Expanding the Traditional Effectiveness Window

Jan Hasslid       Program Manager
### Report Documentation Page

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<tr>
<td>NDIA (National Defense Industrial Association) 211 Wilson Blvd, STE. 400 Arlington, VA 22201-3061</td>
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<td>Proceedings from the 36th Annual Gun &amp; Ammunition Symposium &amp; Exhibition 9-12 April 2001</td>
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**Abstract**

**Subject Terms**

**Report Classification**

**Classification of Abstract**

**Number of Pages**
CONTENTS

• OBJECTIVE
• EFFECTIVENES IN SELECTED PROGRAMMES
• EXPANDING WINDOW
• OPTIMIZATION APPROACH
  – Interior Ballistics
  – Intermediate Ballistics
  – External Ballistics
  – Terminal Ballistics
• RESULTS
• CURRENT & FUTURE ACTIVITIES
TARGETS:

- UNPROTECTED PERSONNEL
- UNPROTECTED VEHICLES
- LIGHT FORTIFICATIONS
- LIGHT ARMORED VEHICLES
- HEAVY ARMORED VEHICLES
- LIGHT NAVY APPL.
- HEAVY NAVY APPLICATIONS
- HELICOPTERS
- FIGHTER AIRCRAFT
- FIGHTER BOMBER
- TRANSPORT AIRCRAFT

SHELL TYPES:

- HEI
- API
- MP

MEDIUM CALIBRE
30x173 Family of Ammunition qualified with the Bushmaster II mod 0 & mod 1

**MP-T/SD**  NM 222
**TP-T**     NM 219
**APFSDS-T** NM 225
### AAAV TGT Matrix

<table>
<thead>
<tr>
<th></th>
<th>Light</th>
<th>Medium</th>
<th>Heavy</th>
</tr>
</thead>
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<tr>
<td><strong>Infantry</strong></td>
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<td><strong>HEI</strong></td>
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<td>*</td>
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<td><strong>MPLD</strong></td>
<td>*-----</td>
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<td>*</td>
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<tr>
<td><strong>APFSDS</strong></td>
<td>*-----</td>
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<tr>
<td><strong>ABM</strong></td>
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#### Expanding the Effectiveness Window
- **MRP-T**
  - *.... ....* "-.." "..-"
- **ABMP-T**
  - *----- ------- .. -- -----

**M E D I U M  C A L I B R E**
Pushmaster II- Traditional Long Rod Rock Penetration
Bushmaster II-Optimized Long Rod Granite Rock Penetration with an APFSDS-T

- SECONDARY EFFECTS
- Severe structural damage
- Lethal fragments scattered
- Dust cloud & Reduced Visibility
30x173 APFSDS-T
Organization of activities 2001

APFSDS-T
NM 225

Support
administration

Sales Support  Production  New Technologies

USA
MK 258 mod 0

Europe

Asia
User Training

Norway
LOT NM 225

Evaluation
LOT YY-XXX

Production
Technology

MRP

APFSDS-T
3rd generation

Analysis
Tools

International
Symposia

HBFSDS-T
MK 258 mod 1

Symposium Straume Hasslid
## Supplier Selection Criteria for the User

<table>
<thead>
<tr>
<th>Modern Ammunition</th>
<th>IM Performance</th>
<th>NATO standardized Ammunition family</th>
<th>Fits the engagement scenario for MOUT</th>
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<tbody>
<tr>
<td>New Technologies Integration</td>
<td>El Propellant</td>
<td>Hydrocode analysis for maximum performance</td>
<td>CFD-analysis for superior exterior dynamics</td>
</tr>
<tr>
<td>A Heritage and commitment for the future in medium caliber</td>
<td>The Multipurpose Concept</td>
<td>In service ammunition with Air Force, Navy &amp; Army</td>
<td>Integrated Process &amp; Production Development</td>
</tr>
<tr>
<td>Competitive in cost for performance</td>
<td>30mm stored kills outperform 35 &amp; 40mm</td>
<td>Low Lifecycle Cost</td>
<td>All current target scenarios defeated</td>
</tr>
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</table>
Optimization

Approach!
Dispersion due to Initial Yaw-Condition

Muzzle Exit Results: N5N150.D

Muzzle Velocity = 1410 (m/sec)  Mach Number = 4.142

<CR> to Continue
F1 for Plot Menu
Objective #1

*Bushmaster II integration (0’-8,5’)*
### DISPERSION RESULTS

<table>
<thead>
<tr>
<th>Barrel</th>
<th>Dispersion (1SD)</th>
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<tr>
<td></td>
<td>Sx</td>
<td>Sy</td>
</tr>
<tr>
<td>Mauser Mann</td>
<td>0.15 (mils)</td>
<td>0.15</td>
</tr>
<tr>
<td>Bush II Mann</td>
<td>0.20 (mils)</td>
<td>0.20</td>
</tr>
<tr>
<td>Bush II Auto s.s.</td>
<td>0.35 (mils)</td>
<td>0.35</td>
</tr>
<tr>
<td>Bush II Auto burst</td>
<td>0.45 (mils)</td>
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Expanding the Traditional Effectiveness Window

APFSDS-T ≫ MRP

Multi Role Penetrator
Urban/Bunker Targets (600x600x1200)

- Projectile Break-Up
- Full Penetration (+15mm RHA)

Target 1 Entrance

Target 2 Entrance
30x173 APFSDS-T NM 225

- 5 rds burst from the Bushmaster II mod 1 (chromed 0-7,5 deg)
- Reinforced Concrete block 1500x1500x300(5ftx5ftx1ft)
- Strength C55; Double matrix 12,7mm re-bar; Grain<8mm
- 10,6mm ARMOX MIL-A-12560 with hardness HB 367
- 3mm Steel witness plate of size 2000x2000 approx.

LOF
V0=1430m/s

305mm
127m
10,6mm
128,5m
3mm
129,5m
Urban Combo Target Set-Up
Expanding the Traditional Effectiveness Window

MP-T/SD⇒ ABMP-T

Air Burst Multi Purpose

3 Modus

Programmable time based fuze - Detonation
Point Detonation - Detonation
Multi Purpose - Deflagration
ABMP-T Ammunition Concept

Transponder Antenna

Pre-Fragmented Steel Body

MP Nose Cap

Fuze Element

High Explosive

Explosive Compound

Press filled powder

Tracer flare

Booster
SUMMARY

• Qualified ammunition defeats current targets as defined in performance spec.
• Effectiveness window expanded:
  – Urban Targets
  – Submerged Targets
  – Targets defeated at longer stand-off
• > Reduced System Cost and Product LCC
Mr. Short Rod & Mr. Long Rod at New Frontiers

The Parrot Rifle, Fredericksburg, VA