

Production of High Nitrogen Gun Propellants Using Twin Screw Extrusion

S0984 - Flexible Manufacturing of Nitrogen Based Gun Propellants (Flex Man)



OBJECTIVE

Continuous processing is a revolutionary lower-cost technology being used for the manufacture of gun propellants and other energetic materials. Navy systems such as the extended range conventional 5 inch round and the Advanced Gun System (AGS) require higher-performing gun propellants to increase stand-off range and to engage targets further inland. Novel propellant formulations and geometries, such as propellants that include high nitrogen ingredients and co-layered propellants, have the potential to offer this higher performance while also decreasing gun barrel erosion and improving munition insensitivity. The objective of this project was the development of a continuous process to manufacture low cost, high volume nitrogen-based gun propellants, including a co-extrusion process for the manufacture of co-layered propellants.

PAY OFF

The primary focus was to establish the manufacturing capability to produce energetics using continuous extrusion processes. As an added benefit, cost avoidances of approximately 25% are historically realized when switching from conventional batch processes to a continuous extrusion process. Operating efficiency is obtained by replacing numerous labor-intensive operations of the batch process with a single automated process. Lower environmental costs are derived from reducing explosive waste and eliminating waste solvents. Enhanced operator safety is realized because the continuous process incorporates remote and automatic control. Improved reliability results from better dimensional control of the propellant and improved product quality.

IMPLEMENTATION

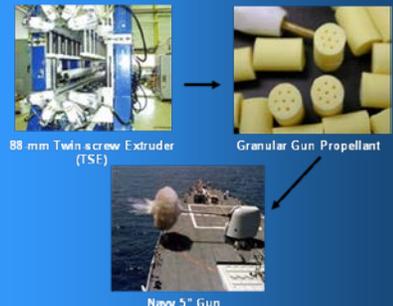
The process development and demonstration for the co-layered, granular and slotted stick configurations have been completed at Naval Surface Warfare Center, Indian Head Division (NSWC/IHD). Final reports have been distributed. This technology has the potential to be implemented for Navy programs being developed in parallel with the project such as an extended range conventional 5-inch round, the High Energy BB round, and the Extended Range Long Range Land Attack Projectile (ER-LRLAP) for AGS. The Extended Range Munition (ERM) Program is in the process of being restructured, so qualification and production dates are unknown at this time, but the technology will be available when those dates are determined. After a successful demonstration, the process will be transitioned to an energetics manufacturer. If a willing industrial source cannot be found, NSWC/IHD will implement this technology into production.

Period of Performance
Apr. 2001 to Oct. 2010

Stakeholder
PEO IWS

Performing Activity
EMTC

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Total ManTech Investment
\$6,819,000

Please visit the EMTC Web site:

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

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