

Improved Manufacturing Methods for Titanium in Lightweight Armament and Ground Vehicle Systems

Addresses the Army's need for high strength/low weight characteristics of titanium to meet the performance and transportability requirements of lightweight systems at a reasonable cost.

OBJECTIVE / SOLUTION

This ManTech ATO-M task is designed to reduce the cost of titanium as a raw material by at least 35% and lower primary manufacturing costs by 50%. It will also develop an improved melting process to reduce the number of processing steps and maximize the use of scrap in order to make quality material available at a reasonable cost; address primary manufacturing processes including welding, forging, and casting; develop, commercialize, and implement relevant technologies that can lead to further cost reductions; impact costs on the supplier level by commercializing technologies, thus directly benefiting all programs that use titanium; and leverage with other metal development initiatives within the Army, Navy, and Air Force to ensure lower program costs to the Army ManTech Program.



Stryker Combat Vehicle



High Deposition
Robotic Welding



Titanium Stryker
Cupola Shield



Future Combat
System (FCS)
Titanium-Intensive
Prototype Vehicle

ACHIEVEMENTS

This ATO-M achieves maximum affordability through developing new technologies to lower the cost of titanium in raw material manufacturing, forging, casting, and fabrication by welding. The reduction in the number of processing steps and the use of scrap has demonstrated a feasibility to lower the cost of titanium from \$18/lb. to less than \$10/lb. This low cost material will be available from titanium vendors for use in the Future Combat Systems (FCS). The development of a new welding algorithm for titanium has led to the welding of large vehicle and armament structures by automated processes, as opposed to manual processes. This has led to a reduction in part cycle times that is being applied at both General Dynamics and United Defense Industries production facilities. Also, these production facilities will be ready with high deposition automated welding technology to cost-effectively manufacture titanium FCS components. The program has delivered material and hardware in support of Stryker Brigades engaged in Operation Iraqi Freedom (OIF), and has proven an effective protective measure, having saved soldiers' lives.

BENEFITS

- Use of titanium has the potential to achieve 40-50% weight reductions.
- The M777 Lightweight Howitzer's weight was reduced from 17,000 lbs. to 9,000 lbs. using titanium.
- Achieves maximum affordability by developing new technologies to lower the cost of titanium in raw material manufacture, forgings, castings, and fabrication by welding. Cost reductions in these primary manufacturing processes could be up to 50%.

STATUS

- In sixth year of a planned six year effort; a total of 250,000 lbs. of low-cost titanium material has been cast and rolled into plate. Low-cost titanium has also been applied to castings and extrusions.
- New welding algorithms for high deposition pulsed robotic welding have been developed and applied.
- Low-cost titanium plate and robotic welding used to fabricate a number of prototype components for M777 Light Weight Howitzer, PM Mortars, PM Stryker, and the Future Combat System (FCS).
- Has provided 100,000 lbs. of material to support Stryker Ballistic Shield Application (Operation Iraqi Freedom).
- High productivity welding process being transferred to production facilities, including Rock Island Arsenal, General Dynamics, BAE, and other commercial fabricators.

WEAPON SYSTEMS / SECONDARY ITEMS IMPACTED

- Future Combat Systems (FCS) – Hull, Turret, and Hatch prototype hardware
- M777 Lightweight Howitzer – FY05 Low Rate Initial Production (LRIP)
- Stryker Combat Vehicle Cupola Shields
- Marine Corps Light Armored Vehicle (LAV)

POTENTIAL COST AVOIDANCE

- Total benefits of \$497,000,000 over 9 years; payback expected in 1.24 Years.
- Benefit-to-Investment Ratio (BIR) of 23.87.
- Total cost avoidance of \$411,500,000 over 9 years; payback expected in 3 years.
- Savings-to-Investment Ratio of 19.0.