Expeditionary Fighting Vehicle (EFV) 30mm Ammunition Feed System

Presented by:
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Presentation Outline

- Vehicle Highlights
- Ammunition Feed System (AFS) Overview
- Testing Completed to Date
- Key Program Milestones (and Video)
- Path Forward
EFV Vehicle Highlights

- **Mission**
  - Transport Infantry From Ships Beyond the Horizon to Inland Objectives
  - Provide Direct Fire Support During Combat Operations

- **Speed**
  - Land: 45 mph
  - Water: 29 mph

- **Weight**: 76,000 lbs

- **Carrying Capacity**: 20
  - 3 Crew; VC, gunner, and driver
  - 17 Infantry

- **Fire Power**
  - MK46 30mm Weapon Station With the MK44 30mm Automatic Gun
  - M240 7.62mm Coaxial Machine Gun
EFV AFS Key Requirements

- **Ready ammunition capacity:**
  
<table>
<thead>
<tr>
<th>Container</th>
<th>Threshold</th>
<th>Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary (HE)</td>
<td>150</td>
<td>180</td>
</tr>
<tr>
<td>Secondary (AP)</td>
<td>50</td>
<td>60</td>
</tr>
<tr>
<td>TOTAL</td>
<td>200</td>
<td>240</td>
</tr>
</tbody>
</table>

- **Rate of Fire:** 200 rounds/min.
  - Single shot, 5 round & continuous burst

- **Gun Elevation Range:** -10° to +45°

- **Vehicle Attitude:** Up to 60% grade (31°)

- **Operational after 360° rollover**

- **Weight:** 235 lbs

- **Reliability:**
  - ≥ 10,000 (MRBF),
  - ≥ 22,000 (MRBOMF)
EFV Design Overview
-Current AFS Configuration

MK44 30mm Bushmaster II Gun and Dual Feeder

Primary Container Cover (HE) w/ Indexing Conveyor

Primary Container (HE)

Secondary Container (AP)

Redesigned Upper AP and HE Flex Chutes

Pivoting Roll-Over

Redesigned Lower AP and HE Flex Chutes

Powered Forwarder

Electronic Control Unit
EFV Testing Summary
- AFS Brassboard

**Cycle Testing**
- ~10,000 rounds cycled
- HE can resistance characterized
- HE can index function characterized
- Booster function characterized
- Cycle tested both HE & AP sides
- Loading assessment with vehicle mock-up
- 31º Tilt Test
  - HE ammo can and forwarder only

**Identified design improvements**
- Roll-Over Geometry Redesign
- HE can round positioning & retention features
- HE separator mechanism actuation method external to can
EFV Testing Summary
- Delivered Production Systems 1-9

● Acceptance Testing
  ➔ 9 systems
  ➔ GDATP EDL facility
  ➔ Engineering Pre-Test

● Formal ATP
  ➔ 4 gun elevations
    ■ -10°,+15°,+30°,+ 45°
  ➔ Cycling per elevation
    ■ Single Shot
    ■ 5 round burst
    ■ Continuous burst
  ➔ Download capability
EFV Testing Summary
-Total rounds cycled per production configuration

<table>
<thead>
<tr>
<th>System</th>
<th>Pre ATP Cycled Rounds</th>
<th>ATP Cycled Rounds</th>
<th>Post ATP Cycled Rounds</th>
<th>Total Rounds on System</th>
</tr>
</thead>
<tbody>
<tr>
<td>System #1</td>
<td>2316</td>
<td>156</td>
<td>0</td>
<td>2472</td>
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<tr>
<td>System #2</td>
<td>1302</td>
<td>188</td>
<td>0</td>
<td>1490</td>
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<tr>
<td>System #3</td>
<td>193</td>
<td>158</td>
<td>9928</td>
<td>10279</td>
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<tr>
<td>System #4</td>
<td>107</td>
<td>121</td>
<td>0</td>
<td>228</td>
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<tr>
<td>System #5</td>
<td>120</td>
<td>156</td>
<td>73</td>
<td>349</td>
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<tr>
<td>System #6</td>
<td>122</td>
<td>156</td>
<td>0</td>
<td>278</td>
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<td>System #7</td>
<td>193</td>
<td>251</td>
<td>0</td>
<td>444</td>
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<td>System #8</td>
<td>206</td>
<td>307</td>
<td>0</td>
<td>513</td>
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<tr>
<td>System #9</td>
<td>274</td>
<td>402</td>
<td>0</td>
<td>676</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>4833</strong></td>
<td><strong>1895</strong></td>
<td><strong>10001</strong></td>
<td><strong>16729</strong></td>
</tr>
</tbody>
</table>

Total rounds cycled on Turret #1 (including brassboard) as of 4/25/2010: 26735
EFV Testing Summary
- Follow On Engineering Testing Design Upgrades

● 6 Design Areas Identified for Upgrades on Delivered Systems
  - HE Cover
  - HE Separator Handle
  - ECU Firmware
  - HE Container
  - Pivoting Roll-Over Sprocket
  - Forwarder Clutch

● Retrofit Activity
  - Delivered systems were returned to GDATP for retrofit
  - Two week turnaround time per system
  - Upgrade activity occurred from February through April 2010.
  - All Systems have been retrofitted and returned to GDAMS.
Key Program Milestones

- **Contract Award:** November 2007
- **PDR:** March 2008
- **Brassboard Hardware Testing**
  - Sept. 08 - Jul. 09
- **CDR:** Sept. 2008
- **Production Acceptance Testing**
- **Live Fire Demonstration**
  - October 2009 at the GDATP Ethan Allen Firing Range
  - Representatives from GD Amphibious Systems (GDAMS), Marine Corps EFV Program Office, Government Accountability Office (GAO) and local media.
Live Fire Demonstration
EFV AFS Path Forward

- GDATP Supplier Retained Unit
  - Complete Engineering Testing
    - 10,000 rounds cycle test in the GDATP Engineering Development Laboratory (EDL)
    - Testing will include efforts in a 31° tilt stand.
  - Conduct Environmental Qualification Testing
    - Testing consists of Shock, Vibration, Underwater Mine Blast, Temperature, High Pressure Spray and Salt Fog

- Delivered Units
  - Operational Assessment (OA) Summer 2010
Questions?