. There have subsequently been laboratory scale investigations of the technology at various labs throughout the Navy and Department of Defense (DOD). In the RAM, mixing is achieved by acoustical energy input to the material rather than mechanical mixing by moving blades. This means that, unlike current mixing, there are no moving parts in contact with the explosive material, which provides a significant safety advantage. Existing methods have the potential for friction initiation of energetic material if blades and bowl become off-set and make contact, or if foreign material enters the mixer and becomes lodged between blades and bowl. This failure mechanism has resulted in past explosive incidents. Replacing mechanical mixing of energetics with resonant acoustic mixing would eliminate this safety hazard. The objective of the project is to develop and demonstrate a small munitions production process utilizing an 80-pound capacity Resonant Acoustic Mixer (RAM-5) to mix the explosive fill.

### Payoff

RAM Technology offers a number of benefits as compared to current energetics mixing processes. PBXN-110, the explosive fill of the Mk152 Warhead, is currently manufactured using planetary vertical mixers. Some of the benefits of RAM over Vertical Mixing are:

(1) Safety – as mentioned above, RAM provides a significant safety advantage over vertical mixing, (2) Faster Production – RAM mixes much more quickly than conventional mixers, (3) Reduced Costs - evaluation of the labor required for the proposed production process shows a cost reduction of about \$100 per warhead, which has a current production cost of \$1500 each. At current production levels, this results in an annual savings of \$1M to Mk 152 production, providing a 2.5 year ROI. Additional savings would be achieved as the newly proven technology is used for other existing programs and new work, (4) Reduced Footprint, and (5) New Capabilities. RAM also offers the potential to produce materials not easily processed using current mixing methods. Materials with higher viscosities and shorter pot lifes (solidification times) can be made.

### Implementation

The successful completion of this project will result in a fully operational resonant acoustic mixing production facility at NSWC IHEODTD, as well as a qualified RAM production process for the Mk 152 warhead to meet PMA 242 requirements. Direct transition to full production is anticipated following successful FAT results.

Techniques and processes developed will support RAM programs elsewhere. Allegheny Ballistics Laboratory (ABL) has already expressed interest in partnering with NSWC IHEODTD and utilizing the newly purchased RAM-5. Implementation is targeted for 2.75" IM warheads such as the Mk 152, Mk 146. PMA 242 has signed a Technology transition Plan to look at utilizing the RAM technology for full-scale manufacture.

Please visit the EMTC Web site:

<http://www.navsea.navy.mil/nswc/indianhead/codeCA/EMTC/main.aspx>