Tungsten Carbide Penetrator & Assembly Cost Reduction

PROBLEM / OBJECTIVE

Until 2010, ammunition for small arms weapons has not kept up with evolving threats, and the performance of legacy ammunition has remained relatively stagnant since the early 1980s. Developed using Cold War-era technology, legacy ammunition has a number of deficiencies in providing warfighters with a definitive advantage against current and future threats. Traditional tungsten carbide manufacturing involves sintering simple stock shapes, such as bars or rods, and then hard-grinding the final shape into the material. A large-scale effort to develop and field the next generation of small caliber ammunition—and with it, the overmatch capability legacy ammunition does not provide—is underway at Project Manager Maneuver Ammunition Systems (PM MAS), Product Manager Small Caliber Ammunition, located at Picatinny Arsenal, New Jersey.

The objective of this project was to mature the manufacturing readiness level of improved material solutions and reduce manufacturability and cost risks as products transition to full-rate production.

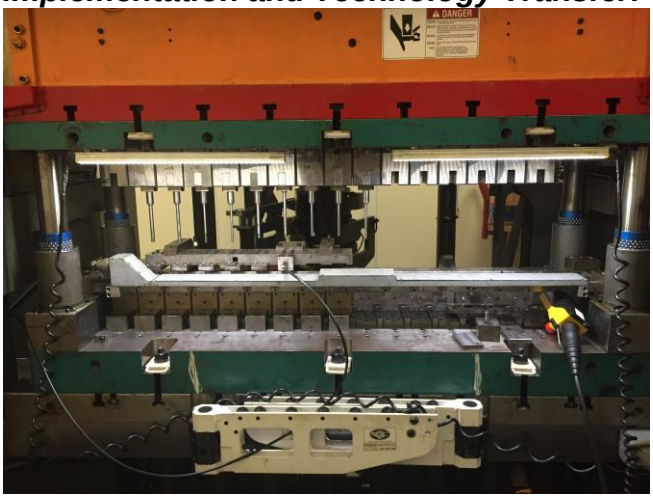
ACCOMPLISHMENTS / PAYOFF

Process Improvement: The team engaged with several small businesses to develop improvements in multiple novel and advanced tungsten carbide manufacturing techniques.

- The program office selected a green machining process as the most viable approach to drive down component costs. The process is a powder metallurgy technique where chalk-like pre-forms of tungsten carbide powder are shaped before sintering (a heat treatment process that binds the powder particles together to produce a hard, dense material).

Green-machining decreases the product cost by increasing the efficiency of producing complex shapes and configurations. More than 30,000 components were produced from October 2015 through December 2016 using this method. These improvements reduced manufacturing time from one part every 15 minutes to two parts every minute. It reduced the projected unit price to less than 25 percent of the original cost—resulting in a potential savings of more than $300 million over the expected 20-year life of the program

Implementation and Technology Transfer:



The team developed a new tooling package that uses a higher-precision Bullet Assembly Machine (BAM) to maintain the existing rate of 60 parts per minute with higher operational availability, lower scrap rates, more process feedback to the operator and the ability to make faster tooling changes. More importantly, as the manufacturing equipment becomes available to the industrial base for full-rate production, the higher precision means better-quality ammunition delivered to the field, more quickly and at a lower cost.

Expected Benefits and Warfighter Impact:

The impact of this project is reduced cost and time to produce new ammo for the Warfighter. Specific benefits from this effort include:

- Reduced cost of producing the bullet ($20 to $5)
- Reduced time to produce the bullet (15 Min to 30 Sec)
- Increased bullet performance

TIME LINE / MILESTONE

Start Date	October 2014
End Date	September 2017

FUNDING

U.S. Army ManTech	$8.0M

PARTICIPANTS

Project Manager Maneuver Ammunition Systems
Army RDECOM Armaments Research Development & Engineering Center