



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

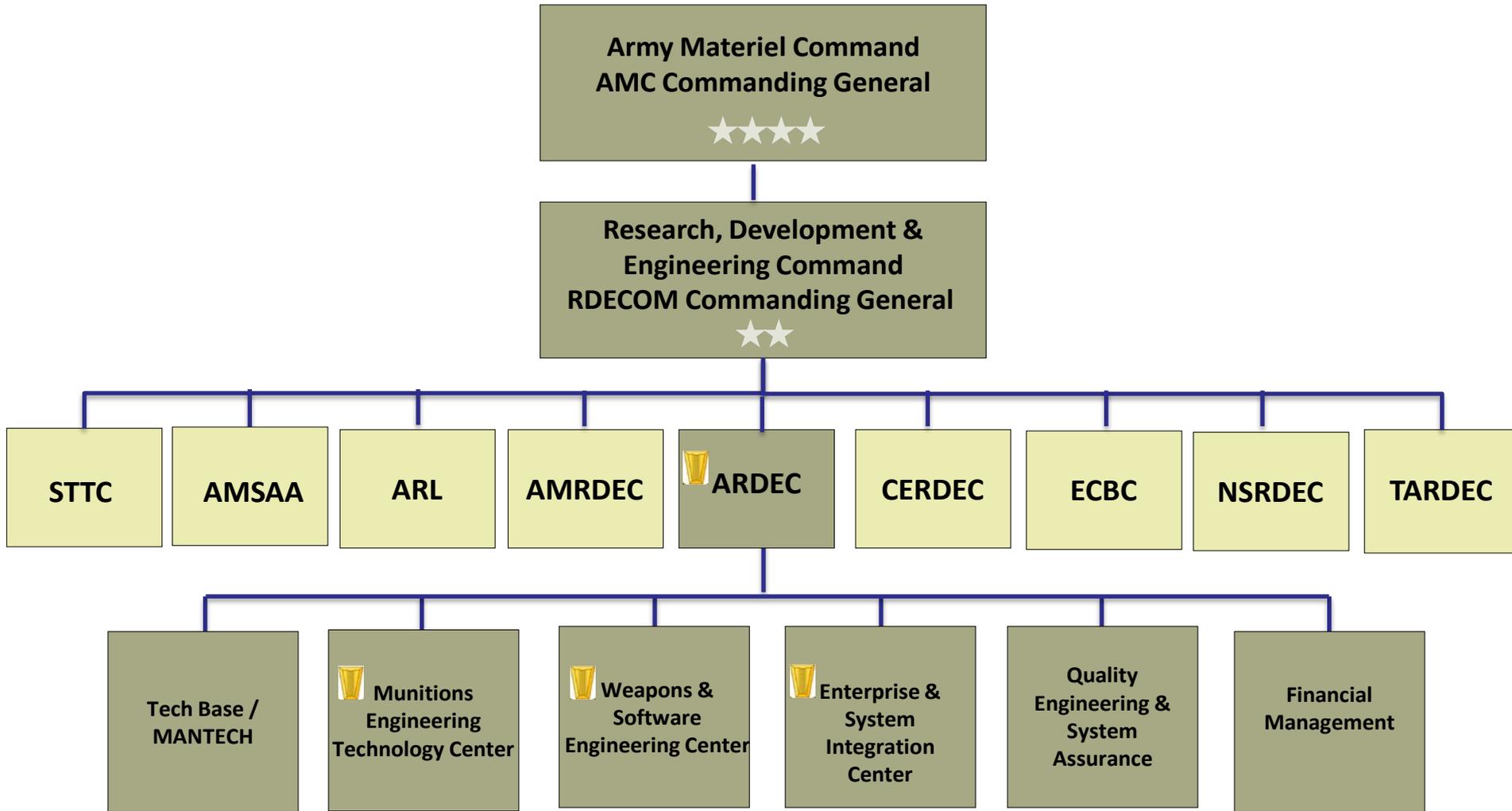


TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

**ARDEC Overview - 54th Annual NDIA Fuze Conference
12 May 2010
Dr. Joseph A. Lannon
Director, ARDEC**



ARDEC Organization - Chain of Command





Research



Development



Production



Field Support



Demilitarization



Vision:

Innovative Armaments Solutions for Today and Tomorrow

Mission:

To develop and maintain a customer focused, world-class workforce that will execute, manage and continuously improve 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

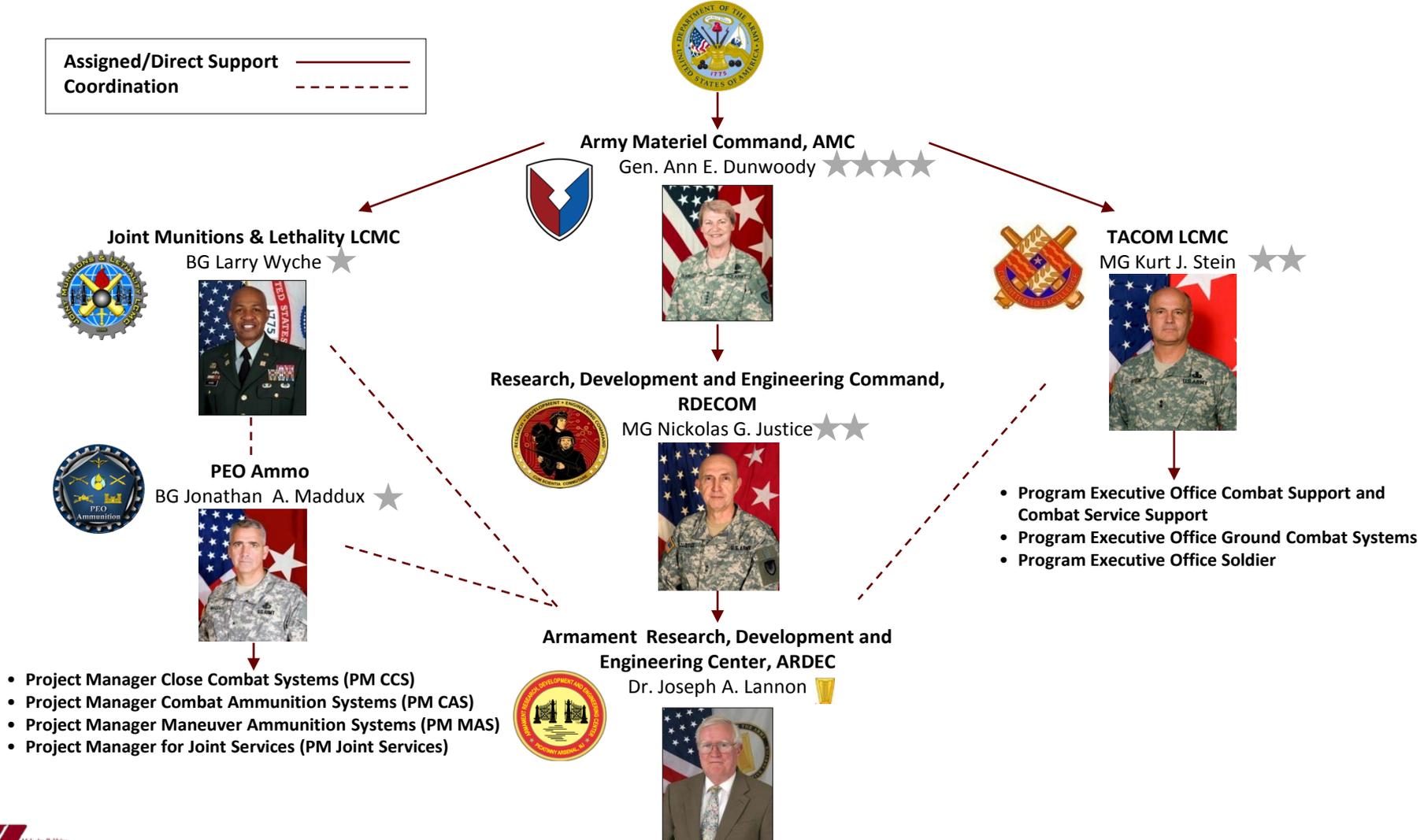
ARDEC provides the Technology for Over 90% of the Army's lethality; Significant support to other services' lethality



ARDEC Supports Two LCMCs



Headquarters, Department of the Army



- Project Manager Close Combat Systems (PM CCS)
- Project Manager Combat Ammunition Systems (PM CAS)
- Project Manager Maneuver Ammunition Systems (PM MAS)
- Project Manager for Joint Services (PM Joint Services)

- Program Executive Office Combat Support and Combat Service Support
- Program Executive Office Ground Combat Systems
- Program Executive Office Soldier





ARDEC at a Glance

- Established “Center of Mass” for Armament Systems and Munitions for Joint Services
- ARDEC is the largest tenant at Picatinny Arsenal
 - Over 500 Buildings/64 Laboratories
- Proven track-record supporting transition of technologies to the field;

14 Materiel Releases (MR) in FY 08	18 MR in FY 09	2 MR in FY10
13 Urgent Materiel Releases (UMR) FY 08	22 UMR in FY09	2 UMR in FY10

- **A total of 186 New Weapons and Equipment fielded since 9/11**
- ARDEC Gov’t Personnel* ~ 3570; 1340 new hires since FY99
 - Picatinny Site = 3095 Benet (Watervliet Arsenal) = 258
 - Rock Island Arsenal = 157 Adelphi & APG = 59
- >\$200M invested in “World Class” experimental R&D facilities since mid-90’s; Additional \$75M planned
- Strong partnerships with Industry, Academia, and other Government agencies - Growth and Success through **Cooperative Research and Development Agreements (CRADAs) = 118**
- Intellectual Property*:
 - Invention Disclosures – 85
 - Patent Applications – 183
 - Patents Issued – 9
- Patent License Agreements = 16
- In-house rapid prototyping initiatives demonstrating new desired capabilities, supporting production prove-out and initial fielding demands
- > \$100M Tech Base portfolio addressing Joint needs (Core Tech Base/ManTech only; does not include SBIR or Congressional Plus-ups)



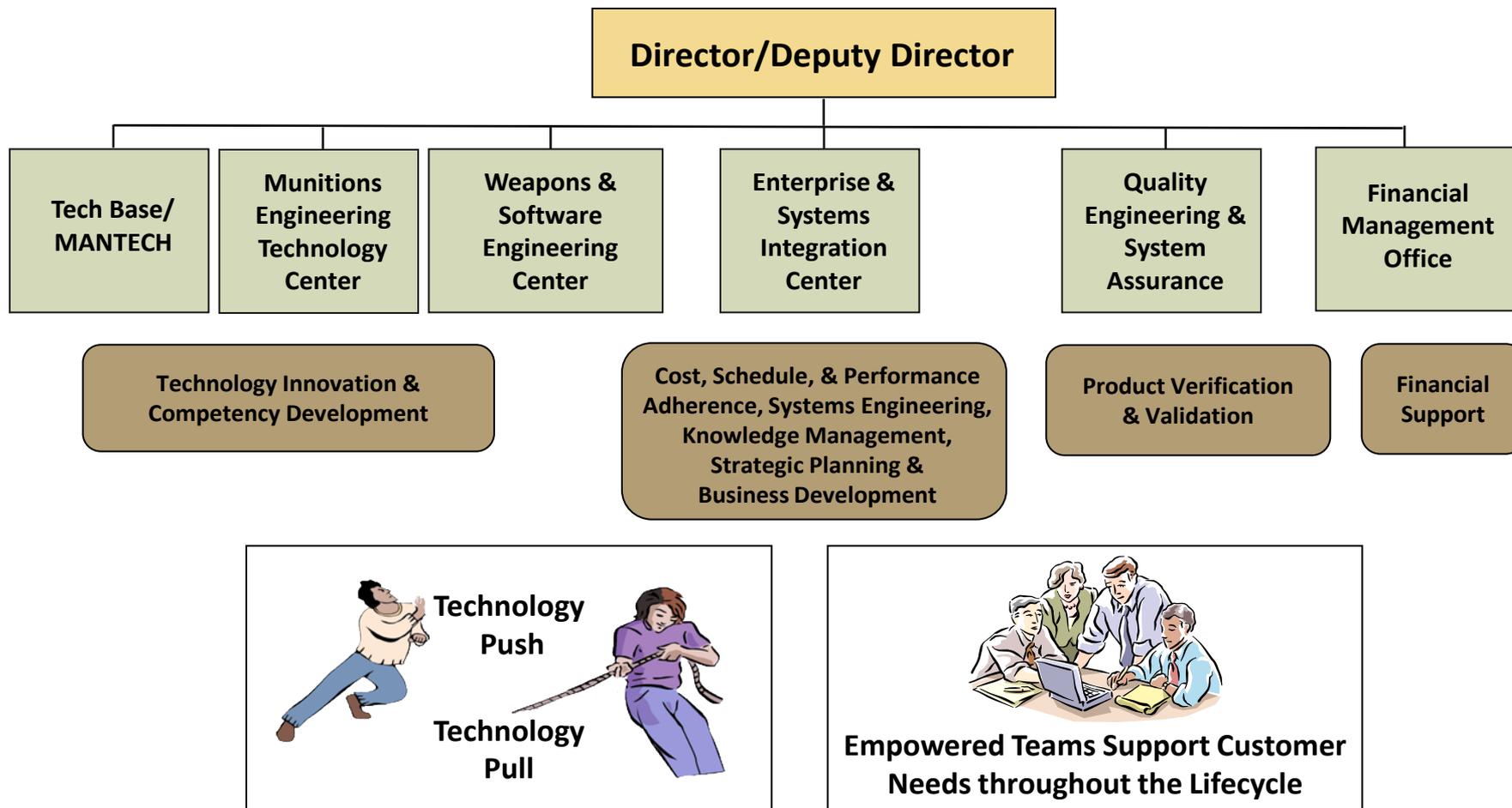
\$160M in Congressional in FY10

* = as of 31 March 2010





ARDEC Organizational Concept



Collaboration Drives Success





ARDEC Core Competencies

Collaboration Mechanisms

- ATOs/Tech Base
- Defense Ordnance Technology Consortium
- National Small Arms Consortium
- International
- Agreements
- Test & service Agreements
- CRADAs
- Rapid Prototyping

Emerging Technologies

- Networked Lethality
- Defense Against Unmanned Systems
- Counter Terrorism Technologies
- Homeland Defense Technologies
- Advanced Materials / Nanotechnologies
- Novel Power & Energy Systems for weapons and munitions
- Armaments Manufacturing Science Technologies
- Reliability & Predictability Technology
- Modeling & Simulation of Armament systems
- System Engineering

Advanced Weapon Systems

- Direct Fire weapons
- Indirect Fire weapons
- Scalable lethal Effects
- Non-Lethal Systems
- Small/Medium/Large Caliber Ammunition
- Directed Energy
- Remote Armaments
- Insensitive Munitions
- Fuzes
- Telemetry
- Precision Armaments
- Grenades
- Maneuver Support Munitions
- Demolitions
- Weapons & Munitions Manufacturing technology
- Detonators
- Explosive ordnance devices

Fire Control

- Battlefield Digitization
 - Software Applications
- Embedded Systems Software
- Firing Tables
 - Aeroballistics
 - Automated Test Systems
- Optics for Fire Control
- Smart Sight
- Projectile Tracking and Control
- Vehicle Health Management System
- Software Acquisition Support
- Software Engineering Processes
- Fire Control Technologies



Logistics

- Ammunition Logistics RDTE
- Battlefield Tools and Equipment
- Packaging

Advanced Energetics and Warheads

- Propellants
- Explosives
- Pyrotechnics
- Warheads
 - Kinetic Energy
 - Chemical Energy
 - Shaped Charges
 - EFPs
 - Fragmentation
 - Thermo baric
 - Multi purpose & Scalable
 - Non lethal
- Environmental Technologies
- Demil technologies





Weapons and Ammunition Fielded Since 9/11



XM153 Remotely Operated Weapon Station



XM1116 Extended Range Non-Lethal Marking Munition
URGENT MATERIEL RELEASE 2007
Effective Range approx. 30 to 150+ -40g, tear shaped bean bag coated with green marking powder



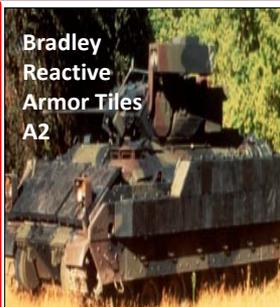
Weapons: Mossberg 500/590



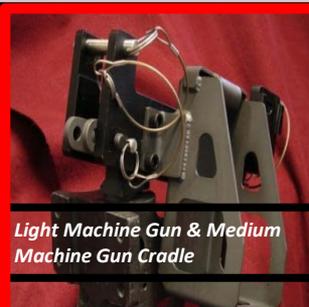
Objective Gunner Protection Kit (O-GPK)



Overhead Cover for the O-GPK



Bradley Reactive Armor Tiles A2



Light Machine Gun & Medium Machine Gun Cradle



CROWS Lightning / PD Cue



186* successful fieldings since 09/11/2001

Army's Greatest Inventions
21 of 70 Soldier Choice Awards

* = as of 15th March 2010



M1030 12 Gauge Door Breaching Cartridge

Contractor: QTK
NSN: 1395-01-476-7440
DODAC: AA54



Weapons: Mossberg 500/590, XM28 (Modular Accessory Shotgun System)



M829A3 APFSDS-T 120mm



XM 110 SASS



M32 LHMBC



Objective Weapon Elevation Kit



M100 GREM



M211/M212 Aircraft Countermeasure Flares



M982 Excalibur Block IA-1 Projectile



Picatinny Blast Shield for the LAV-25



AT4 Confined Space

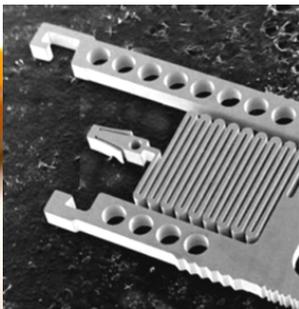
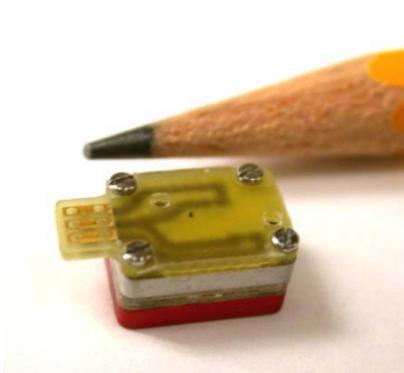


* = unique systems approved for fielding (e.g. MR) since 9/11/01



Significant Fuze Technical Accomplishments

Advance Fuze Technologies



MEMS Safe & Arm (S&A)



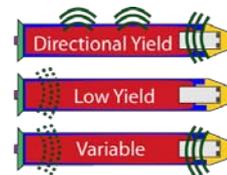
Excalibur XM 982



EPIAFS

Affordable Precision Munitions

- Scalable Technology for Adaptive Response (STAR)
- Affordable Precision Technologies



Force Protection



Kinetic Energy Active Protection System

Non-Lethal Munitions



40mm LV Airburst Non-Lethal Munitions

Innovation



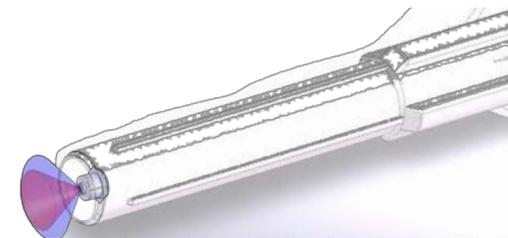
Lethal UAV



ARDEC Fuzing Technology Initiatives



- Scalable Technology for Adaptive Response (STAR) ATO
 - 250 mm GMLRS, 105 mm Precision, 30 mm Airburst
- Kinetic Energy-Active Protection System Target Detection Device (KE-APS TDD) ATO
- Cluster Munitions Replacement ATO
- DoD Joint Fuze Technology Program
- Affordable Precision Components ATO



KE-Active Protection System Interceptor



Practice Concept Cluster Munitions Replacement



Fuze Technology Integration

- Technology Insertion To Current Munition Items
- Addresses Industrial Base Single Point Failure Issues
 - Risk Mitigation:
 - Battery Aging
 - M734A1 Digital Signal Processor (Alternative Design)
 - Block Upgrades:
 - Standardization of Hand Grenade Fuzes
 - 30mm Increased sensitivity M759 Fuze
 - Mortar S&A enhancements
- PEO Ammunition / User Payoff:
 - Insert Current Technology Into Today's Munitions
 - Preclude Obsolescence By Incorporating Component Technology
 - Provide Safer, More Reliable and More Lethal Munitions



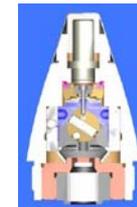
Reserve Battery



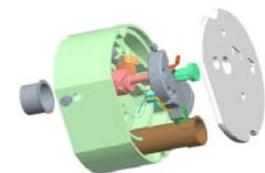
Hand Grenade Fuze



M734A1 Digital Signal Processor



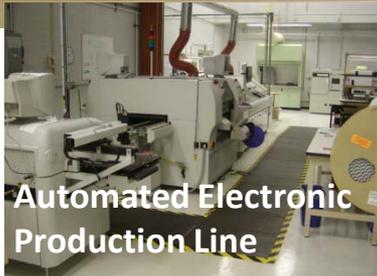
30mm Increased Sensitivity M759 Fuze



Mortar S&A



ARDEC In-House Fuzing Capabilities Fuze Development Center



Automated Electronic Production Line



Computer Numerical Control Machine shop



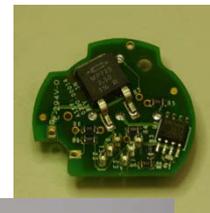
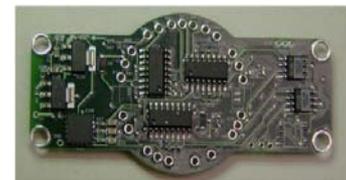
Inverse Drop Tester



Spin Tester



Real Time X-Ray machine

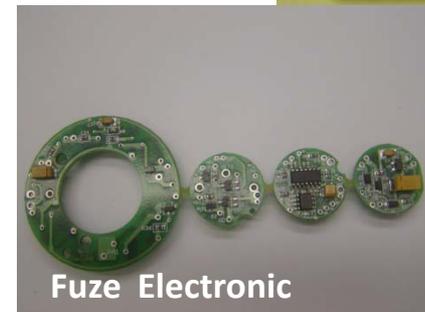


Capabilities for Rapid Prototyping:

- Custom Circuit Card Design and Fabrication
- Automated Surface Mount Assembly
- Optical Strain and Stress Measurement
- Environmental Test
- Real-Time X-Ray Inspection
- Stereo lithography
- High Speed Spin Stand
- Machine Shop

Current Projects Supported:

- PGM Simulator
- SMADSNET
- EPIAFS GNC Trainer
- Artillery Training Kit
- M228 Support
- M762 Training Fuzes
- Anti-Tamper Fuze



Fuze Electronic

Mission: To Accelerate New Technology To The Field



General Info

- Fuze function currently located at Adelphi, MD (already part of ARDEC)
- Provides focus on fuze science and technology efforts and early development
- 42 KSF: Admin space; Laboratory/Test areas; ammunition magazines
- Multiple sites around Picatinny Arsenal; renovations and new construction

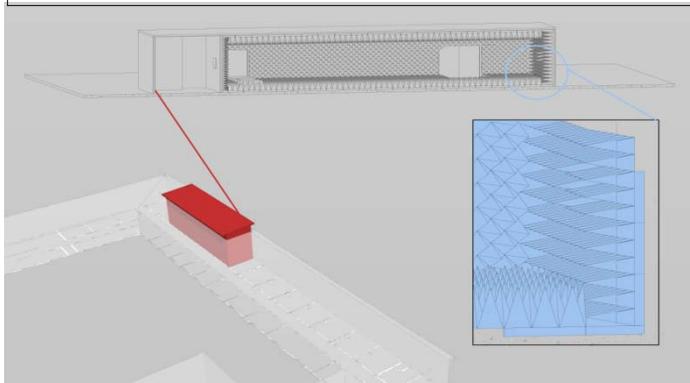
Army Fuze Engineering Complex



Fuze Energetic Research Laboratory



State of the Art Anechoic Chamber



Fuze Electromagnetic Research Laboratory





Army Fuze Safety Review Board (AFSRB) Support 2009 - 2010



➤ Initial/Interim Fuze Safety Certification (Test/TC)

- XM1156 Precision Guidance Kit (PGK) - 4 February 2009
- Multi-role Anti-armor Anti-personnel Weapon System (MAAWS) 84mm Anti-Structure Munition (ASM) 509 - 4 March 2009
- M762/M762A1 Electronic Time (ET) Fuze Used on 155mm XM1066 Infrared (IR) Illuminating Projectile – 8 April 2009
- Selectable Lightweight Attack Munition (SLAM) M4E1 and M320E1 SLAM Improved Functional Trainer (SIFT) – 10 August 2009

➤ Final Safety Certifications (MR):

- M153 Time Delay - Sympathetic Detonator (TD-SYDET) and M316 Trainer - 4 February 2009
- Dual Safe Fuze for the AT4CS-RS 84mm HEAT Weapon - 18 March 2009
- M156 Magneto-Inductive Remote Activation Munition System (MI-RAMS) with M39 Receiver (also know as “Type A Receiver”) - 9 April 2009
- M783 PD/Dly Fuze Used with 81mm M889A2 HE Mortar Cartridge and M734A1 Multi-Option Fuze for Mortar (MOFM) Used with 81mm M821A2 HE Mortar Cartridge – 30 June 2009
- Smoke, Visual, Restricted Terrain, XM106 (formerly known as XM106 Screening Obscuration Device-Visual Restricted (SOD-Vr)) with M201A1 Mod 3 Fuze - 27 July 2009
- F555 Electronic Time (ET) Fuze Used on 84mm 545C Illuminating Round - 25 September 2009

• XM7 Spider (SW control of Safety Critical Functions) – June 2009

➤ UMR & Approval Letters

- AFSRB, Navy Fuze & Initiation Systems Technical Review Panel (FISTRP), and Air Force Nonnuclear Munitions Safety Board (NNMSB) Executive Secretary on Anti-Structural Munition (ASM) Hand Grenade, MK14 - Mod 25 February 2009
- 2.75 Inch (70mm) XM282 Multi-Purpose Penetrator (MPP) Warhead Rocket - 28 April 2009
- M762/M762A1 Electronic Time (ET) Fuze Used on 155mm XM1066 Infrared (IR) Illuminating Projectile - 14 May 2009
- Viper Strike Munition (VSM) Used on the Hunter Unmanned Aerial Vehicle (UAV) (Impact Mechanism change and added timeout detonation feature) - 3 September 2009

ARDEC FOCUS:

Smaller, Smarter, Safer Fuzing for the Warfighter





Summary



- **Global Leader In Armaments Technology Solutions**
- **Provide Exceptional Customer Satisfaction**
 - **We work with soldiers:**
 - **Develop new armaments systems**
 - **Improve fielded systems**
 - **Quickly solve field problems**
- **State of the Art Fuzing Capabilities**
 - **In-House Facilities**
 - **S&T Technical Expertise**

Flexible, Agile, Innovative and Responsive

