ARDEC & Picatinny Community Support to Southwest Asia

Presented to:

NDIA Armaments Technology Seminar & Exhibition

Anthony J. Sebasto
U.S. Army Armament Research, Development, and Engineering Center (ARDEC)
asebasto@pica.army.mil
973-724-6198

14 June 2005
• Established “Center of Mass” for Armament Systems and Munitions for Joint Services
• ARDEC Personnel = 2679; >600 new hires since FY99
• $100M invested in modern experimental R&D facilities since mid-90’s
• Proven track-record supporting transition of technologies to the field; since Nov 03.....
  • 9 Type Classifications
  • 16 Material Releases (MR)
  • 10 Urgent MR (17 since early FY03)
• Strong partnerships with Industry, Academia, and other Government agencies.
• In-house rapid prototyping initiatives overcoming production problems or providing new desired capabilities to field in near term
• >$125M Tech Base portfolio addressing Joint needs

2004 Army Large R&D Lab of the Year
World Class Facilities
Most Recent in Operation

Armament Technology Facility
Opened 1996
$11.7M

Precision Armaments Laboratory
Opened 2003
$8.4M

Davidson Advanced Warhead Development Facility
Opened 2000
$8.8M

Precision Armaments Laboratory
Opened 2003
$15.5M

Armament Software Engineering Center
Opened 2005
$8.8M

~$45M in Facility Modernization invested over last 10yrs
World Class Facilities
Breaking “old” grounds

High Energy Propellant Formulation Facility
- MCA Funded - $17.7M
- Planned Completion – FY07
- 45,000 ft² -
  - Propellant Pilot Plant / Characterization Laboratories / Magazine Storage / Offices

Pyrotechnic Research & Technology Complex
- MCA Funded - $9.9M
- Planned Completion – FY07
- 33,000 ft² –
  - Engineering Offices & Laboratories
  - Pilot manufacturing facility
  - Energetic stowage

Explosives R&D Loading Facility
- MCA Funded - $8.0M
- Groundbreaking Dec 05; Completion – FY07
- 28,000 ft² –
  - Melt Pour Operations & Engineering
  - Climate Controlling Machining
  - Explosive Pressing, Cast Cure, & X-Ray

Just Kidding!

Actual Building Concept Available Jul 05
Type Classification & Material Releases
Some Examples - FY04 to Present

<table>
<thead>
<tr>
<th>Type Classification Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>• M85 Remote Activation Munitions System Trainer</td>
</tr>
<tr>
<td>• M111 Improved Position, Azimuth Determining System</td>
</tr>
<tr>
<td>• M192 Lightweight Ground Mount</td>
</tr>
<tr>
<td>• M240H- 7.62mm Aviation Machine Gun (Aviation Version)</td>
</tr>
<tr>
<td>• M255A1 Flechette Warhead, 2.75 Inch Rocket</td>
</tr>
<tr>
<td>• MK281 Cartridge, 60mm: Smoke, WP, M722A1 w/ Fuze PD/DLY M783</td>
</tr>
<tr>
<td>• M769, 60mm, Full Range Practice Cartridge (FRPC)</td>
</tr>
<tr>
<td>• M829A3, Cartridge, 120mm, Armor Piercing, Fin Stabilized, Discarding Sabot with Tracer (APFSDS-T)</td>
</tr>
<tr>
<td>• M879, 81mm, Full Range Practice Cartridge (FRPC)</td>
</tr>
<tr>
<td>• M111 Improved Positioning &amp; Azimuth Determining System</td>
</tr>
<tr>
<td>• M1155 Portable Inductive Artillery Fuze Setter (PIAFS)</td>
</tr>
<tr>
<td>• M303 Special Operations Forces Demo Kit</td>
</tr>
<tr>
<td>• M95/M96 Mortar Fire Control System</td>
</tr>
<tr>
<td>• Cartridge, 9mm, Jacketed Hollow-Point, M255A1 Flechette Warhead, 2.75” Rocket</td>
</tr>
<tr>
<td>• M192 Lightweight Ground Mount</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Materiel Release (MR) Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>• M19/M20 Modernized Demolition Initiator</td>
</tr>
<tr>
<td>• CHARGE, PROPELLING, 155MM: M232 (MACS)</td>
</tr>
<tr>
<td>• Cartridge, 60mm: Smoke, WP, M722A1 w/ Fuze PD/DLY M783</td>
</tr>
<tr>
<td>• M769, 60mm, Full Range Practice Cartridge (FRPC)</td>
</tr>
<tr>
<td>• M829A3, Cartridge, 120mm, Armor Piercing, Fin Stabilized, Discarding Sabot with Tracer (APFSDS-T)</td>
</tr>
<tr>
<td>• M879, 81mm, Full Range Practice Cartridge (FRPC)</td>
</tr>
<tr>
<td>• M111 Improved Positioning &amp; Azimuth Determining System</td>
</tr>
<tr>
<td>• M1155 Portable Inductive Artillery Fuze Setter (PIAFS)</td>
</tr>
<tr>
<td>• M303 Special Operations Forces Demo Kit</td>
</tr>
<tr>
<td>• M95/M96 Mortar Fire Control System</td>
</tr>
<tr>
<td>• Cartridge, 9mm, Jacketed Hollow-Point, M255A1 Flechette Warhead, 2.75” Rocket</td>
</tr>
<tr>
<td>• M192 Lightweight Ground Mount</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Urgent MR Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>• XM101 Common remotely Operated Weapon Stations (CROWS)</td>
</tr>
<tr>
<td>• M930E1 120mm Illuminating Mortar Cartridge</td>
</tr>
<tr>
<td>• X26E Advanced Taser Weapon and Associated Equipment</td>
</tr>
<tr>
<td>• XM32 Lightweight Handheld Mortar Ballistic Computer</td>
</tr>
<tr>
<td>• M107 Cal .50 Long Range Sniper Rifle (LRSR)</td>
</tr>
<tr>
<td>• FN303 Less Lethal Launcher</td>
</tr>
<tr>
<td>• M211 and M212 Flare: Countermeasure</td>
</tr>
<tr>
<td>• Non-Lethal Capabilities Sets</td>
</tr>
<tr>
<td>• AT4 Confined Space High Performance Weapon</td>
</tr>
<tr>
<td>• MP5-A5 9mm Submachinegun</td>
</tr>
<tr>
<td>• Lightweight Shotgun System</td>
</tr>
<tr>
<td>• M203 Grenade Launcher (GL) Day/Night Sight (DNS)</td>
</tr>
</tbody>
</table>

Supporting Transition of Technologies to Production/Field During War Time
Urgent Fieldings
Some FY03/04 examples

**AT-4 Confined Space (CS)**
- Enables safe firing in MOUT environments
- Same performance as AT-4
- ~800 systems to Army and SOCOM FY03/04

**Gunfire Detection System (GDS)**
- Acoustically locate small arm fire origins
  - Provides azimuth, elevation & range
  - 360 degree coverage
- >100 systems fielded to Army and SOCOM since Aug 03

**XM32 LtWt Handheld Mortar Ballistic Computer (LHMBC)**
- Computes ballistics, gun pointing data and tactical fire control for US 60, 81 & 120mm mortars faster and more accurate than M23 MBC
- 32 units fielded to 3/2 Stryker Brigade Aug 04

**M211/212 Countermeasure Flares**
- Broadens countermeasure signature to defeat all fielded Surface-to-Air Missile (SAM) Threats
- > 65,000 Flares fielded to Army & Air Force since Jan 03
Urgent Fieldings
Some FY04/05 examples

**M107 0.50 Cal Sniper Rifle**
- First .50 cal semi-auto sniper rifle
- Effective against materiel/personnel to 2km
- Multiple Urgent Releases in FY04/05
- Full Materiel Release approved Jan 05

**XM101 Common Remotely Operated Weapon Station (CROWS)**
- Enables User to engage targets while under protected under armor
- Fully stabilized firing of M249, M240, M2, & MK19
- Urgent Fielded Feb 05

**X26E TASER**
- M26 Advanced Taser
- X26E Taser/ M4 Adaptor
- Adaptation from original M26 TASER
- X26E provides readily available non-lethal capability to XM-4 carbine
- Urgent Fielded 350 X26E TASER since May 05

**M930E1 120mm Illuminating Mortar Cartridge**
- Responded to Urgent Requirement
- Standard white light illumination
- Reworked M930 stockpile to meet current need
- Urgent Fielded in 95 days (Feb 05)
Rapid Prototyping Initiatives
Examples Supporting Production Requirements

**Stryker Ballistic Shield**

- Lightweight (145lb) Cupola mounted ballistic titanium protection w/armor windows
- Leverages MANTECH for low-cost Titanium processing and manufacturing
- ARDEC producing 136 kits in response to Stryker Brigade urgent need
- 70 kits produced and shipped; >30 kits installed and in operation
- Spiral improvements to kit underway
Rapid Prototyping Initiatives
Examples Supporting Production Requirements

**M54A1 Burster Tube Loading**

- Problem: M54A1 production problems impacted fielding of M110A2 to USMC
- ARDEC developed new melt pour & controlled cooling process
- 7000 Burster Tubes loaded/delivered by ARDEC to Pine Bluff by Jun 05
- ARDEC executing new requirement for additional 7000 burster tubes
- Technology transfer of ARDEC process to industry underway
Special Weapon Observation Reconnaissance
Direct-Action System (SWORDS)

- Demonstrates small, low-cost, remotely operated weapon system
- Remotely Operated Recon, Security, Sniper Asset with increased weapons accuracy & control
- Early User design feedback from Stryker Brigade, 10\textsuperscript{th} MD, & SOCOM
- Safety Confirmation Testing continuing to support potential Urgent Materiel Release Oct/Nov 05
- Transition agreement in place with Robotic Systems - Joint Project Office
Special Weapon Observation Remote Direct-Action System (SWORDS)
Live Fire (w/M240B 7.62mm Machine Gun)
Remote Weapon Acoustic Counter Sniper System

- Joint ARDEC, AMC-FAST, PM-Soldier Weapons, & Industry Program
- Integrates 360° acoustic detection & location with remote weapon station
- Automatic/manual weapon position
- On-the-move weapon position updates
- USARPAC evaluation in CONUS and Limited Safety Release Jul 05
- ARDEC & PM working path ahead for evaluations in Iraq Oct/Nov timeframe

Enhances Situational Awareness of the most Critical Threats....Shooters!
Rapid Prototyping Initiatives
Examples of “Tech Push” for Early User Demo’s

*Picatinny Lightweight Remote Weapon Station (PLRWS)*

- Joint ARDEC, PM-Soldier Weapon (PM-SW), and REF Program
- Lightweight remote mount for M249, M240, & ACSW applications
- Target Wt: <150lbs with weapon/ammo (GOAL MET)
- Compliments CROWS-class systems
- 2-Axis Stab; 360° continuous rotation; Elevation Range: +45° to -15°
- SAFC II sight integration and hardstand/vehicle testing Sept/Oct 05
- ARDEC working path ahead under PM-SW Remote Mount Strategy
Early Attack Reaction Sensor (EARS)

- Joint ARDEC and AMC-FAST Program
- Portable Hand-held Gunfire Detection System to detect/range small arms gunfire origin for individual soldier out to ~150m+
- PDA Display Outputs: Shockwave Alert, Muzzle Blast Bearing Estimate, Shooter range w/ Audio Alert
- Successful Proof of Concept at ARDEC Nov 04 out to 100m
- Technical demonstration at APG Aug 05
- User demonstration Dec 05
- Future Capability:
  - Wireless network - triangulate to provide high localization accuracy.
  - Vehicle mount & helmet mount application
Rapid Prototyping Initiatives
Examples of “Tech Push” for Early User Demo’s

Non-Lethal Options for Theater Internment Facility (Camp Bucca)

Typical Compound Area

- Response to 18th MP BDE Commander request for site survey team to provide non-lethal technology options to control detainee populations during riots
- Joint USAMPS, ARDEC, and JNLWD survey team visit 25-29 April 2005
- Longer stand-off NL munitions primary User need
- ARDEC prototyped technology options for demonstration in theater in < 72hrs
- VERY POSITIVE User feedback from BDE Commander; Operational Need Statements in process
Purpose:
• Standardize gelatin block test methodology amongst DOD and other federal agencies
• Establish ranking methodology for lethality of bullets

Product:
• Gelatin Block Test Standardization Manual (COMPLETED)
• Ranking of “off the shelf” bullet designs based on lethality

Payoff:
• Allows any Gov't agency/contractor to share data with confidence.
• Determine if there is a more effective 5.56mm bullet than M855
In Summary....ARDEC/Picatinny...

• Proven track record of rapid transition of technology to the field

• Demonstrating new technology concepts enhancing warfighter capabilities

• Rapid prototyping processes solving production issues to meet warfighter needs

ARDEC & Picatinny Community....... 

Products, people, and processes enabling our ultimate customer, the soldier, to “take care of business” throughout the spectrum of conflict!