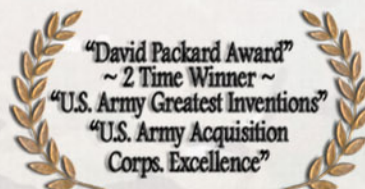




NDIA Armament Systems Forum

**COL M. Gutierrez, Project Manager,
Maneuver Ammunition Systems**

25-28 APRIL 2016





PM MAS Family of Products

85 Products Managed



Small Caliber

Development

Production

50 Products Managed



Medium Caliber

Development

Production

22 Products Managed



204 Products Managed



Development

Production

Non NATO Munitions, Soviet Calibers

NOT TO SCALE

DISTRIBUTION STATEMENT A:
Approved for Public Release



Priorities & Focus

1. Future Capabilities

- Two family of ammunition CDD's approved (5.56mm and 7.62mm)
- Four ammunition CDD's in staffing (Cal .50, 40mm LV, 40mm HV, Precision Sniper)
- Stryker ONS

2. Production – Support to Joint Warfighter

- FY15 deliveries - 882M rounds

3. NSA Production – Support to U.S. and Allied Warfighter

- FY15 Deliveries – 204M Rounds with \$91M in new orders

4. Maintain Industrial Base While Managing Inventory

Development / Qualification Programs Underway

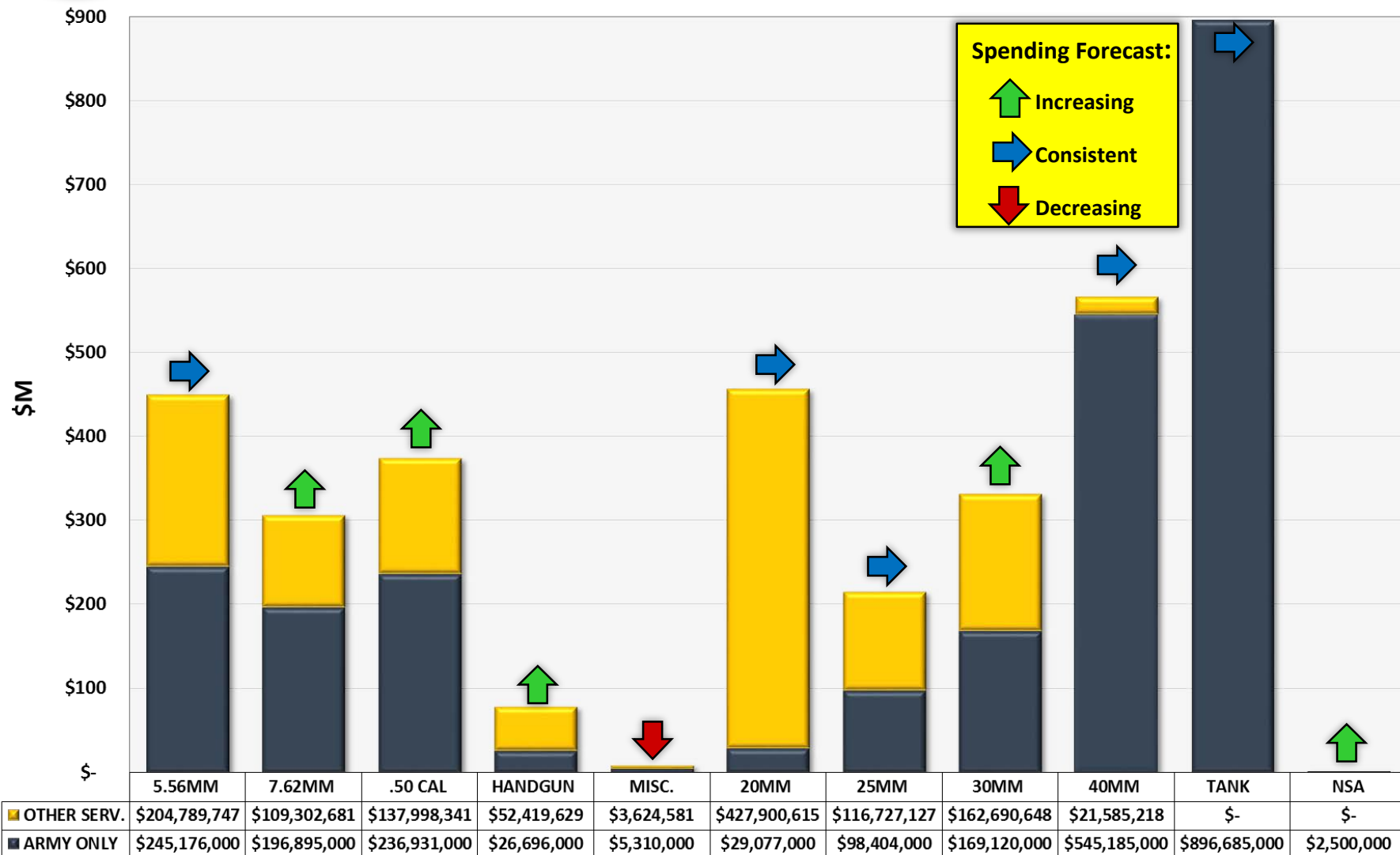
- Modular Handgun Ammunition (Collaboration w/PM-SW)
- One Way Luminescence (OWL)
- Lightweight Ctg. Cases for Small Caliber Ammo
- 40mm Day/Night Thermal (DNT)
- 120mm Advanced Multi-Purpose (AMP)
- 25mm XM25 (Collaboration w/PM-SW)
- Stryker ONS 30 x 173mm

Potential FY17-21 Development Programs

- Improved Sniper Ammo
- Reduced Range Training Ammo (RRTA)
- .50 Cal All Purpose Tactical Ctg.
- Advanced 40mm Grenades
- 30mm Airburst



PM-MAS PB17 Budget Outlook (FY17-FY21)





Industrial Base Posture

Key Trends

SMALL CALIBER AMMUNITION (5.56mm, 7.62mm, .50 CAL, Misc)

- High volume products in relatively good position
 - ✓ Reaping benefits of moderate to high commercial demand
 - ✓ Maintaining a Second Source for high demand products
- Boutique Items – Close Combat Mission Capability Kit (CCMCK), Short Range Training Ammunition (SRTA) etc. are more dependent on other service buys

MEDIUM CANNON CALIBER (20mm, 25mm, 30mm)

- 20mm-25mm consistent buys in outyears
- HE LW30mm production declining fast as we reach War Reserve
- TP LW30mm Production Steady
- 30x173mm Ammunition for Stryker ICV ONS
 - ✓ Short-term Urgent Materiel Release (UMR) of Ammo
 - ✓ Long-term production and programmable airburst dev.
 - ✓ Also dependent on A-10 long-term viability

NON NATO STANDARD AMMUNITION (NSA)

- FY16 has seen increase in demand for NSA
 - ✓ There is requirements increase in FY16 from same time as in FY15
- As US Combat Forces Draw Down, Munition Support for our Allies still in fight has increased

MEDIUM CALIBER AMMUNITION (40mm Grenades)

- New emerging requirements could increase outyear demand
 - ✓ Low Velocity Improved Range Anti Personnel (IRAP) Ctg. Development
 - ✓ Potential Adoption of 40mm Door Breaching Ctg.
 - ✓ Potential High Velocity Anti-Personnel Capability on MK19

**Healthy
Ammo
Stockpiles**



PM MAS FY16/ FY17 Competitive Opportunities

FY16 / FY17					
FY16					
Program/ Item/ Description	Projected RFP Release	Projected Award Date	Total Potential Contract Value	Contract Strategy*	Contract Type**
Small Caliber Second Source	JUL/FY15	JAN/FY16	\$580M	NTIB	FFP
Pistol Family (9mm, .38 cal, .45 cal)	JUL/FY15	FEB/FY16	\$99.2M	C	IDIQ
Non Standard Ammunition(ACC)	MAR/FY16	MAR/FY16	\$750M	C	IDIQ
9mm DDI	MAR/FY15	MAR/FY16	\$1.2M	C	FFP
40mm Dummy	NOV/FY16	APR/FY16	\$0.5M	SBSA	FFP
FY17					
Small Caliber Non Recurring Engineering	APR/FY16	NOV/FY16	\$65M	C	IDIQ
7.62mm Bottlenose Blank	JUL/FY16	FEB/FY17	\$6.3M	C	FFP
5.56mm Frangible	AUG/FY16	MAR/FY17	\$52.8M	C	REQ
Shotshells	AUG/FY16	APR/FY17	\$5.0M	C	IDIQ
PA125 Cans	OCT/FY17	JUL/FY17	\$6.0M	SBSA	IDIQ
Non Standard Ammunition(ACC)	JAN/FY17	JUL/FY17	\$500M	C	IDIQ
40mm Systems	JAN/FY17	SEP/FY17	\$500M	C	FFP
*Competitive (C), Small Bus Set-Aside (SBSA), National Tech. & Industrial Base (NTIB), Sole Source (SS), Limited Competition (LC)					
**Firm Fixed Price (FFP), Indefinite Delivery/ Indefinite Qty. (IDIQ), Requirements Contract (REQ)					
AWARDED					



MAS FY16/17 DOTC Opportunities

FY16

Small Caliber

- One-Way Luminescence (OWL) - Pursuing alternate tracer compounds
- Prototype equipment, tooling, and component technologies
- Propellant optimization

Medium Caliber

- 40mm Fuze Reliability Analysis (M549A1 & M550)
- 40mm High Velocity Mann Barrel Development/Qualification (Breeches and Other Testing Equipment)

FY17

Small Caliber

- Prototype equipment, tooling, and component technologies

Medium Caliber

- 40mm Increased Range Anti-Personnel (extended range/increased lethality/anti-defilade)



PM-MAS Request for Industry Input

- **PM-MAS has R&D Funds to execute EMD Programs for validated requirements (Most cases)**
 - **Identify/Minimize potential sole source situations at all levels of suppliers**
- **Potential for 30 x 173mm PABM**
- **NDI solutions may be evaluated via performance specification**
- **Industry input will be considered in developing acquisition strategy**
- **PM MAS requesting industry consideration of U.S. production of non NATO munitions**



Maneuver Ammunition Systems Technology Focus Areas

- **Lightweight Small Caliber Cartridge Case**
- **One Way Luminescence (OWL)**
- **Medium Caliber Ammunition Improvements**
 - Counter-Defilade Capability
 - Increased Range (Material, Personnel)
 - Increased Effects (Material, Personnel)
- **Small Cal Ammo Improvements**
 - Automated primer manufacturing
 - Lead Free replacement for lead styphnate in primers
 - Mercury free Stress Corrosion Cracking test for brass cartridges
 - .50 Cal All Purpose Tactical Cartridge (APTC)
 - Subsonic sniper cartridges
 - Reduced Range Training Ammunition
 - Improved Sniper Ammunition



Message to Industry

- **Overall Direct Fire Ammunition production slowly rising for next few years**
 - War Reserve in most cases fully stocked
 - 30x173mm - new opportunity for Industrial Base
- **Multiple R&D projects initiated FY15 in Small, and 40mm with more R&D programs expected in out-years**
 - Chance for Industry to bring new ideas / innovations for development to attention of PM-MAS for possible development & production
- **Requirement for Non NATO munitions is not going away in near future**
 - Over \$1B has been awarded from FY09-15 NSA
 - Demand from Afghanistan, Iraqi, and U.S. sources will continue for foreseeable future



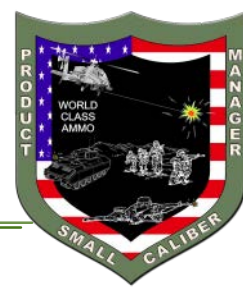
NDIA Small Arms Systems

LTC Todd Masternak
Product Manager
Small Caliber Ammunition Systems

26 April 2016



Small Caliber RDT&E Overview



REQUIREMENTS:

- **Capability Development Document (CDD)**
 - 7.62mm Family of Ammunition (FoA) CDD Approved in 4QFY15
 - 5.56mm FoA CDD Approved 4QFY15
 - .50 Cal Munitions CDD in Joint Staffing
 - Precision Munitions CDD in Staffing
- **Future Capabilities Highlighted in 5.56mm, 7.62mm and .50 Cal CDDs**
 - Increase Survivability
 - Reduce Warfighter Load
 - Provide Greater Training Flexibility
- **Future Capabilities Highlighted in Precision Munition CDD**
 - Increased Lethality and Accuracy
 - Reduced Vulnerability

PM MAS FUNDING:

RDT&E Funding Appropriations

- Demonstration and Validation / Engineering and Manufacturing Development in support of 7.62mm FoA CDD
- Operational System Development in support of Green Primer

Additional RDT&E Funding Forecasted in Support of 5.56mm FOA CDD, .50 Cal Munition CDD and Precision Munitions CDD

OTHER FUNDING:

Additional Funding Available Through ARDEC, ARL, and JSSAP Tech Base Efforts

Increased RDT&E Funding to Support Warfighter Needs!



7.62mm One Way Luminescence (OWL)



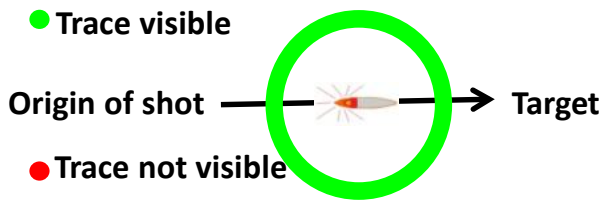
Top Level Strategy:

- Execute DOTC & US GOV Prototype Development through FY17
 - Conduct concept down select based on TRL6
- Full & Open Single Contractor award for EMD FY18

Requirements:

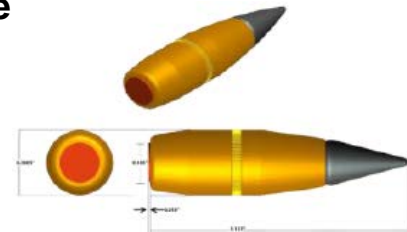
- 7.62mm Family of Ammunition (FoA) CDD, dated 29 JUL 15

Current M62Trace visible

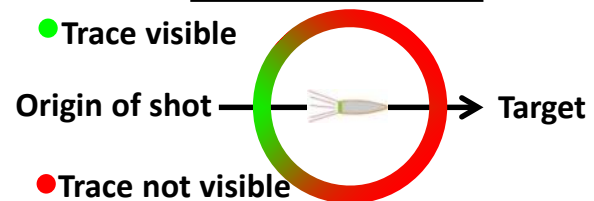


Program Challenges:

- Trace visibility in all sources of ambient light
- Improved terminal effects
- Limited visibility angle
- Manufacturability



Desired Trace visible



	FY16				FY17				FY18				FY19				FY20				FY21				FY22			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
MILESTONES/ PHASES	▲ Market Survey		▲ MDD						▲ MS B												▲ MSC							
CONTRACTS					▲ RFP				▲ Contract Award				Phase I Downselect				Phase 2				▲ LRIP Option							
ENGINEERING/ TECHNICAL REVIEWS	Govt and Industry Concept Development								▲ TRA/ TRL 6 Tech. Downselect				▲ SRR				▲ PDR				▲ CDR							
TEST	▲ DT				▲ TIWG				▲ BST				▲ DVT				▲ PPQT				▲ PQT							
DELIVERIES (QTYS)									▲ 200				▲ 5K				▲ 50K				▲ 500K				▲ 5M			

Pre-Decisional



7.62mm Lightweight Small Caliber Ammunition (LSCA) Program



Top Level Strategy:

- Execute DOTC to demonstrate TRL 6 Polymer Case Technology in M80 to achieve 25-30% reduction in cartridge weight
- Qualify M80A1 EPR and M62A1 Tracer (LFS)

Requirements:

- 7.62mm Family of Ammunition (FoA) CDD, dated 29 JUL 15
 - Meet or exceed M80A1/M62A1 performance
 - Reduce weight by 10%(T) to 50% (O) over existing brass cased cartridges

Program Challenges:

- Temperature Sensitivity
- Weapon/Ammo Interface
- Proprietary Design and Manufacturing Process

7.62mm M80 Hybrid Metal / Polymer PCP Ammo



	FY16				FY17				FY18				FY19				FY20				FY21				FY22							
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q				
MILESTONES/ PHASES			▲ Industry Day						▲ SRR		▲ PDR					▲ CDR				◆ Decision Point					▲ Fielding Decision							
CONTRACTS		▲ Ind Bas Assessment			▲ Contract Award			▲ TD Award												▲ ECP	▲ Award											
ENGINEERING/ TECHNICAL REVIEWS			Phase I		Procurement Allocated Lead Time				Phase II				Phase III								▲ LRIP				Pre-Decisional							
TEST			TF L6 Demo									PPQT LUE					PQT															
DELIVERIES (QTYS)											▲ 50K						▲ 500K										▲ 750K					



Reduced Range Training Ammunition



Top Level Strategy:

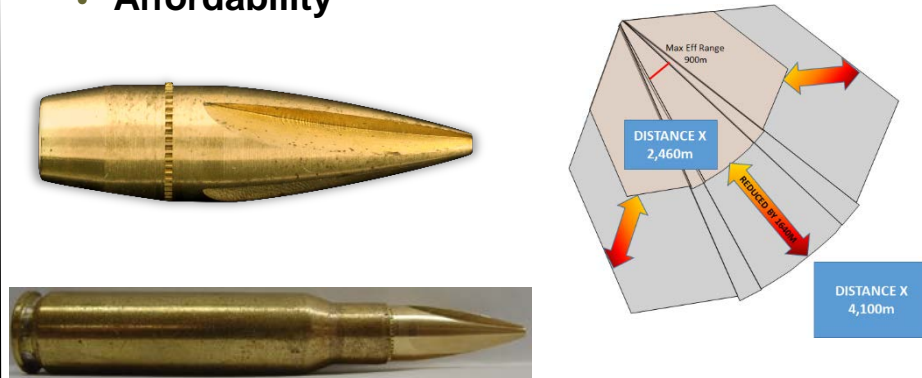
- Develop and qualify training ammunition with a trajectory match to combat ammunition with significantly shorter Surface Danger Zones (SDZ) for use on training ranges

Requirements:

- 7.62mm Family of Ammunition (FoA) CDD, dated 29 JUL 15
- Reduce Max range while maintaining tactically relevant training range; 2,400m (T) and 900m (O)
- Accurate enough to hit targets at 800 meters with 50% probability of hit (T); 1,100 meters with 95% probability of hit (O)

Program Challenges

- Performance goals (max range/effective range) may be difficult to attain simultaneously with geometric modifications (fins, etc.) to projectiles
- Affordability



	FY16				FY17				FY18				FY19				FY20				FY21				FY22							
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q				
7.62mm Milestones					▲ MDD								▲ MSB								▲ PDR				▲ CDR	▲ MS C						
CONTRACTS					Prototype Contract				System Development Contract								LRIP & FRP															
Testing			▲		Prototype Testing and Evaluation																											
			Baseline testing																													

Pre-Decisional



Lead Free (Green) Primers



Top Level Strategy:

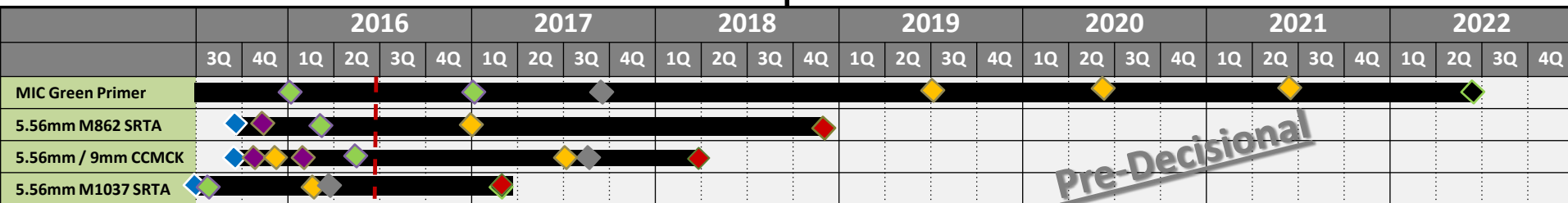
- Replace Lead in primers without adding other harmful components
 - Training Unique Rounds – USG conducting evaluations of commercial lead free primers
 - Combat Rounds – Multi-Path Approach
 - Developing Metastable Interstitial Composite (MIC) formulation for all calibers. Facilitate LCAAP and provide industry automation/mix technical data
 - Alternatively continue to evaluate commercial green primer capabilities for risk reduction and potential cost savings

Requirements:

- Presidential Executive Order to reduce quantity of toxic and hazardous chemicals and materials acquired

Technology Challenges:

- Maintaining performance
 - Maintaining or improving pressures and velocities
 - Cold temperature performance
- Long Term Storage
- Automation (Combat ammunition)



M1037 Short Range Training Ammunition (SRTA)

- Evaluated 5.56mm SRTA cartridges with commercial green primers
- Selected and qualifying green 5.56mm SRTA M1037 cartridge
 - Ongoing DVT and EMQB

Metastable Intermolecular Composite (MIC)

- Develop automated primer mfg. process from mixing to packaging
- Evaluating formulation in primary combat ammunition
- Characterizing primer outputs



M1042/M1071/M1041 Close Combat Mission Capability Kit (CCMCK)

- SOCOM evaluating and qualifying lead free CCMCK ammunition
- Limited User Demo to conduct air sampling/toxic fume evaluation
- PM MAS providing support to SOCOM for Army qualification requirements



NDIA Armaments Systems Forum

Jim Terhune
Acting Deputy Product Director
Medium Caliber Ammunition

26 April 16



Agenda



- **30mm x 173mm Stryker ICV**

- **40mm Grenades**
 - **Increased Range Anti-Personnel (IRAP)**
 - **Door Breach (DB)**
 - **Short Range Anti-Personnel (SRAP)**
 - **High Velocity Air Burst (HVAB)**



30mm x 173mm Opportunities Stryker ICV



■ Opportunity

- 81 Stryker Infantry Carrier Vehicles being modified to include a turret with 30mm x 173mm weapon and linkless feed system
 - Short Term - Support of Urgent Materiel Release (UMR) Test and Evaluation
 - Develop linkless packaging for ammunition
 - ✓ MK239 TP-T
 - ✓ MK317 TPDS-T
 - ✓ MK238 HEI-T
 - ✓ MK258 APFSDS-T
 - Army will likely buy small quantities of above cartridges to support UMR
 - Intermediate - Production to support UMR
 - Procure MK238, MK239 and MK317 as is
 - ✓ Develop Second Sources
 - MK258 or other APFSDS-T
 - ✓ W-Ni-Co cannot be fielded
 - ✓ Cobalt free penetrator (e.g. W-Ni-Fe) required





30mm x 173mm Opportunities Stryker ICV



■ Opportunity

- 81 Stryker Infantry Carrier Vehicles being modified to include turret with 30mm x 173mm weapon and linkless feed system
 - Long Term – Programmable Air Burst will be needed to meet Stryker ICV lethality requirements
 - Development strategy currently being discussed
 - Program likely start FY18 or later
 - Must be capable in day or night of identifying and suppressing (and defeating when qualified air-burst munitions are available) enemy troops in open/defilade out to distance of at least 1500m from stationary, stationary to moving, moving to stationary and moving to moving targets
 - Must be capable in day or night of identifying and defeating enemy light armored vehicles out to distance of at least 1800m from stationary, stationary to moving, moving to stationary and moving to moving targets
 - Stryker ICV with lethality upgrade should integrate Range Finder (RF) Class 1 eye-safe in all user modes for ranges between 50-10,000m
 - ✓ Range accuracy should be no less than +/- 1.5m at 3200m





40mm Low Velocity (LV) Weapons & Ammunition



40MM – LV FAMILY OF AMMUNITION



M203



M320

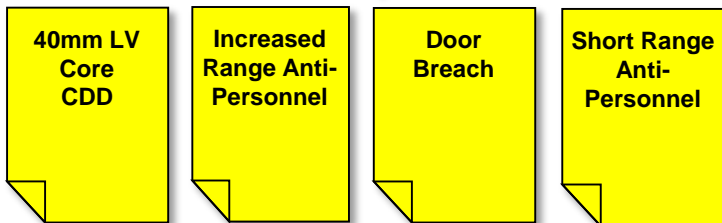




40mm Low Velocity Family of Ammunition CDD



---New Capabilities---



- **CDD and cartridge-specific annexes expected to be approved 3QFY16**

- **Increased Range Anti-Personnel (IRAP)**

- Increased lethality
- Increased engagement ranges
- Improved accuracy
- Counter defilade

- **Door Breaching (DB)**

- Gain access to an existing entry point
- Limit collateral damage
- Accurate deployment

- **Short-Range Anti-Personnel (SRAP)**

- Urban/Restrictive Terrain
- Close Quarter Combat
- Enhanced Lethal effects
- Limited collateral damage



---Operational Shortfall---

Small Arms Capabilities Based Assessment (SA-CBA), APR 08

IRAP- *“Warfighters lack the ability to achieve desired accuracy and incapacitating effects against personnel targets in defilade at ranges out to 500 meters”.*

DB- *“Squads lack the ability to conduct ballistic breach at ranges up to 50 meters. Squads lack the ability to conduct rapid (single-shot) breach without pause between actual breach and entry of initial force”.* The ability for Soldiers to conduct a ballistic breach of an existing door creating an entry point into a building or other structure is critical during Urban Operations.

SRAP- *“Warfighters lack the ability to achieve desired accuracy and incapacitating effects against personnel targets from 0-50 meters”.* Grenadiers must be able to quickly place lethal fire on close range threat personnel that are an immediate danger to the small unit with a high probability of incapacitation, while reducing collateral damage and with fewer non-combatant casualties.



40mm Increased Range Anti-Personnel (IRAP)



IRAP Requirements



- **Weapon Compatibility:**
 - **M320 (mounted/standalone) & M203**

- **Fuze Functionality:**
 - **Airburst (counter defilade) & Point Detonate**

- **Increased Lethality against Adversaries in Body Armor**

- **Extended Range: out to 600 meters**

- **Recoil Forces: < 45 ft-lbs**



IRAP Current/Planned Activities



MCoE:

- CDD Approved (**3QFY16**)
- Request Clarification of Requirements (**3-4QFY16**) (i.e. Draft CPD 300m(T), 500m(O))

ARDEC:

- Develop Draft TEMP, P-Spec and TDP (**MAR-DEC 16**)
- Tech Development Leading to Integrated Cartridge Demo & TRL 6 (**JAN 17**)

All Dates Tentative

PM MAS:

- Release Market Survey for Integrated Solution: 21 DEC15
- Hold Industry Day: 27JAN16
- Initiate CRADAs for Contractors to Provide Test Hardware (**JAN 17**)
 - Contractor HW Tested in Conjunction with ARDEC Tech Demo
- DASM Review (w/MDA Decision) Briefing (**MAR 17**)
- MDD Brief (**MAY 17**)
- MS B Decision Brief (& Developmental RFP Brief) (**JUN 17**)
- IRAP Industry Day (**AUG 17**)

ACC-NJ:

- Draft RFP Release (**JUL 17**)
- RFP Release (**SEP 17**)
- Receive Proposals (**NOV 17**)
- Contract Award (**MAR 18**)



IRAP Opportunities



■ Needs

- Proximity and/or Programmable Fuze
- Accuracy Improvement
- Increased Lethality
- Extended Range
- Minimize Recoil

■ CRADAs

- Full-Up Rounds: A round that can provide increased fuze functionality (airburst, self-destruct and point detonate), increased lethality and increased accuracy
- Fuze (and programmer if applicable) technology/design can provide increased functionality of 40mm projectile to include airburst function, self-destruct and improved point detonate (PD) function on low impact angles & soft targets
- Warhead technology/design that can provide increase lethality against personnel targets from 40mm munition
- Propulsion technology/design that can provide increased accuracy & range (up to 600m) of 40mm projectile fired from M320



40mm Door Breach



40mm Grenade for Door Breach (DB) Opportunity



- **User Endorsed 40mm Door Breach and Recommended Termination of M100 Grenade Rifle Entry Munition (GREM) as Program of Record on 21 APR 14**
- **Small Arms Capability Based Assessment (CBA) defined operational capability gaps (APR 08)**
 - “Squads lack ability to conduct ballistic breach at ranges up to 50m.”
 - “Squads lack ability to conduct rapid (single-shot) breach without pause between actual breach and entry of initial force.”
- **Final approval of CDD and CARD # expected 3QFY16**
 - Cartridge must be compatible with M320 and/or M203 Grenade Launcher
 - Cartridge must be capable of breaching doors from range of 25m to 50m
 - Target Door types will be metal, wood, single, and double
- **Request for Proposal (RFP) planned 3QFY18**
- **Mature 40mm LV Door Breach technology ready for EMD is desirable**





40mm Short Range Anti-Personnel (SRAP)



SRAP Requirements



- **Weapon Compatibility: M320(Stand-alone) & M203**
- **Effects on Exposed Adversaries in Body Armor**
- **Range: Out to 50m**
- **Recoil Forces: < 45 ft-lbs**
- **Attributes:**
 - **Will not contain any explosive**
 - **Renders enemy incapable of performing their assigned combat functions of shoot, move and communicate within 1 second after being impacted**
 - **Must impact target with sufficient quantities and force to render threat personnel incapable of combat related functions**



40mm High Velocity Airburst (HVAB)



40mm High Velocity (HV) Airburst Program Opportunity



- 40mm High Explosive munition defeats personnel targets in defilade with no modification required to existing Mk19 Mod3 GMG weapon systems (fuze programming/communication unit will be attached to weapon)
- CDD currently being staffed - approval projected 4QFY17
 - Cartridge should incorporate a programming or target sensing fuze that has a Point Detonating (PD), Airburst (AB), and Self Destruct (SD) capability
 - Cartridge should have an effective range of at least 1,500 meters against Point Targets and 2,212 meters against Area Targets
- Possible Solution may incorporate IR, RF or any other technology
- RFP planned to be conducted at end of 2QFY18 with a potential 2 phase approach
 - Phase 1 – Retrofit ~1.5 million M430A1 cartridges with AB fuze
 - Phase 2 – Product improvement to meet CDD requirements or full up development program

