XM350 Propelling Charge for the 105mm M1130E1

St. Marks Powder
Attn: Mr. William O’Meara
Tel (850)-577-2261
William.O’Meara@gd-ots.com
PO Box 222, St Marks Florida 32355

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Department of the Army
Office of the Project Manager for Combat Ammunition Systems
Attn: Ms. Kristy Klein
Tel 973-724-9611
Kristy.Klein@us.army.mil
Picatinny Arsenal, New Jersey 07806-5000

St. Marks Powder
Attn: Mr. William O’Meara
Tel (850)-577-2261
William.O’Meara@gd-ots.com
PO Box 222, St Marks Florida 32355
Government-Industry Contributors/Co-Authors

Government:
Kristy Klein*
James (Jim) Rutkowski
Charlie Patel
Katherine Murphy

Industry:
William (Bill) O’Meara*
Robert (Bob) Pulver
Erica Wilder
Charles (Chip) Hayden

* Presenter(s)
XM350 for the 105mm XM1130E1

XM350 (Propellant)
- 105mm Propellant Charge System
- 7 Zones in Acrylic Bags
- HYBRID BALL POWDER® Propellant
- Approximately 4.5 lbs propellant
- Improved primer design

M1130 (Projectile)
- Army’s latest 105mm Projectile
- Increased lethality High Explosive, Pre-Formed Fragmentation
- Approximately 35 lbs
- Base Bleed and Aerodynamic

Base Bleed projectile with HYBRID BALL POWDER® propellant provides the 105mm cannon an extended range of over 17 km (standard conditions) with the 7 zone charge and also provides range overlap (min.10%) with improved accuracy and lethality!

Distribution Statement A: approved for public release; distribution is unlimited.
105mm Artillery Cartridges
“Upgrade Opportunity”

**CURRENT ISSUE:**

- Units must carry more ammo to cover standard and extended range missions
  - Cartridges designed for M101/M102 howitzers at zones 1-7 (M67/M176 prop chg)
    - M1 (HE) up to 11.5km
    - M548 (HERA) up to 15.3km
    - M927 (HERA) up to 16.5km
  - 3 Cartridges designed for M119A1/A2/A3 howitzers at zone 8 (M200/M229 prop chg)
    - M760 (HE) up to 14.0km
    - M915 (DPICM-SDF) up to 14.1km
    - M913 (HERA) up to 19.5km

**OPPORTUNITY (XM350):**

- Qualify a new propelling charge to replace the M67/M200/M229 and cover all current zones, from 1 through 8, within a single M1130 cartridge
  - New charge would be 7 separate zones
    - Match zone-1 MV for Min Range
    - Three or four intermediate for Range Overlap
    - Match zone-7 MV for Standard Max Range
    - Match zone-8 MV for Extended Max Range

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M1130E1 with XM350

Current HE
4 Cartridges

- M1 (HE)
  - M67 prop chg to 11.5 km
- M760 (HE)
  - M200 prop chg to 14.0 km
- M927 (HE-RA)
  - M67 prop chg to 16.0 km
- M1130 (Pff-BB)
  - M67 prop chg to 13.0 km

Proposed HE
1 Cartridge

- XM350 prop chg to 17+ km
- M1130E1 (HE PFF BB)

Opportunity to Increase Operational Flexibility & Reduce Logistics

Distribution Statement A: approved for public release; distribution is unlimited.
M1130 105mm Projectile
High Explosive, Pre-Formed Fragmentation

- HE-PFF-BB Projectile demonstrated a 2 - 4 X improvement in lethality against select targets yet has improved survivability IM warhead

- Reduction in collateral damage yet improved first shot Pkill

- Advanced base bleed and aerodynamic design for increased range and accuracy…growth to precision accuracy

- Formally received US Army Materiel Release as the M1130 (with the M67 propelling charge)

- XM350 charge provides a significant boost in range (over 30%) and area coverage (over 70%)

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XM350
Replacing M67 & M200 Propelling Charges

New XM350 Prop chg (Z1→7) to 17+ km

- Contains 7 unequal cloth bags – total 74 oz. XM60 HYBRID BALL POWDER® Propellant
- Used with M1130 HE-BB-PFF

Current M67 Prop chg (Z1→7) to 11.5 km

- Contains 7 unequal cloth bags -- total 45.2 oz. M1 propellant, M1-SP in Z1-2, M1-MP in Z3-7
- Used with all standard NATO 105mm artillery ammunition

Current M200/M229 Prop chg (Z8) to 19.5km

- Contains 1 single cloth bag (Z8) -- total 68 oz. M30 propellant
- Used with HE (M760) to 14.0km
- Extended range DPICM (M915) to 19.5km

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XM350 Propelling Charge

- 7 Zone Propelling Charge provides a minimum of 10% range overlap

- Primer redesigned for improved ignition properties

- XM60 HYBRID BALL POWDER® Propellant
  - Cooler burning than the M30 in the M200 charge

- EMQB chemical stability testing completed
  - meets the safe shelf life requirement of 20yrs or more

- HYBRID BALL POWDER® Propellant, used in the first tank round that passed all IM requirements as recognized by MSIAC.
  - XM350 results may vary due to cartridge case/packaging confinement

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XM60 HYBRID BALL POWDER®
Propellant for the XM350

The State-of-the-art in Propellant Technology for Small, Medium and Large Caliber Ammunition

Ballistic efficiency achieved by combining perforated geometry with burn rate modifiers (deterrents)

Deterrent Layer - applied to tailor the burn rate for specific applications/ zones to optimize ballistic efficiency

Small Grains with Very High Gravimetric Density (Loading Density ~1.050 g/cc) load well in the zone bags and achieve required charge weight sufficient to meet extended range velocity at lower flame temperatures

Uncoated HYBRID Grains

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XM350 Charge Development

Collaborative effort between ARDEC, St. Marks and PM-CAS personnel developed the propellant, charge design configuration, including a new primer design that reduces pressure waves, improves velocity SD and enable increased performance while meeting a minimum of 10% range overlap at all zones.

Improved Design Smoothed Pressure Rise

XM350 Cross Section

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TC Plan for XM350 with M1130

Overview

✓ Produced and delivered 10,000 lbs of XM60 propellant
✓ Completed charge weight assessment for each zone
➢ Conduct EMQB required testing to qualify XM60 propellant
   ➢ Currently ongoing – to be completed by 1st Qtr 2013

➢ Fabricate 1,400 XM350 propelling charges and LAP
   1,000 M1130E1 cartridges
   ➢ LAP contract to be completed by 1st Qtr 2013

➢ Conduct qualification tests for 105mm artillery ammunition
   ➢ To be completed by 1st Qtr 2014
Summary
XM350 with M1130 → M1130E1

Current HE
4 Cartridges

<table>
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<tr>
<th>Cartridge</th>
<th>Range (km)</th>
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<tbody>
<tr>
<td>M1 (HE)</td>
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Proposed HE
1 Cartridge
XM350 prop chg to 17+ km
M1130E1 (HE PFF BB)

Opportunity to Increase Operational Flexibility, Capability & Reduce Logistics

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