

Application and Welding of Titanium for Army Ground Combat Systems

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The Army has a need to cost-effectively reduce the weight of its vehicles without compromising the performance. The Army is willing to pay up to \$80 per pound saved. As part of the transformation to a lighter footprint, quick deployment objective force, the Army has increased the use of titanium for its ground combat system.

Legacy systems such as M1 Main Battle Tank have used titanium to trim weight. New systems under development such as Crusader (self-propelled howitzer) and Light Weight 155 (LW155) howitzer have used titanium to successfully control the weight of the system within the quick deployment, air transportable weight goals. Both these systems employ intensive welding of titanium. For example LW155 requires 14,000 linear inch of titanium welding. The lightweight howitzer uses Gas Tungsten Arc Welding (GTAW).

Crusader gun mount cradle has successfully demonstrated a weight reduction of 31% using titanium, Ti-6Al-4V per the MIL-T-9046, with a modest increase of 14% in cost over the current steel cradle. The cost was contained by using cradle design that is easier to fabricate in titanium and in the use of low-cost titanium welding processes such as Gas Tungsten Arc Welding (GTAW or TIG) and Gas Metal Arc welding (GMAW or MIG) using limited shielding. Mechanical properties of the low-cost TIG and MIG were established for the design of the cradle.

The gun mount successfully completed the simulation testing at Rock Island Arsenal followed by firing test at Yuma Proving Grounds.