

Improved 12,7 mm (.50 cal) Multi Purpose (MK211) Anti Material Concept

Bruce Webb – Nammo Tactical
Andreas Gaarder – Nammo Raufoss

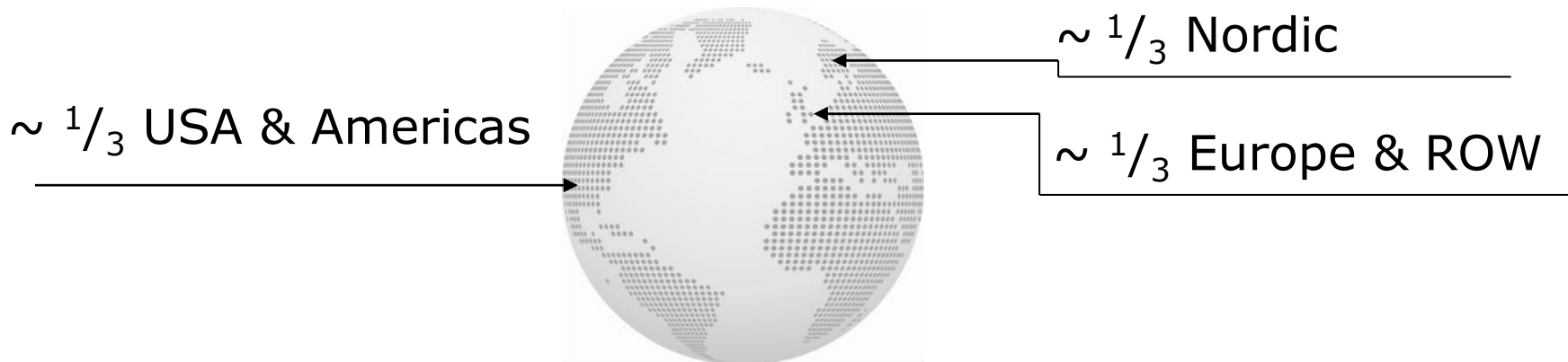
Presentation for the NDIA
Joint Armaments Conference
2014

Nammo

NAMMO Overview

- A Technology Driven Aerospace & Defense Group

- Corporate HQ in Norway
 - Presence in 9 countries
 - 2200 employees
 - Revenue \$620 million (2013)
 - 85% defense / 15% civil
- Nammo Inc HQ in Virginia
 - Nammo Talley (SSA)
 - Nammo Pocal
 - Nammo Tactical Ammunition
 - Nammo Demilitarization
 - Nammo Composite Solutions



Core Business & Technologies

- **Ammunition**
 - Specialty producer of small, medium and large caliber ammunition
- **Shoulder-Launched Munitions**
 - Advanced multi-purpose SLMs for current and emerging warfighter missions
- **Missile Products**
 - Highly engineered rocket motors, warheads, composite/metallic cases and actuation systems
- **Demilitarization**
 - World leader in safe and environmentally responsible recycling of ammunition and energetic materials



Nammo Has Supported US Ammunition Supply With .50cal MK211 for 31 years

- More than 30M projectiles delivered through Lake City AAP
 - Sniper and Machine Gun – linked configurations

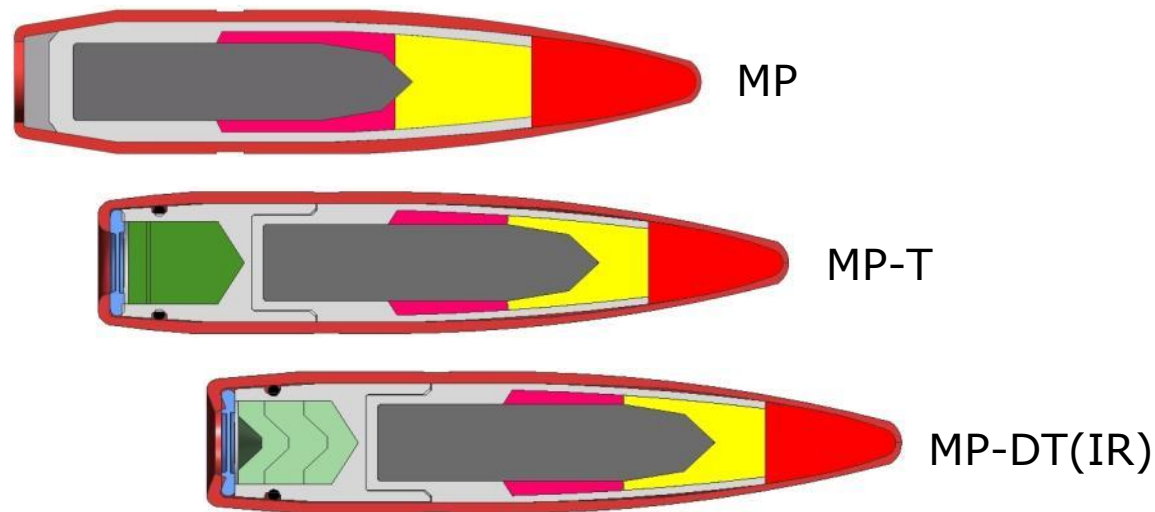
- 2011: Nammo Tactical Ammunition established
 - Small quantity sniper ammunition assembly
 - Special Loads/Configurations
 - Research and Development Support
 - Improved Logistics Support (Foreign Trade Zone)



Nammo

.50 Caliber Multi-Purpose Agenda

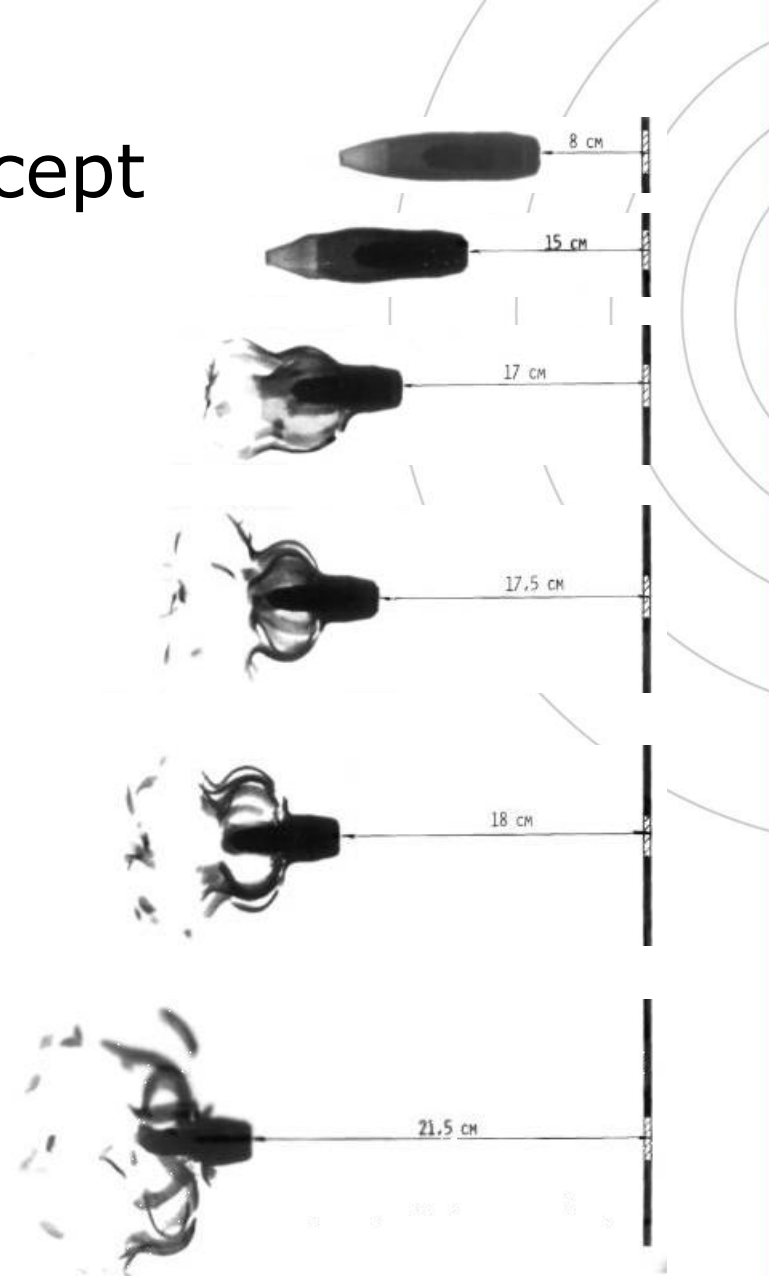
- Multipurpose Concept: 20mm Performance in a 12.7mm form
- Evolution of MP Ammunition: 21st Century Improvements
- Effectiveness Study results
- System Safety – Handling and Unexploded Ordnance (UXO)
- MP Training Analog: SG-M Round



.50 cal Multipurpose Concept

- *Unleash the Potential*

- Armor Piercing
- High Explosive
- Fragmentation
- Incendiary



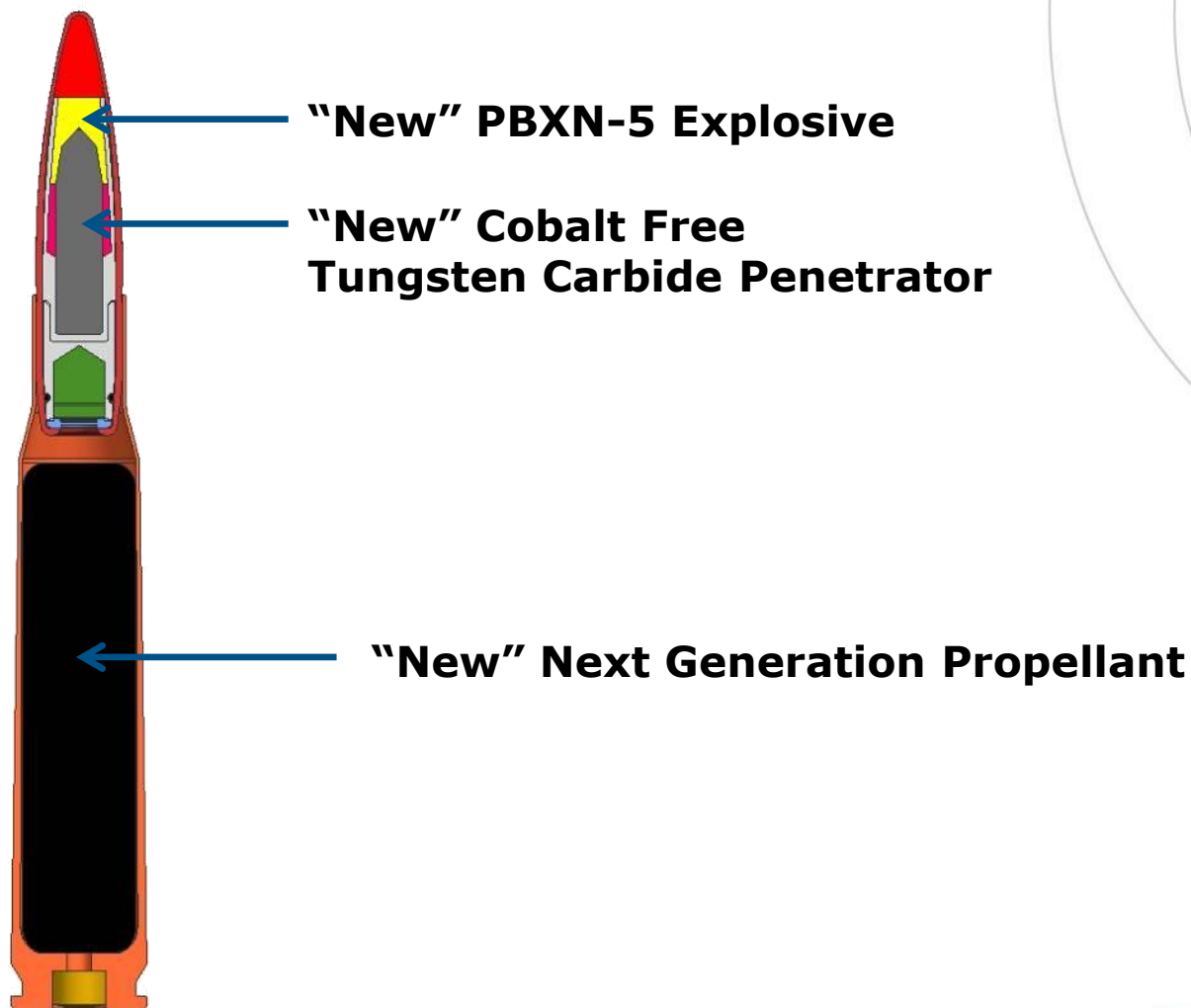
.50 cal Multipurpose Concept

- *Unleash the Potential*



8 inch reinforced concrete, range 200 yards

Next generation .50 cal MP – F3



Next generation MP: Better Penetration and "Temperature Stable Velocity"

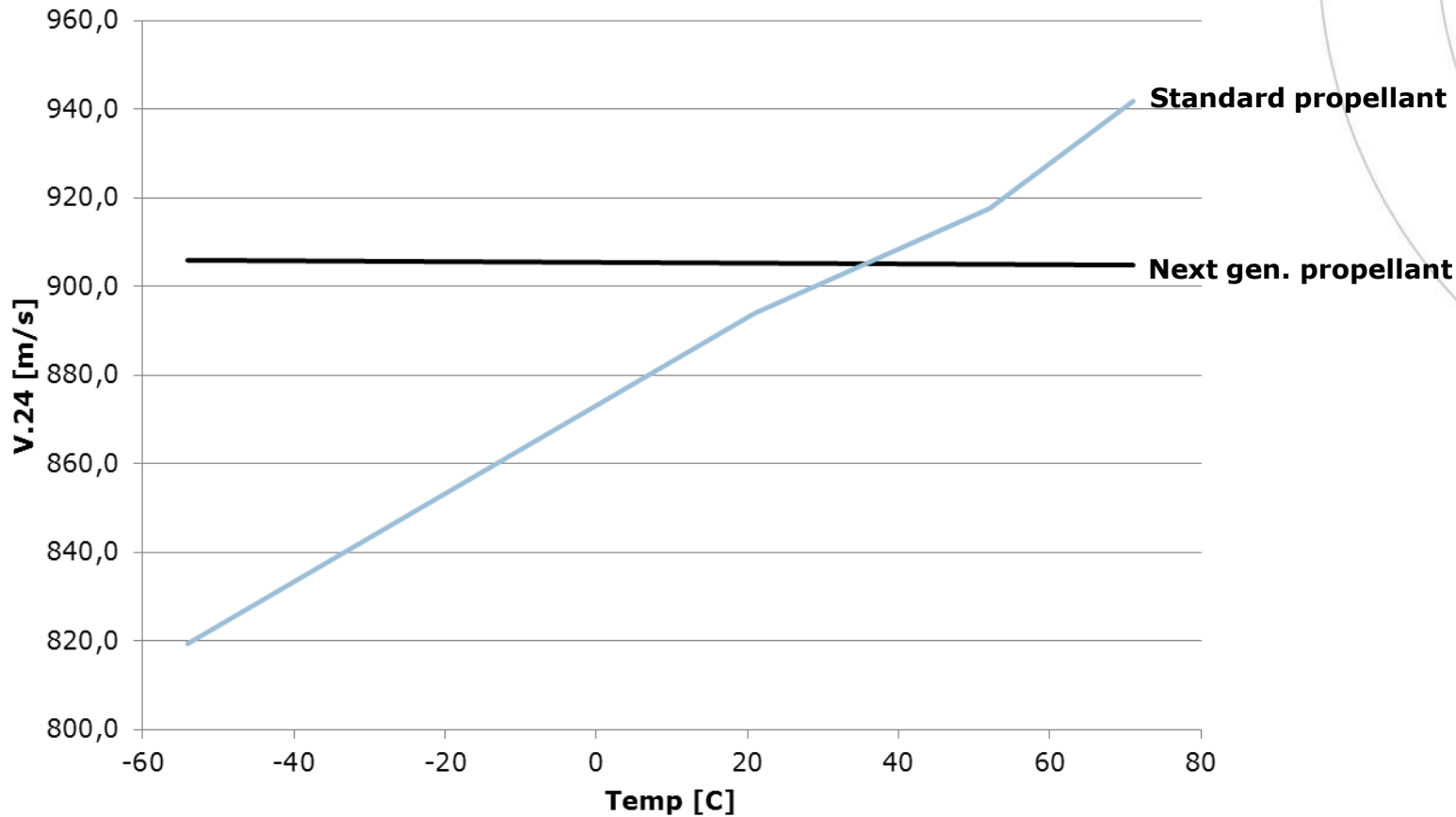
Penetration - Standard	Penetration - "F3"
12.7 mm (0.5") at 200 yds	22.0 mm (0.85") at 200 yds
10.6 mm (0.4") at 1000 yds	12.7 mm (0.50") at 1000 yds
(Full penetration of 80 degree NATO target)	

Accuracy/Velocity Stability - Standard	Accuracy/Velocity Stability - "F3"
1.5 MOA	1.5 MOA
120 m/sec Delta Velocity from -50C to 70C	5 m/sec Delta Velocity from -50C to 70C

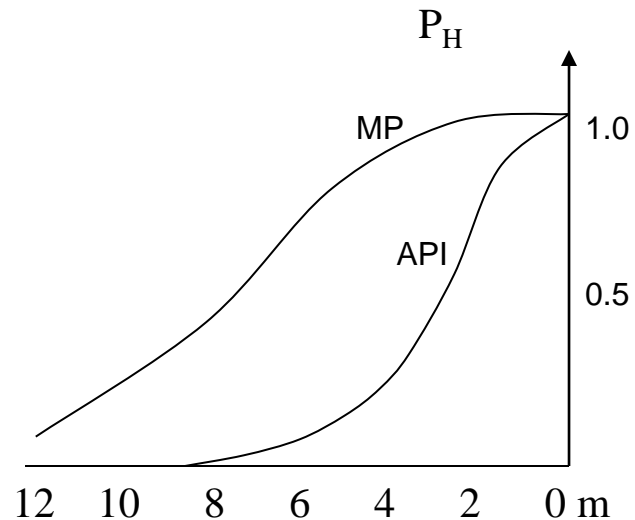
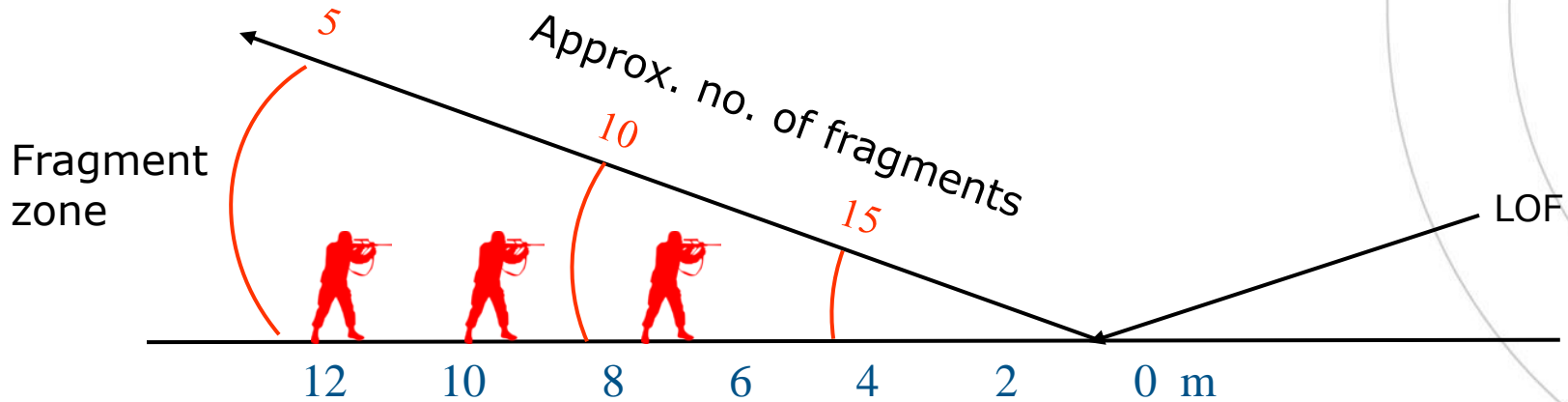
Next Generation Propellant

STANAG 4170 qualified & REACH compliant

Velocity/Temperature



Suppression Effect



MP Effectiveness Study

Two Rounds Stop Light Armor at 1200m

- Light armoured vehicle defeated by an average of 1.4 MP rounds
 - @ 1200m in 0° , 45° and 90°
- > 3.5x better P(k/H) than a standard AP round.

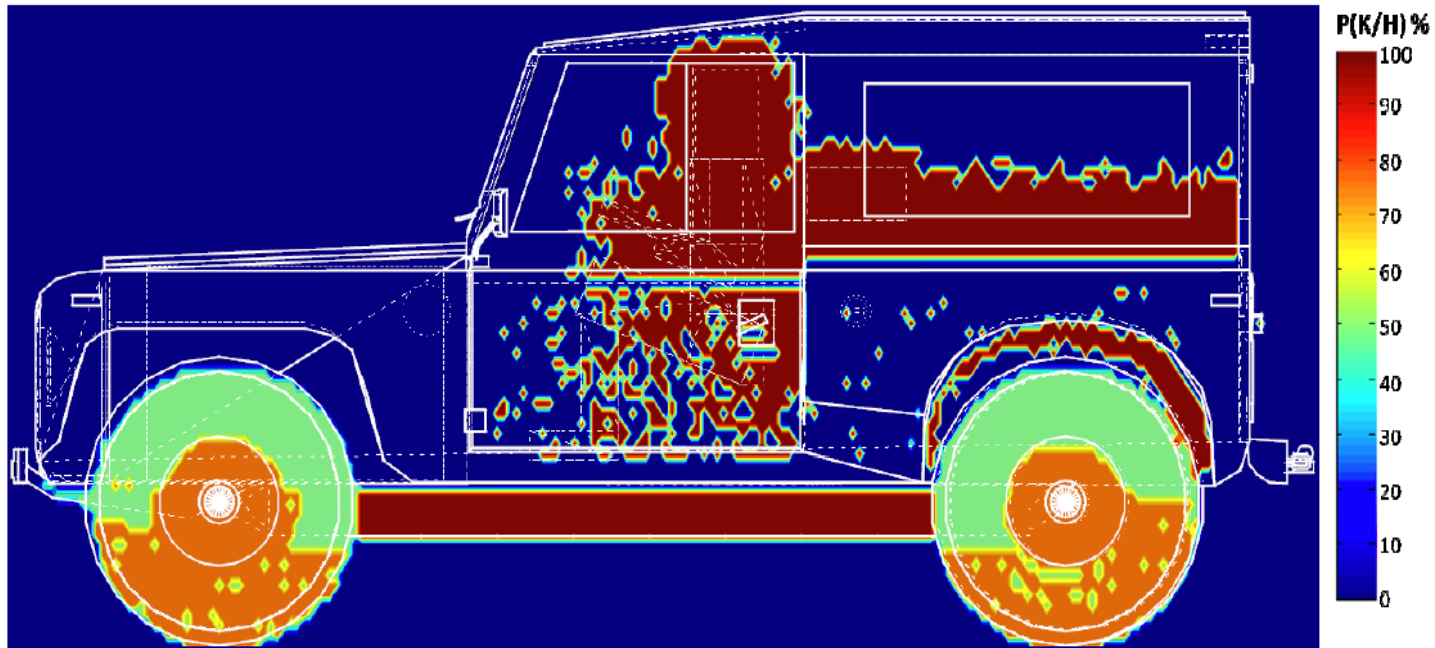


Figure 27 - Probability of Mission Kill Contour Map (Range = 1200m, View Angle = 90°)

MP Effectiveness Study

Five MPs Stop Armored Personnel Carrier at 600m

- The BTR-70 200m away defeated by 1-2 MP rounds.
 - 200m at 0° and 45°
- The BTR-70 600m away defeated by 4-5 MP rounds.
 - 600m at 0°

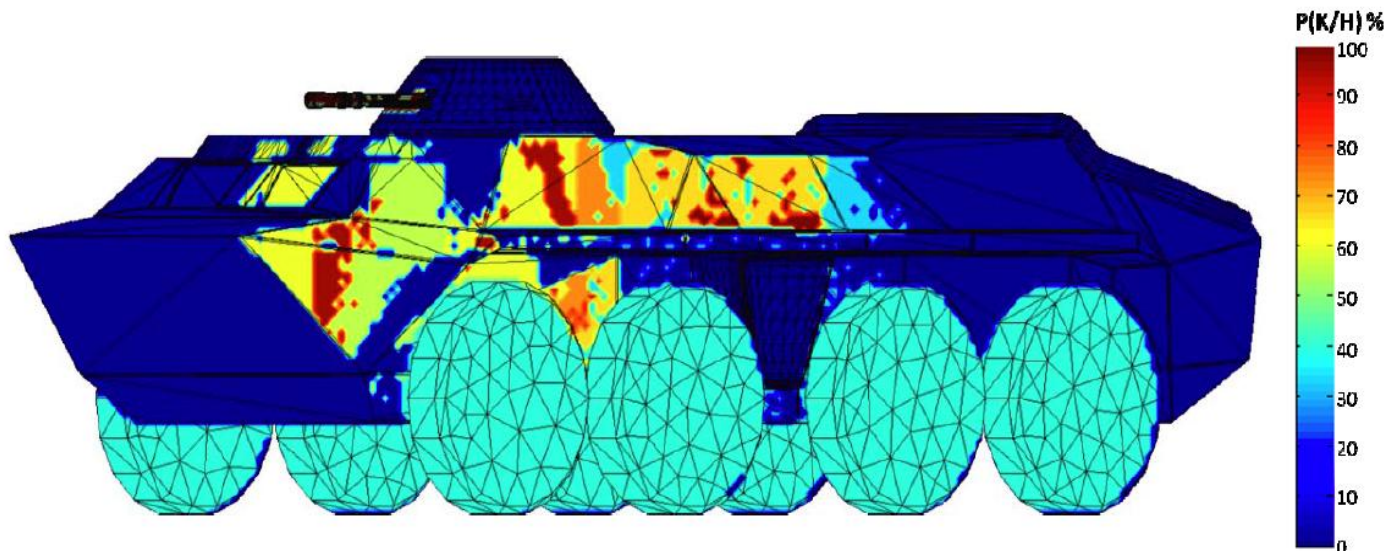


Figure 27 - Probability of Mission Kill Contour Map (Range = 200m, View Angle = 45°)

Multipurpose Safety

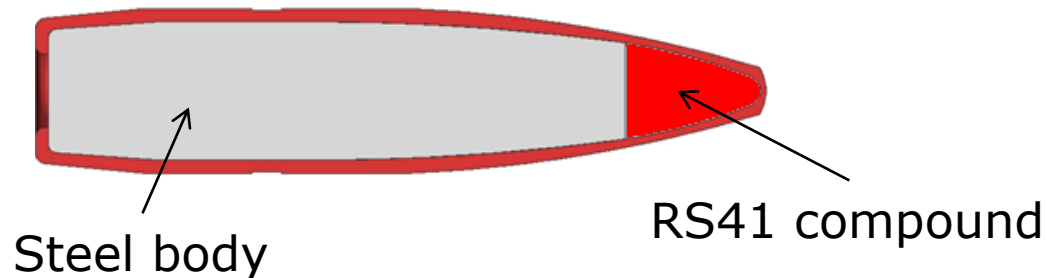


- No fuze/stored energy in the MP technology.
- **100% safe to handle even after firing.**
- Requires significant energy to start the pyrotechnic chain
- Impact velocity of ~ 1000 ft./s is needed to ignite the round.

- Lot Acceptance Tests to verify round safety round:
 - 50 ft. cartridge drop, nose down on an armor plate
 - **No ignitions - ever, and post-test round is safe to handle and fire.**
 - 8 ft. projectile drop, 3 lbs. load dropped onto projectile nose
 - **No ignitions - ever, and post-test projectile is safe to handle and fire.**
 - Muzzle sensitivity test – Rounds fired into aluminum sheet at 65 ft.
 - **No ignitions - ever**

SG-Marker Round

- Ball round with «flash-on-impact» similar to the MP round
- Trajectory match with MP Family
- No explosives/Can be used as a training round for the MP
- Zero UXO Hazard
- Easy for sniper/spotters to see impact without tracers
- Linkable for «low signature» impact report



Questions ?

Bruce Webb – bwebb@nammoinc.com
Andreas Gaarder – andreas.gaarder@nammo.com