NDIA 42\textsuperscript{nd} Annual Armament Systems: Gun and Missile Systems

April 25, 2007

Recent Developments in Affordable Laser Guided Precision Weapons Capabilities

Jim Franciscovich
Electronics and Integrated Solutions Inc.
Sensor Systems
Affordable Tactical Seekers

Driven by Changes

The Precision War = Dynamic Missions/Threats
- Target Sets Requiring Better than GPS Accuracy
  - Tank (T-80), SA-6, SA-8, Guns, Self Propelled AAA, APC, Bunker doors, small revetments, pickup trucks, SUV’s etc
- Real Time Reactive Targeting – Dynamic Mobile Targets
- Fighting in Close without Boundaries- Distributive Operations
- Restricted Rules of Engagement
- Minimize Collateral Damage - Preservation of the Infrastructure
- Minimize Potential for Fratricide

Affordability
- Low Unit Cost – Shortened Development Timelines
- Use of Qualified & In Inventory Assets
- One Weapon One Kill
- Minimize Platform Integration Costs
- Minimize Training & Logistics Burdens

Enabled by Technology

Focus on the Future = Low Cost Precision Effects

Approved for Public Release
Advanced Precision Kill Weapon System (APKWS™)
Employment Concepts

- Precision Strikes on Soft/Light Armor Point Targets
- Increases Platform Stowed Kills
- Close Aerial Fire Support
- Urban Terrain Employment
- Remote Designation of Targets
- Complement to HELLFIRE and Unguided Rockets
- Reduced collateral damage
- Mission Description:
  - SASO – Enhanced Aircraft Performance and Duration
  - LIC – Enhanced Effectiveness for Scout/Reconnaissance
  - MIC – Provide Significant Capability vs Multiple Point Targets
  - HIC – Complement Deep Strike and Anti-Armor

Hydra-70 Rocket (1 - 6 Km)
- Short effective range
- Poor accuracy (Area Weapon)
  - High cost/soft kill at 6 Km
  - High collateral damage
  - Fratricide potential
  - Low stowed kills at 6 Km
- High transportation cost

HELLFIRE (1 - 8 Km)
- High cost/soft kill at 6 Km
- Weapon Over-match

AGM-114 Hellfire
(Anti-Armor)

Unguided 2.75” Rocket (Area Suppression)

~ Weapons Gap ~
Guided 2.75” Rocket
(Soft & Lightly Armored Point Targets)

- More Accurate Than Unguided 2.75” Rocket – Essential Anti-Terror Weapon
- Less Costly Than HELLFIRE and allows for more Stowed Kills
- Reduced collateral damage

Platforms:
Cobra
Apache
Kiowa
ARH
UAV’s….

Approved for Public Release
APKWS™
CONCEPT OF OPERATIONS

CONOPS
• Suppression
• Self Designate
• Cooperative Engagement

Approved for Public Release
APKWS™ Components

Mid-body Design is Supportable

• No field modifications required
• No changes to weapons loading
• Limited training required for pilots

Mid-body Design is Reliable

• Optics protected prior to launch from adjacent firings, sand, moisture, etc.
• Wide FOV for broader capture area

M151 Unitary Warhead & M423 Fuse

Mark 66 Mod 4 2.75” Rocket Motor

No Impact on Warhead Effectiveness

• Warhead does not “fire through” guidance unit

<table>
<thead>
<tr>
<th>Description</th>
<th>Current Wt per Unit (lbs)</th>
<th>Length (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guidance &amp; Control</td>
<td>8.9</td>
<td>18.5</td>
</tr>
<tr>
<td>Motor</td>
<td>13.7</td>
<td>41.8</td>
</tr>
<tr>
<td>Payload &amp; Fuse</td>
<td>9.2</td>
<td>13.5</td>
</tr>
<tr>
<td>All Up Round</td>
<td>31.8</td>
<td>73.8</td>
</tr>
<tr>
<td>Requirement</td>
<td>35</td>
<td>75</td>
</tr>
</tbody>
</table>

Approved for Public Release
Mid-Body Seeker

Compatible with legacy Hydra components

Deployment Flexibility

Stowed and sealed optics provide full lifecycle environmental protection

Guidance Section protected inside the launcher

Simple Guidance Section Assembly Into an All Up Round

Approved for Public Release
Proven Performance

Tested throughout the full environmental spectrum

- Vibration
- Shock
- Environmental Testing
- HWIL, ALSPES, at Temp Facility, Outdoor Range Testing

Approved for Public Release
Flight Test Success
APKWS™ Advantages

**Increased Accuracy**
- 20-100m
- Low cost conversion
- Low cost conversion

Area Suppression becomes Precision Strike

**Reduced Logistics Burden**
- 1.5km to 5km range
- 12 to 1 reduction in transport load outs for same combat effectiveness

**> Stowed Kills per Sortie**

**< Cost for Stowed Kills per Sortie**

- AMRDEC/DCD analysis in support of LCPK ATD

Approved for Public Release
XM 395 PGMM
Precision Guided Mortar Munition

XM 395 PGMM Satisfies the need for responsive, precision munition that reduces collateral damage

BAE Systems Wide FOV Distributed Aperture Semi-Active Laser Seeker “DASALS™”
- Delivered > 50 Seekers
- Demonstrated Mortar Launch Hardness
  - Rail Gun & Guided Flight
- Demonstrated Hit
  - ATK scored a hit after firing PGMM from a standard 120mm mortar at Yuma Proving Grounds.
  - The round flew approximately 2.5 miles to target and maneuvered to a precision strike

Laser-guided 120mm mortar
- Max-range 7.2km
- Deployed similar to conventional mortars
- Compatible with all current smooth bore 120mm mortar weapons

Target set includes enemy personnel protected by brick over block walls, lightly armored vehicles (LAV), and an earth & timber bunkers
Flight Test Success

Approved for Public Release
Optically Designated Attack Munitions (ODAM)
60 mm fuze / guidance

1) Mortar Roll Stabilized
2) Trajectory Estimated
3) Apogee Sensed
4) Mortar Roll Angle = 0°
5) Spot Acquired
6) Aero Corrections

1200m – 3000 Launch Ranges
≤ 4m CEP
≥ 300m Designation Range
≥ 100m Steering Radius

ODAM will change the Paradigm of Indirect Fires!

Approved for Public Release, Distribution Unlimited
Why ODAM?

- Drives precision down to infantry company level
  - First-shot kills, avoid collateral damage
  - Enable reliable indirect / long-range fires
- Dramatically accelerates the infantry battle
  - ~5X more kills / mortar platoon, ~10X faster
- Low cost – not silver bullet – use as either guided or unguided round, as tactics dictate
  - Train as you would fight

- If proven successful – disruptive technology
  - ~1/20 recurring cost of other precision rounds
  - Adds only 1 lb / round, 4 in to length (3.7 to 4.7 lb, 15 to 19 in)
Flight Test Success
Summary

• **Affordable Precision Benefits the Warfighter**
  • Fills the Requirements for Responsive, Precision Munitions that Reduce Collateral Damage
  • Demonstrated Progress & Increased Technology Readiness Levels
  • Improves the ability to Train as you would Fight
• **First-shot kills accelerates the battle in a distributed operational environment**
  • Potential exist to drive precision down to Infantry Company level
  • Allows for Affordable Real Time Reactive Targeting addressing Dynamic Mobile Targets

Approved for Public Release