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**Vision:**

Innovative Armaments Solutions for Today and Tomorrow

**Mission:**

Provides fully integrated life cycle engineering (from R&D to demil) for armaments and munitions in support of the Army, Program Executive Offices, the Single Manager for Conventional Ammunition, Air Force, Navy, Marines, Coast Guard and Special Operations Forces

**Advanced Weapons** – line of sight/beyond line of sight fire; non line of sight fire; scalable effects; non-lethal; directed energy; autonomous weapons

**Ammunition** – small, medium, large caliber; propellants; explosives; pyrotechnics; warheads; insensitive munitions; logistics; packaging; fuzes; environmental technologies and explosive ordnance disposal

**Fire Control** – battlefield digitization; embedded system software; aero ballistics and telemetry

*Provides the Technology for Over 90% of the Army’s Lethality; Significant support to other Services Lethality*
FCS Key Initiatives

• S&T Successfully Transitioned Key Armament Technologies to FCS
  - LOS/ BLOS Armament
  - NLOS-M
  - MRM

• Successful Partnership with LSI for SDD Armaments

• ARDEC Meeting and Exceeding LSI Expectations
PROBLEM:

105mm weapon systems could not provide lethality necessary to defeat the next generation Main battle tank; existing 120mm systems worldwide too heavy and not integratable onto a preferred 20 ton class vehicle

SOLUTION:

• Produced Lightweight 120mm Gun Assembly
  - Initial Proof-of-Principle Gun designed, built, fired in 13 months, compared to 24 month average
  - Gun Assembly Wt. ~ 4200 lbs. as compared to M256 Abrams 120mm main armament – 6800 lbs.
  - Reduced gun firing impulse for integration in 20 Ton class vehicles, 5300 lb-sec vs. 7000 for M256
  - Ability to fire both current & developmental 120mm rounds – 5 current rounds + 3 new rounds

• Developed enabling fabrication techniques
  - New steel w/ 20% higher yield strength
  - Integrated muzzle brake, saves ~200 lbs in gun weight
  - Lighter Composite over wrapped gun tube (lower weight without loss of pressure containment, over 35% lighter than the M256)
120mm LOS/ BLOS Transition to Mounted Combat System (MCS)

**Primary Weapon for Mounted Combat System**
- Provides direct fire in support of forces in the Unit of Action (UA).
- Beyond Line-of-Sight (BLOS) capability to 12 km with Medium Range Munitions (MRM).
- All the Performance of Current 120mm Cannon in a Light Weight, Compact Design
- Over 2,000 lbs lighter than 120mm Gun used on Abrams Tank
- Muzzle Brake & Recoil System Design Enables a 120mm Gun to fire from a 20 Ton Vehicle.

**Lightweight Gun Mount**
- Compact Cradle Design
- Titanium Recoil Rails
- Lt Wt - Modular Recuperators
- Composite Replenisher *
- Titanium Recoil Brakes *
- Titanium Yoke/Adapter *

**Lightweight 120mm Gun Tube**
- High Strength Gun Steel / Composite Wrap
- Dual Autofrettage
- High Efficiency Muzzle Brake
- Reduces Firing Shock to Vehicle & Crew
- Enables 120mm Gun to fire from 20 Ton Vehicle

**Multi-Lug Breech Mechanism**
- Long Life, Compact, Light Weight
- 600VDC Electrically Actuated
- Ammo Data-Link Enables Communication to Smart Rounds
- Electro-Thermal Ignition *

* Technologies not transitioned

Gun Technology Demonstrated on Over 730 Rounds of Live Fire Testing on various iterations

**GENERAL DYNAMICS**
Land Systems

**ARDEC - Innovative Armaments Solutions for Today and Tomorrow**
ATD for 120mm LOS/BLOS Armament:

- Successfully completed in FY05 and transitioned to LSI
- ARDEC is providing SDD engineering, design and hardware for the primary weapon assembly to LSI under CRADA
- Timeframe Oct 2005 - Jan 2013; $71.1M
ARDEC’s Objective NLOS-M Technology Development

PROBLEM:

No existing mortar system, US or foreign, could meet the FCS NLOS-M threshold requirements for lethality, range, and rate fire using existing family of ammunition at target weights.

SOLUTION:

- Produced Breech Loading 120mm Mortar and demonstrated FCS required technologies.
  - Ability to fire both current & developmental 120mm mortar rounds with no ammunition modification or expendable devices at threshold rates of fire. No competitive system could do this.
  - Thick walled mortar tube provides passive tube cooling.
  - Fast acting screw block breech, based on artillery designs.
  - Three ammunition position & retention technologies to ensure proper loading and firing.
  - Innovative out of line firing pin to permit safe loading.
  - Mortar Assembly (including mount) Wt. ~ 1200 lbs. compared to competitive systems 1900 to 2900 lbs. Weight was not optimized in this program.
  - Turret, mount, & ammunition handling systems developed to support demonstration.
  - Demonstrated 12 RPM firing.
Primary Weapon for Future Combat System NLOS-M

- Mortar developed under ARDEC Science & Technology Objective program.
- Provides breech loaded 120mm mortar capability. DEMONSTRATED
- Non Line-of-Sight (NLOS) capability to 8 km with unmodified M900 series mortar ammunition. DEMONSTRATED
- Can fire 16 rounds per minute, 8 rounds per minute sustained. 12 rounds per minute DEMONSTRATED

Lightweight 120mm Gun Tube from ARDEC Technology Program
- 3 Meter, Thick Wall Tube
- High Strength Gun Steel

Screw-Block Breech Mechanism from ARDEC Technology Program
- Modified for NLOS-M System Integration.
- Incorporates one ARDEC Ammunition Retention Technology
- Integrates with BAE Mount, Ammunition Loading, Round Retention, Firing Mechanism, & Actuation Devices *

NLOS-M Firing Platform (BAE)
- ARDEC’s XM325 EP1 has successfully integrated on the NLOS-M Firing
- Firing Tests by BAE are underway

* Technologies not transitioned
XM325, Cannon, 120mm Mortar, Breech Loading:

- Successfully completed in FY06 and transitioned to LSI
- ARDEC is providing SDD engineering support, design and hardware for the 120mm cannon assembly to LSI under CRADA
- Timeframe Oct 2006 - Mar 2011; $4.1M
Mid Range Munition (MRM) for the FCS Mounted Combat System

PROBLEM:
The FCS MCS required an extended range, heavy armor target engagement capability to increase the lethality and survivability of the system.

SOLUTION:

MRM SYSTEM CHARACTERISTICS:
• Precision Munition for FCS MCS Vehicle
• Designed to Defeat High Pay-Off, Fleeting Targets (MBTs with ERA, APCs, Artillery, etc.)
• Incorporates Autonomous and Designated Mode Seekers
• Operates in Line-of-Sight or Beyond Line-of-Sight from 2km out to 12Km

The MRM provides the FCS Mounted Combat System (MCS) with a precision munition capable of defeating LOS/BLOS threats out to 12km.
ARDEC S&T is developing two competing concepts with industry partners Raytheon and ATK.

**Mid-Range Munition**

Program has Achieved Autonomous, SAL, and Dual Mode TRL 6!

**Target Types**
- Main Battle Tanks (MBT) w/ ERA
- Light Armor (BMP)
- Self Propelled Artillery (SPH)/(MRL)
- Air Defense Artillery (ZSU)
- Bunkers (Earth & Timber)

**Attributes**
- Fleeting High Payoff Targets
- Single Point Defeat
- Stationary or Moving (Fleeting)
MRM has demonstrated TRL6 for:

- All major Subsystems
  - Warhead
  - Airframe
  - Propulsion
  - G&C
  - Seeker
- Integrated Autonomous Seeker Guide to Hit - 2004
- Integrated SAL Seeker (Designate) Guide to Hit - 2006
Complete rounds fired except for warhead. Space was used for telemetry. Lethality demonstration was done separately. Full up round firing will occur during SDD.
In Summary...

- ARDEC successfully developed Armament Technologies for FCS
- Successfully transitioned from S&T
  - LOS/ BLOS 120mm Armament
  - NLOS-M cannon assembly
- Expect to transition MRM 1QFY08
- ARDEC has successful partnership with LSI contractors to continue development in SDD

...Continued Dialog to Maximize Collaboration Opportunities

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