IM in the Field – Experience of Reduced Sensitivity Mortar Cartridges to Actual Combat Threat Stimuli
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120mm M120 / M121
I-81mm M252
60mm M224
IM Design Features Incorporated into 60mm HE Ammo (M720A1 & M768)

- **PBXN-5 Explosive Fuze Booster**
  - Improved thermal response than former COMP A5 explosive - Burning / pressure rupture vs. partial detonation in Variable Confinement Cook-off tests (VCCT).
  - Approved in-line explosive (MIL-STD-1316).
  - Already utilized in M734A1 and M783 Fuzes (lead charge).

- **Plastic Fuze Adapter**
  - Provides warhead venting.
  - Prevents internal pressure buildup and acceleration of a burning reaction to a deflagration / explosion (upon auto-ignition / cook-off of explosive fill in a fire or exposure to thermal stimuli).

- **PAX-21 Explosive Main Charge**
  - Less shock sensitive than former COMP B explosive fill - 165 cards vs. 208 cards NOL gap tests (LSGT).
  - Improved behavior in burning reactions.
  - Non-TNT based, melt-pour explosive
  - Minimal impact on existing loading facilities.
IM Design Features Incorporated into Packaging for 60mm M720A1 & M768 HE Mortar Ammo

- **Fibertube Container**
  - Eliminated metal packing clip (inserted into fuze wrench slots) - Cartridge presently supported on projectile body by a new plastic ring/fiberboard sleeve system.
  - Longer container to provide additional space for fuze separation and optimal warhead venting.

- **Metal Ammo Container**
  - Taller can for longer PA164 fibertubes.
  - Intumescent paint coating eliminated due to unresolved durability problem (i.e. cracking/de-lamination during rough handling tests at extreme cold environment).
Developmental IM Testing (Fast Cook-off)

Non IM- 60mm M720 HE Cartridges

Projectile Body Fragments and Unconsumed COMP B Explosive (TYPE II Response)
Developmental IM Testing (Fast Cook-off)

IM Enhanced - 60mm
M720A1 / M768 HE Cartridges

Burned-out Projectiles (TYPE V Response)
Mine Resistant Ambush Protected (MRAP) Vehicles
Afghanistan (September 2009)

- MRAP vehicle hit by an Improvised Explosive Device (IED).
- IED ruptured the vehicle’s hull and fuel tank, which engulfed the vehicle in flames.
- Seven-man crew and 60mm M768 HE mortar ammunition were inside the cabin.
- Although several soldiers were seriously injured, all survived.
- Insensitive Munitions (IM) features of 60mm M768 HE cartridges credited with averting a greater disaster.
Response to Actual Combat Threat (IED) Stimuli

Exterior of MRAP

Burned out projectile

Interior of MRAP after IED attack and resulting fire.

Burned-out 60mm M768 projectiles recovered from MRAP
Mortar Ammunition IM Enhancements

- Real Benefits
  - Increased Soldier Survivability
  - Reduced Collateral Damage
  - Enhanced Safety
  - Logistics (Improved Ammo Storage)

- Additional (Ongoing) Design Improvements
  - IMX-104 Explosive Fill
  - PBXW-14 Fuze Booster Explosive