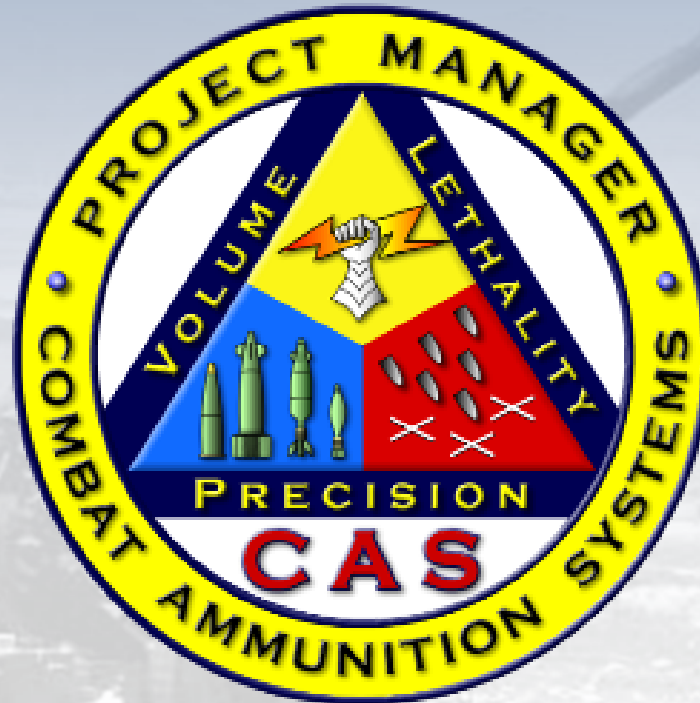


XM350 Propelling Charge for the 105mm M1130E1



GENERAL DYNAMICS
Ordnance and Tactical Systems

2012 NDIA Joint Armaments Conference

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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!

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

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

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%)*



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

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*



XM350, 7-Zone Extended Range Propellant Charge

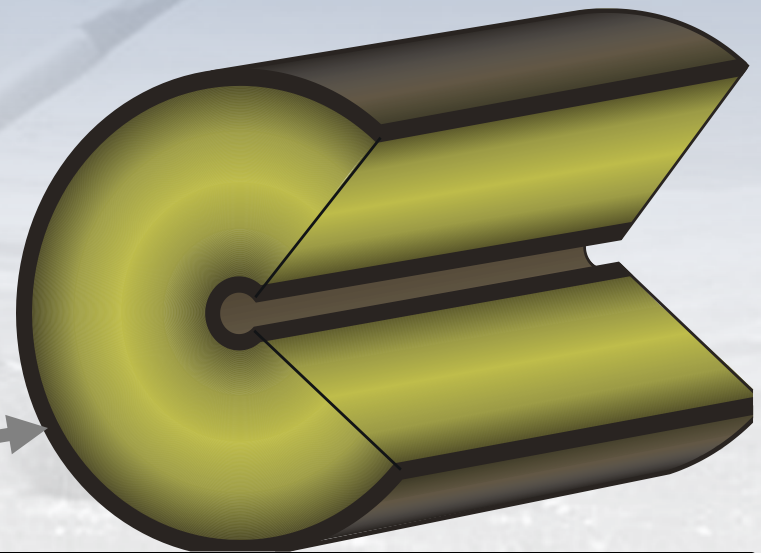
XM60 HYBRID BALL POWDER®

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

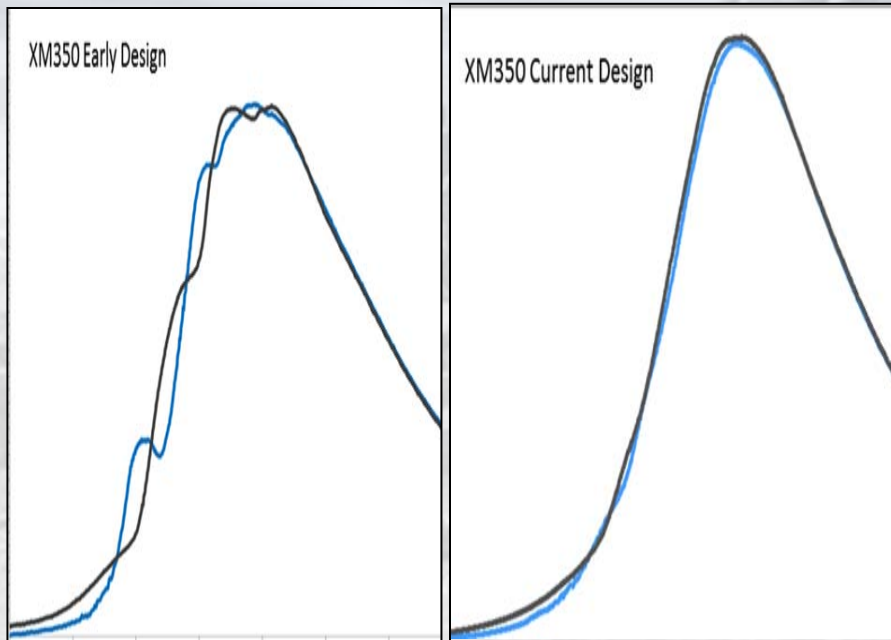


Small Grains with Very High Gravimetric Density (Loading Density ~1.050 g/cc) load well in the zone bags and achieve required charge weight sufficient to meet extended range velocity at lower flame temperatures

← Uncoated HYBRID Grains

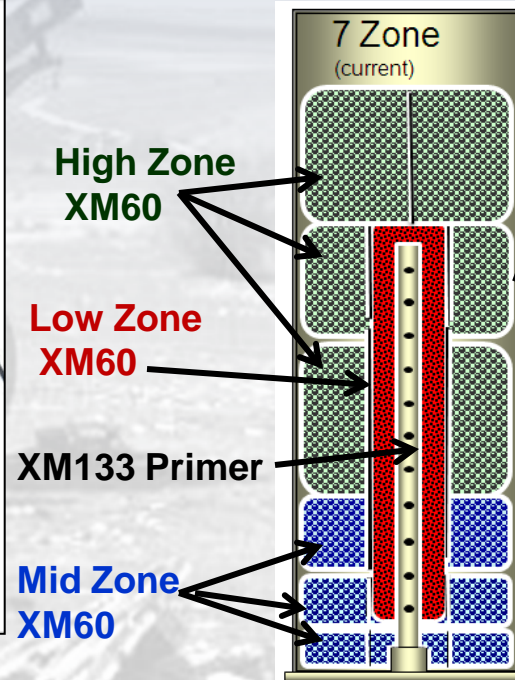
XM350 Charge Development

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



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



Proposed HE

1 Cartridge

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

XM350 prop chg
to 17+ km



M1130E1 (HE PFF BB)

**Opportunity to Increase Operational Flexibility,
Capability & Reduce Logistics**

A faded, grayscale background image showing a military cannon in a desert environment. Two soldiers are visible near the cannon. The word "END" is overlaid in large, bold, yellow letters with a black outline.

END