United States Marine Corps
PM-AAA
Expeditionary Fighting Vehicle

43rd NDIA-Guns & Missile Systems
Major John L. Medeiros
Product Group Turret Systems, Guns/Ammo
Topics

- Program Update
- MK44, 30x173mm Guns/Ammo IPT
- Current PG-TS efforts
**Future: EFV**

- EFV directly supports the Marine Corps’ Capstone Concept: Expeditionary Maneuver Warfare
- The EFV will provide the tactical mobility asset required to spearhead the EMW concept and permit the Marine Corps to fully exploit littoral areas as maneuver space
- The EFV will allow immediate, high speed maneuver of Marine infantry units as they emerge from ships located beyond the horizon (25 nm and beyond)
- The EFV’s unique combination of offensive firepower, armor, NBC protection, and high speed mobility on land and sea represent major breakthroughs in the ability of Naval and Marine expeditionary forces to avoid the enemy’s strength and exploit its weakness

"Revolutionizing Expeditionary Maneuver Warfare"
Program Status

• **Where we are:** Certified Program, June 07
• **Essentially- latter phases of SDD-1 (reliability focused)**
• **Vehicle meets KPP’s, but not reliability-wise**
  – Nunn-McCurdy
  – Stems from Operational Assessment, reliability not as expected
  – Blue Ribbon Panel review (Dec 06)
  – Bottom-Up requirements review by MCCDC (Jan 07)
  – Congressional Inquiry (May 07)
• **ASN to Final approved contract award for SDD-2 vehicles.**
  – SDD-2 Contract Award to build 7 new EFV’s
    • 5 P7s, 2 C7s
    • Mileage/hours on current models exhausted
  – Extending LRIP to 2012 (likely)
• **SecDef/SecNav- USMC will field this vehicle**
EFV PROGRAM HIGHLIGHTS BY ACQUISITION PHASE

FY88 - FY95
Concept Exploration

Component Technology Demonstrators

Hydrodynamic & Automotive Test Rigs

Design Cycles

FY95 - FY01
Program Development & Risk Reduction (PDRR)

1st Generation Prototypes

Integrated Functionality, Full Up System

FY01 – FY12
System Development & Demonstration (SDD)

2nd Generation – 10
3rd Generation - 7

Mature the Design, Prepare for Production

FY12 – FY15
Low Rate Initial Production (LRIP)

LRIP Vehicles

Production, IOT&E, and Live Fire Testing

FY15 – FY2?
Full Rate Production (FRP)

Fielding the “EFV”

FRP Vehicle
Product Group Breakdown

PM AAA Staff functions:
- T & E
- Comptroller
- Operations
- Systems Engineer
- Budgets

ASN
PEO Land Systems
Colonel Taylor
Program Manager
Colonel Bryant
Deputy PM
Mr. Joe Teets

PG Distributed Mechanical System
PG Powertrain
PG Turret Systems
PG Structure/Armor & Attachment
PG Vetronics, C4I, Electronics

Systems Engineer
Chris Melkonian
Fire Controls
Will Sedmak
Lasers/VTC
Mike Kreiner
MK44
Shawn Haag
Ammo/Logistic
Lou Hearrell

Business Manager
Skip Benyo
Publication
John Wright
Operational
MSgt Baker
Turret Structure
Jeff Snyder
Guns/Ammo
Major Medeiros
Mission Statement:
The MK44 Guns/Ammo IPT exist to bring together all Military/Government and Industrial users of the MK44 Gun and 30mmx173 Ammunition in order to increase the information flow within the MK44 and 30mmx173 guns/ammo community.
- Meets Semi-Annually Chaired by the US Marine Corps, PM Advance Amphibious Assault (EFV)
- User needs and Industrial solutions.
- IPT- Integrated Product Team- “Team”

ENDSTATE: Increased information flow!
MK44 30x173mm
Guns and Ammo IPT

Previous IPT notes:

- IPT overview
- US Forces/Foreign Military updates
- Industrial updates
- NATO update
- Vendor/industry briefs
- USMC/USA/USN Joint spec. briefs
- Other vendor briefs
- Test results
- Specification discussions
30mm Guns and Ammo IPT Meetings

- Jan 1998 – DRPM-AAA Barrel Symposium (MAJ Richter hosts) Forerunner of IPT.
- Jan 1999 - DRPM-AAAAV Woodbridge. Ammo producers welcomed
- Oct 1999 - DRPM-AAAAV Woodbridge. (Govt and Boeing)
- Mar 2000- IPT receives DoD Top Acquisition David Packard Award
- May 2000 - DRPM-AAAAV Woodbridge
- Sep 2000 - Quantico (MAJ Cushing hosts)
- Oct 2001 - DRPM-AAAAV Woodbridge
- Mar 2002 – DRPM-AAAAV Woodbridge
- Aug 2002 – DRPM-AAAAV Woodbridge
- Dec 2002 – DRPM-AAAAV Woodbridge
- Feb 2004 – DRPM-AAAAV Woodbridge (MAJ Mullins hosts)
- Jul 2004 – Mesa, AR. ABM Program Re-established. Plan for FCT
- Mar 2005 – DRPM-AAAAV Woodbridge. UK MOD welcomed
- Aug 2005 - Mesa, AR. Norwegian AMC welcomed
- Feb 2006 – Hawthorne, NV. Pre-ABM Lethality Evaluation.
- Aug 2006 – Mesa, NV. (MAJ Medeiros hosts). Austria and Switzerland welcomed.
- Oct 2006 – Crane, IN. WIPTs established.
- Mar 2007 – Carlsbad, CA.
- Oct 2007 – Fredericksburg, VA.
- April 2008 - Tampa, FL.
30mm Air Burst Munition
Down Select

- ATK/Diehl cartridge recommended by SSP for down select and qualification.

- **General Information**
  - **Warhead**
    - High Explosive Air Burst with Base Mounted Fuze
    - SAPHE Performance Against Materiel Targets (MK240 Hardened Nose Design from Diehl)
    - Explosive: PBXN-5
    - Incendiary: Zirconium
    - Inductive Fuze Setting in Gun Feed
  
  - **Cartridge**
    - Aluminum Case
    - Propellant: Single Base
    - Primer: M36A2 Percussion
  
  - **Fuze:** Operates with or without the Inductive Fuze Setter
    - **Point Detonate Mode**
      - Default Fuze Configuration
      - Fuze Detonates Upon Target Impact
    - **Point Detonate Delay Mode**
      - Fuze Detects Impact with Target and Delays up to 1 ms before Detonating
      - Several Fixed Delays are Offered
    - **Air Burst Mode**
      - Fuze Detonates at User Programmed Distance
      - Fuze has Point Detonate Capability if impact with Target Occurs before Set Point
    - **Self-Destruct:** Detonates at Maximum Mission Time
### 30-mm Ammunition Qualification Tests

<table>
<thead>
<tr>
<th>Test Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>AT-1</td>
<td>Interior, Exterior, and Terminal Ballistics: Baseline</td>
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<tr>
<td>AT-1B</td>
<td>Interior, Exterior, and Terminal Ballistics: Post Environment Tests</td>
</tr>
</tbody>
</table>
| AT-2      | Sequential Environment  
- 28 Day Temperature and Humidity  
- Transportation Vibration  
- Shipboard Vibration  
- 4 Day T&H |
| AT-3      | Fast Cook-Off |
| AT-4      | Slow Cook-Off |
| AT-5      | Bullet Impact |
| AT-6      | Fragment Impact |
| AT-7      | Sympathetic Detonation |
| AT-8      | Shaped Charge Impact |
| AT-9      | Salt Fog |
| AT-10     | Sand and Dust |
| AT-11     | Arena |
| AT-12     | Seq. Rough Handling |
| AT-13     | 5-Foot Drop |
| AT-14     | 40-Foot Drop |
| AT-15     | Shipboard Shock |
| AT-16     | Waterproof |
| AT-17     | Energetic Qualification |
| AT-18     | Function and Casualty |
| AT-19     | Fuze Function |
| AT-20     | Fuze Arming Distance |
| AT-21     | Primary Expl. Safety |
| AT-22     | Numerical Effectiveness |
| AT-23     | Jolt |
| AT-24     | Jumble |
| AT-25     | Extreme Temperature |
| AT-26     | Thermal Shock |
| AT-27     | Lead Azide |
| AT-28     | HERO |
| AT-29     | ESD |
| AT-30     | EMV |
| AT-31     | ESD |
| AT-32     | Brush Impact No Fire |
Recent & Upcoming Test Events

• Dynamic Arena Testing: Nov 07 and Feb 08
  – Data reduction on-going
• Lightning & ESD Testing: 26-29 Nov 07
  – Sending test articles to ATK for inspection Apr 08
• 28 Day T&H Testing: Begins 11 Apr 08
  – Begins Environmental Sequence to include: Vibration, Sequential Rough Handling, 4 Day T&H, Extreme Temperature, 40ft Drop, Thermal Shock
• Fast Cook-off Testing: Rescheduled to 24 Apr after weather prevented testing 8 Apr
• Numerical Effectiveness of Interrupter Testing
  – Late May-Early June
• Primary Explosive Safety Testing
  – Early July
• Jolt and Jumble Testing
  – Mid May
• Bullet and Fragment Impact Testing
  – May/June
• Salt Fog Testing
  – May/June
Systems Integration / User Jury

- User preference and functional integration on-going.
PG-TS Timeline

PABM Rd Qualification effort
- Sept 07
- NSWCDD - Dahlgren
- US Army to conduct parallel effort
- Dec 08

GD Integration Program Plan Systems Integration
- Sept 07
- Demonstrate on SDD 1 turret
- Sept 09

PM AAA PABM Verification
- Sept 09
- SDD II
- Fire controls
- User functions
- TTP’s
- Sept 12

• PM AAA (PG-TS) intends to have PABM fully integrated for LRIP Lot 1
Other Ammo Efforts

• Armor Piercing Training Round Need
  • RFI on the street
  • Price/cost
  • Training value

• 30x173mm Surface Danger Zone Testing
  • ATC
  • Validate SDZ for ammo inventory

• PABM Trainer?
  • How to train with PABM
  • Training/spotting round, turret Simulators?
SURFACE DANGER ZONES

Background:
- 2004- Data review, MCPD/USMC Safety/ARDEC Safety insufficient data statistically
- 2005-06- USMC continued utilizing waivers

UPDATE:
- John Riley - Test Director Ammo Systems Division
- April 08- rounds down range Aberdeen (New Bombing Field)
  - MK239, MK258, MK268, AP trainers…
  - planned 7-8 week test
MK44 incident

- Date – 27 February 2008
- Location – Marine Corps Base, Camp Pendleton, Ca.
- Activity – Gunnery Skills Training
- Failure – Barrel Separation
- Injuries – Minor
- Damage to MK44 - Major
Feeder
Feeder & Receiver Assembly
How/prevention

- There are three plausible causes as to how the barrel came to be unlocked
  1. Hardware - The barrel came unlocked on its own
  2. Procedure & Training - The barrel was inadvertently unlocked while performing maintenance on the coax mg the previous day
  3. Procedure & Training - The barrel was not properly installed

- Because none of the three possible causes can be disproven beyond question, the EFV program has decided to address them all
Hardware/Training

• ECP being processed by ATK that will:
  – Increase spring tension in the barrel release pin
  – Provide visual indication within the turret to ensure the barrel release pin is fully seated

• PM AAA and GDAMS is revising EFV gunnery skills training program
• Gunnery Skills Test (GST) will be administered to all test personnel expected to operate the MK46 Weapon System
• Only certified personnel will be allowed to operate as gunner or vehicle commander
Procedure

• Ensure established operational checks are completed daily while on a live fire range
• Greater detail provided on how to inspect barrel status
• Increase the frequency of barrel status inspection
Questions