U.S. ARMY ARMAMENT RESEARCH, DEVELOPMENT, & ENGINEERING CENTER (ARDEC)

Malcolm Baldrige National Quality Award 2007 Award Recipient

ARMAMENT RESEARCH, DEVELOPMENT AND ENGINEERING CENTER PICATINNY ARSENAL, NJ

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Presentation Name: *Armaments for Combat Vehicles*

Date: *October 14th, 2009*

Speaker: *Dr. Joseph A. Lannon*

Speaker Title: *Director, ARDEC*

Armament Research, Development & Engineering Center

Research

Development

Production

Field Support

Demilitarization

Vision:

Innovative Armaments Solutions for Today and Tomorrow

Mission:

To develop and maintain a world-class workforce to execute and manage integrated life-cycle engineering processes required for the research, development, production, field support and demilitarization of munitions, weapons, fire control and associated items

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

ARDEC provides the Technology for Over 90% of the Army's lethality; Significant support to other services' lethality

Supporting the Current Fight

FY06

Picatinny Blast Shield

Hand Emplaced Shape Charge Assembly

Rapid Entry Vehicle

Army's Greatest Inventions

FY07

SWORDS

Excalibur 1a-1

CROWS Lightning/ PDCue

M1A1/A2 Gunner/Loader Protection

M110 Semi Automatic Sniper System

Bridge Erection Boat - Force Protection

Objective Gunner Protection Kit

FY08

O-GPK Overhead Cover

M2 Cal 50 Extender

XM32 Abrams Reactive Armor Tile II

Picatinny Weapon Elevation Kit

Small/Med Machine Gun Weapon Cradle

CROWS/PDCue

FY09

Objective Weapon Elevation Kit

Non-standard Vehicle Armor

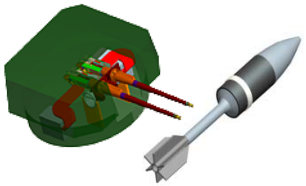
Sherlock

- Armor - Weapons - Ammo - Entry Control Point
- Modification Kits - Sensors - C-IED

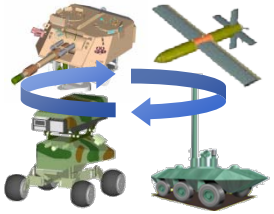
Purple = SOCOM

134 SUCCESSFUL FIELDINGS SINCE 9/11/2001

Supporting the Future Force Through Technology Investments

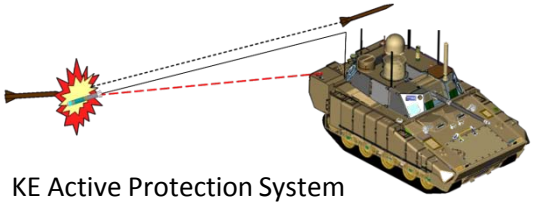


Extended Area Protection & Survivability

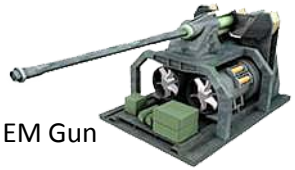


Networked Lethality

Acoustic/Seismic Sensors

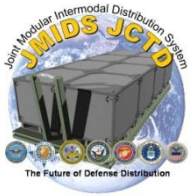


KE Active Protection System Interceptors

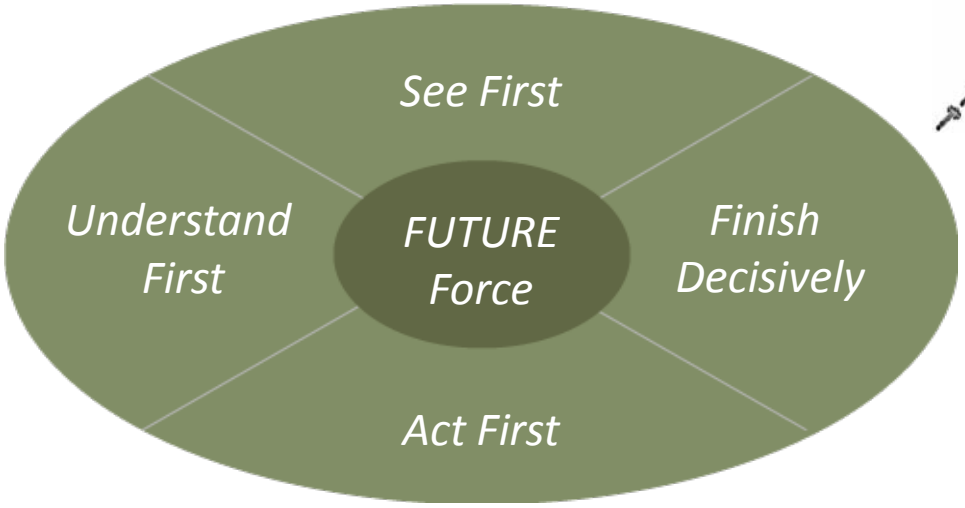


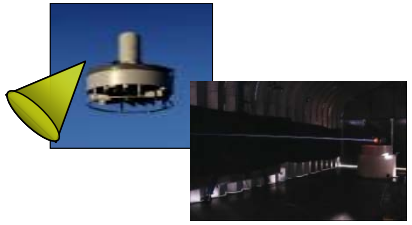
EM Gun

Multi-Mode Warheads



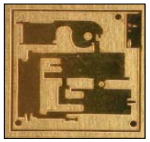
Joint Modular Intermodal Distribution System



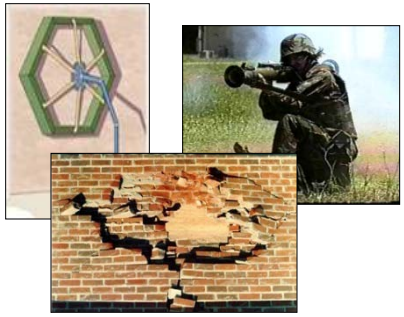


High Power Microwave & LIPC

MEMS IMU

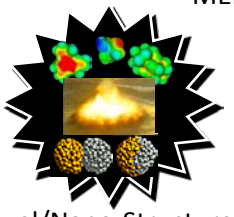


MEMS S&A Fuze & Power



MOUT

Scaleable Effects



Novel/Nano-Structured Energetics

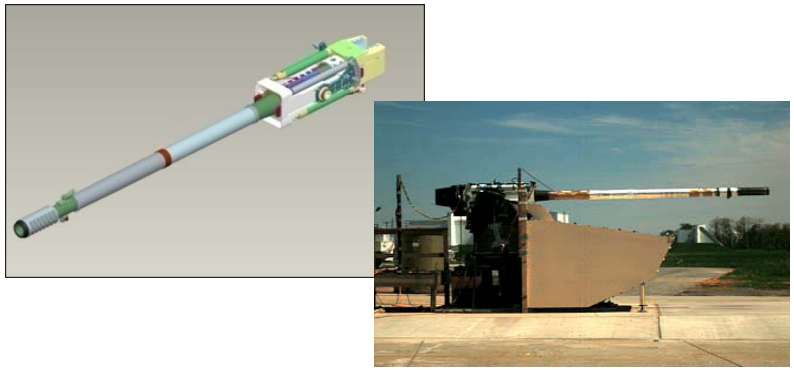
LtWt Small Arms Technologies

Future Combat System Technology Transitions

Partnerships (Cooperative Research and Development Agreements (CRADAs) in support of the Future Combat System (FCS)

XM360 Lightweight 120mm Primary Weapon Assembly; GDLS/ARDEC CRADA

ARDEC provides primary armament system for FCS Mounted Combat



MRM CARTRIDGE, 120 MM,XM1111

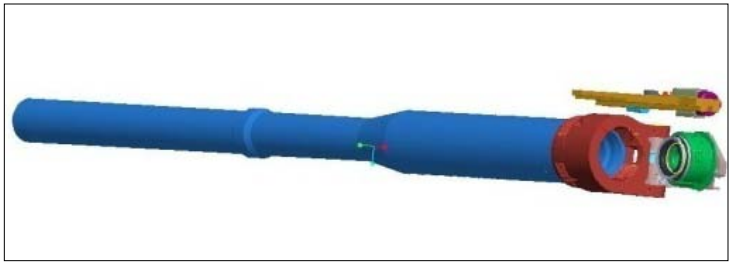
Mid Range Munition Guided Anti-Armor Multi-Purpose (MRM-GAAMP) will provide a precision, beyond-line-of-Sight (BLOS) capability from 2-12km for the FCS Mounted Combat System. Significant ARDEC Tech Base investment has Directly Transitioned to SDD in Support of FCS.

XM324 Non-Line-Of-Sight Cannon (NLOS-C); BAE/ARDEC CRADA

ARDEC provides primary armament system for FCS NLOS-C Manned Ground Vehicle

XM235 Non-Line-Of -Sight Mortar (NLOS-M); BAE /ARDEC CRADADEC

Provides Mortar tube and breech for FCS NLOS-M Manned Ground Vehicle

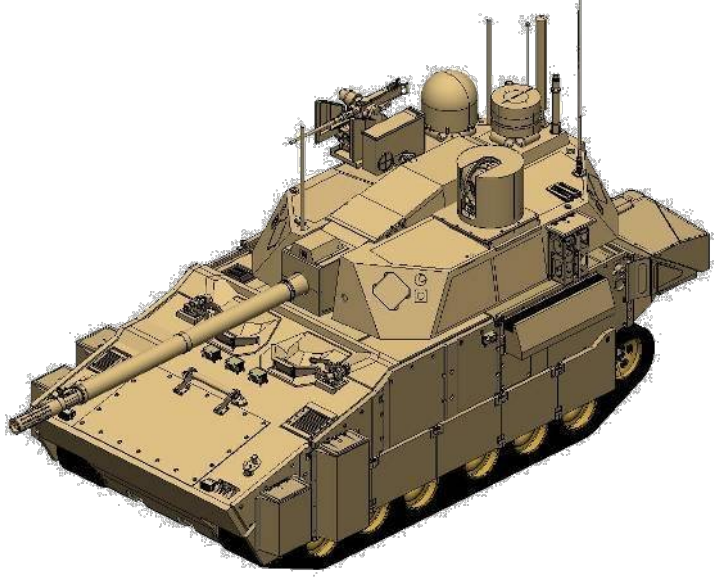


ARDEC is prepared to transition products to GCV, Bradley, & Abrams

Implementing Technology in Products: 120mm XM360

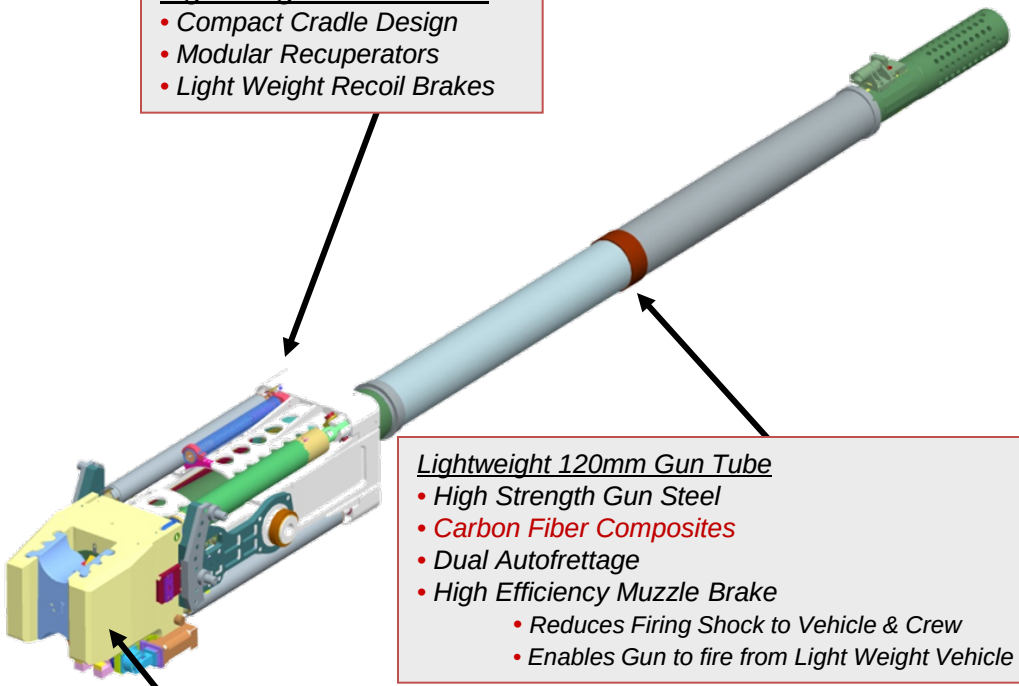
Primary Weapon for Mounted Combat System

- *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 Lightweight Vehicle.*



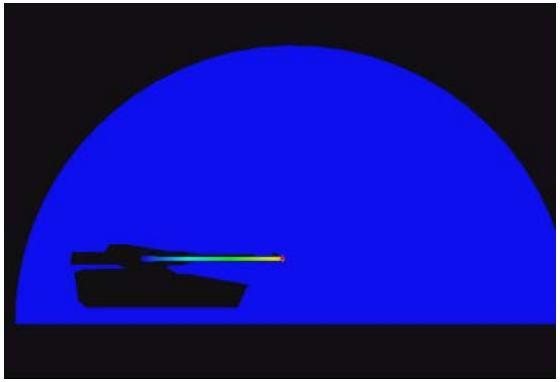
GENERAL DYNAMICS
Land Systems

Lightweight Gun Mount
- *Compact Cradle Design*
- *Modular Recuperators*
- *Light Weight Recoil Brakes*

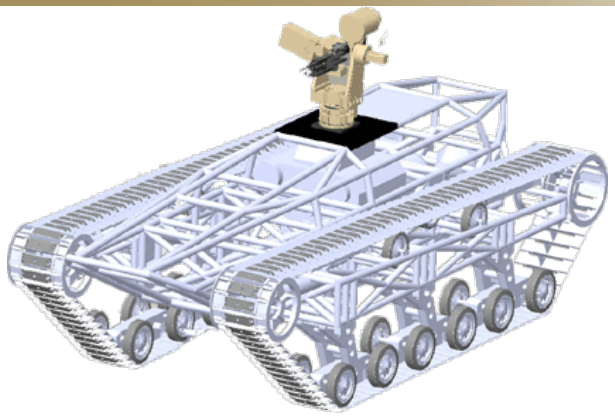


Lightweight 120mm Gun Tube
- *High Strength Gun Steel*
- *Carbon Fiber Composites*
- *Dual Autofrettage*
- *High Efficiency Muzzle Brake*
  - *Reduces Firing Shock to Vehicle & Crew*
  - *Enables Gun to fire from Light Weight Vehicle*

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



Robotics: Improving Lethality



Ripsaw

ARAS
Advanced Robotic
Armament System

Picatinny Lightweight Remote
Weapon Station (PLRWS)
on TARDEC
Advanced Robotic Platforms

Lethal Robotics

ARDEC integrates Remote Weapon Stations (RWS) onto a slue of robotic platforms.

- Picatinny Light Weight RWS onto Ripsaw
- CROWS II RWS onto Ripsaw
- Picatinny Light Weight RWS onto the Tactical Amphibious Ground System-Common Experimental (TAGS-CX).

ARDEC developing next generation Robotic Armament Systems.

- Lethal and Non-Lethal from one system
- Auto Reload for Ammunition
- ARAS ATO – currently at TRL 6

Warfighter Payoff

Warfighters can effectively engage threats with lethal and non-lethal rounds while remaining protected.

CROWS II RWS

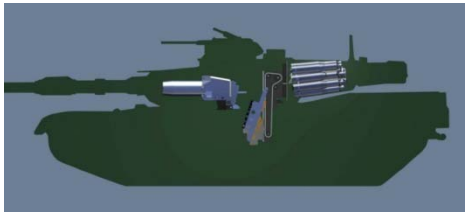
Additional Weapon Technologies

Laser Ignition

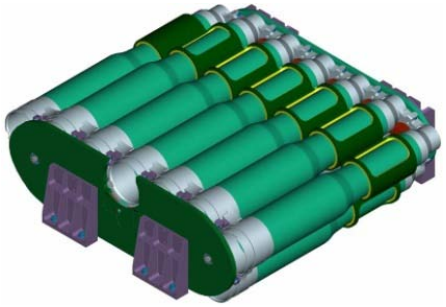
M3WS

LIPC

XM297



Compact Auto Loader



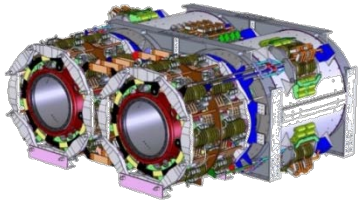
Anti Fratricide
Barrier Material

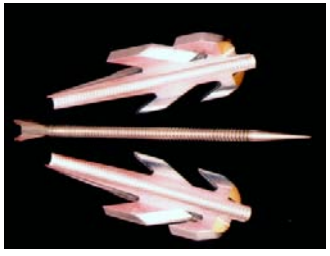
ON-MT

M777

ARDEC's Innovative Firepower
EM Gun

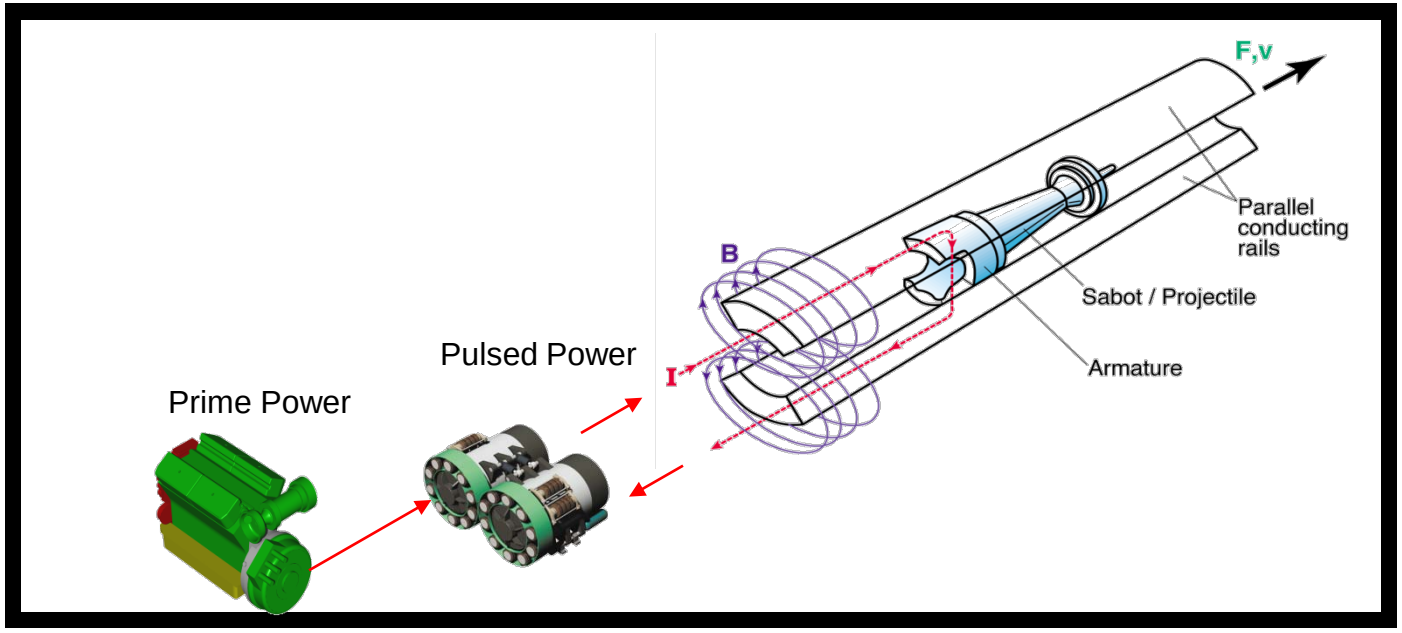
EM Guns differ fundamentally from conventional guns; The accelerating force (F) is provided by Electro-Magnetic forces, not rapid expansion of gases as seen in energetic propellants.





- Understand lethality of hypervelocity penetrators against projected future threat protection packages
- Projected future lethality gap can potentially be nullified by novel hypervelocity penetrators
- Powder-based guns cannot efficiently achieve hypervelocity due to tactical infeasibility

Impact Velocity	Monolithic Rods	Novel Penetrators
1500 m/s	Adequate data	Insufficient data
1850 m/s	Adequate data	No data
2200 m/s	Insufficient data	Insufficient data



In Summary – ARDEC …

- ARDEC retains proven in-house capability for Lethality/Non-Lethal enhancements
  - *Small, Medium, Large Caliber Applications*

- Expertise in Armaments System Engineering
  - *Weapons, Propulsion, Munitions, Warheads…*

- Technology has been matured through Tech Base Investments and CRADAs with Industrial partners.

- Government partnerships with Industry & Academia will continue to grow technology for future systems.

- ARDEC will continue to work with our TARDEC partners to provide Armaments Technology for current and future vehicles.

Our products assure decisive victory and bring our people home!

Contact Information

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