

FCS Durable Gun Barrels and Armaments Manufacturing Technologies

PROBLEM / OBJECTIVE

As the future mainstay of the U.S. Army's Future Force, the Future Combat Systems (FCS) platforms must be capable of lethal effects that achieve the combat overmatch necessary to destroy enemy forces with greater precision at extended ranges. The FCS systems must conform to stringent weight and space requirements to ensure transportability worldwide in support of inter and intra theater operations. The objective of this program was to develop robust production capable large caliber FCS cannon manufacturing processes for high strength steel, composite barrel overwraps, and develop manufacturing methods to improve protective bore coatings, countering the effects of wear and erosion from advanced propellants used in higher performance ammunition of medium caliber FCS cannons.

ACCOMPLISHMENTS / PAYOFF

Process Improvement:

The following tasks have been completed:

- **High Strength Steel** - A computational mechanical simulation approach was used to model and develop two high yield steel strength levels (190KSI and 225 KSI). Currently, evaluating M52 fourth generation 225 KSI 300lb prototype heats. The M47-2C 190 KSI steel design was down selected and scaled-up to multiple 35-45 ton heats producing 6 MCS XM360 heat-treated and forged gun barrels and 18 MCS/NLOS-C preforms ready for conversion through the Watervliet Arsenal rotary forge/heat-treat process.
- **Composite Overwrap** – Production capable thermoplastic wind intension composite overwrap manufacturing machine has been delivered and set-up. Thermoplastic materials at medium tension have been successfully demonstrated for the 120mm XM360 MCS gun. The 120mm XM360 was successfully wrapped at medium tension on the new machine.
- **Explosive Cladding** – Completed machining and rifling studies of Ta-2.5W material cladded on 36" 25mm truncated barrel section. Completed thermal and process modeling of the explosive cladding process for the full-length barrel cladding. Successfully clad two M242 25mm Bushmaster full-length barrels.



Implementation and Technology Transfer:

- Successful completion will allow for cost efficient, high performance, multiple domestic source, high strength steel for the development of the FCS MCS, NLOS Cannon, and the NLOS Mortar.
- This project resulted in an affordable composite overwrap for FCS MCS system using fully automated production process, and prototype machines. This composite technology has been transitioned to FCS MCS SDD program. The EM-gun launchers for the Army and Navy EM Gun programs are being produced utilizing this technology.
- This program provides an affordable explosive cladding process to extend the life of medium caliber gun barrels for the FCS ICV and Bradley Fighting Vehicle.

Expected Benefits and Warfighter Payoff:

This program enables greater than M1 tank lethality on lightweight MCS platforms, higher rates of fire at increased ranges for the MCS and NLOS-C, and enables the ICV to fire higher lethality ammo with extend barrel service life.

TIME LINE / MILESTONE

Start Date: December 2004

End Date: February 2007

FUNDING

Army ManTech: \$16.5M

PARTICIPANTS

Army / ARDEC, Automated Dynamics, Elwood National Forge, Latrobe, QuesTek, and TPL