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Malcolm Baldrige National Quality Award 2007 Award Recipient

ARMAMENT RESEARCH, DEVELOPMENT AND ENGINEERING CENTER
PICATINNY ARSENAL, NJ

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Small Arms Grenade Munitions (SAGM)
NDIA Armament Small Arms Forum

03 June 2015

Agenda

- Project Objective
- Technical Approach
- Challenges
- Metrics
- Test Results
- Final Demonstration
- Timeline
- Conclusion

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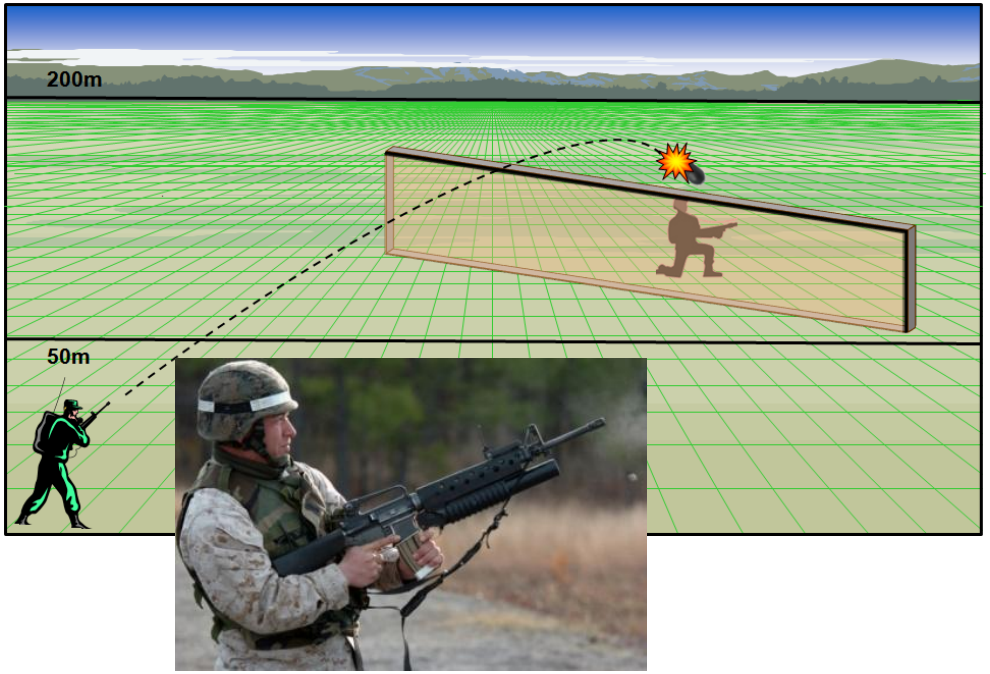
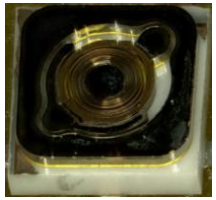
Project Objective

- Add counter-defilade capabilities to Low-Velocity 40mm Grenades while maintaining compatibility with current and future grenade launchers.
- Ammunition shall be fully autonomous, determining time-to-burst without user input, weapon modifications, or attachments.

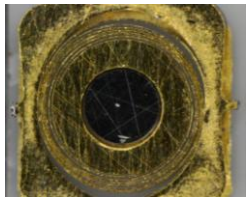


Technical Approach

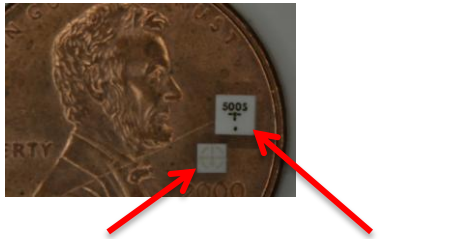
- Phase I: Smaller Fuze
  - Replaced major mechanical fuze components with micro-electro-mechanical systems (MEMS)



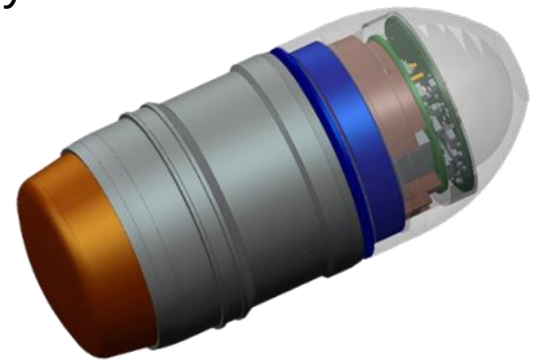
Impact Switch



Spin Switch



- Phase II: Smarter Fuze
  - Utilized Directional Doppler Ratio (DDR) proximity sensor technology
  - Side looking RF pattern 360° around
  - Detects defensive structures near flight trajectory
  - Detonates behind defensive structures



- Phase III: Improved Ballistics & Integration
  - Reduced Drag Coefficient
  - Improve Sensor
  - Integrated with M433 warheads

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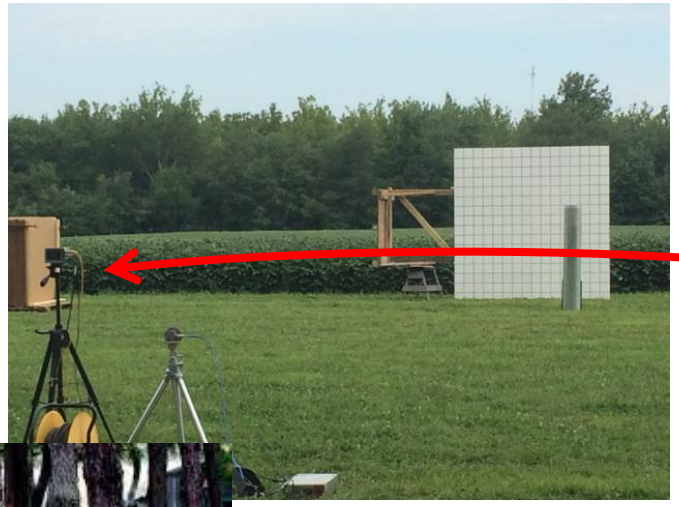
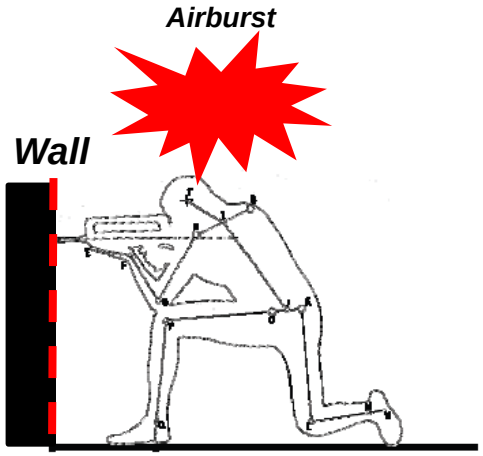
Challenges

- Clutter Resistance
  - Earth clutter resistance verified with testing.





- Target Detection
  - Design robustness against all conceivable defensive structures.

- Burst Point Location
  - Target detection and response.

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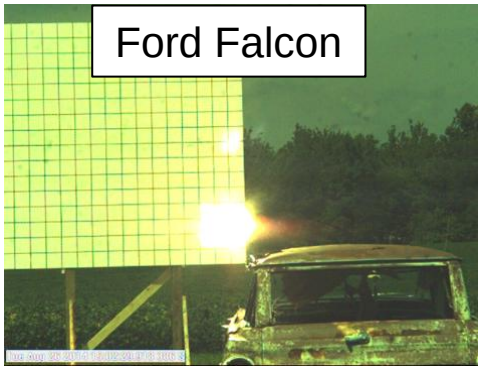
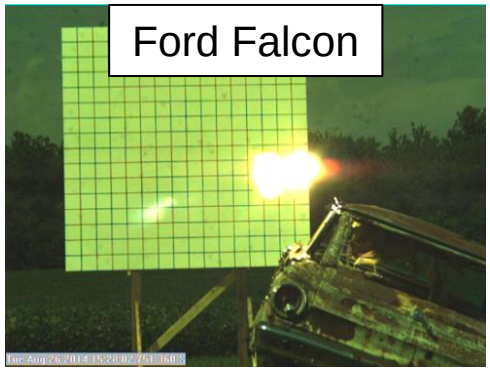
SAGM TPM Tracking

Technical Performance Measure (TPM)	Quantitative Performance Requirement		Current TPM Value
	Threshold	Objective	
Drag Coefficient	0.17	0.16	0.16
Burst Location - Behind Target			
Target - Brick	0.5-1 m	0.5-1 m	≤ 1.24 m
Target - Block			≤ 3.65 m
Target - Car			≤ 0.38 m
Target - Berm			≤ 0.55 m
Airburst	50%	75%	76%

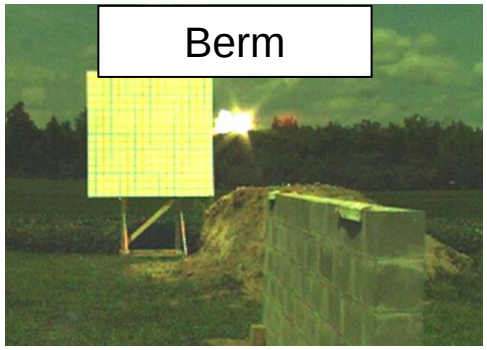
Test Results

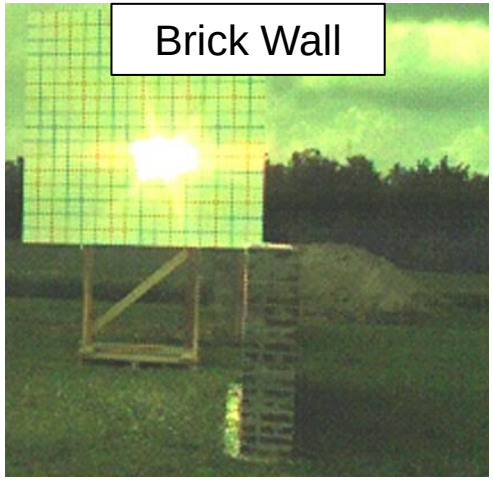
- Targets:
  - Vehicle
  - Dirt Berm
  - Brick Wall
  - Concrete Masonry Unit Wall





- Airburst Success Results:
  - Nov 2013: <30%
  - Aug 2014: 56%
  - Jan 2015: 76%





- Functional Reliability:
  - Nov 2013: ~30%
  - Aug 2014: 88%

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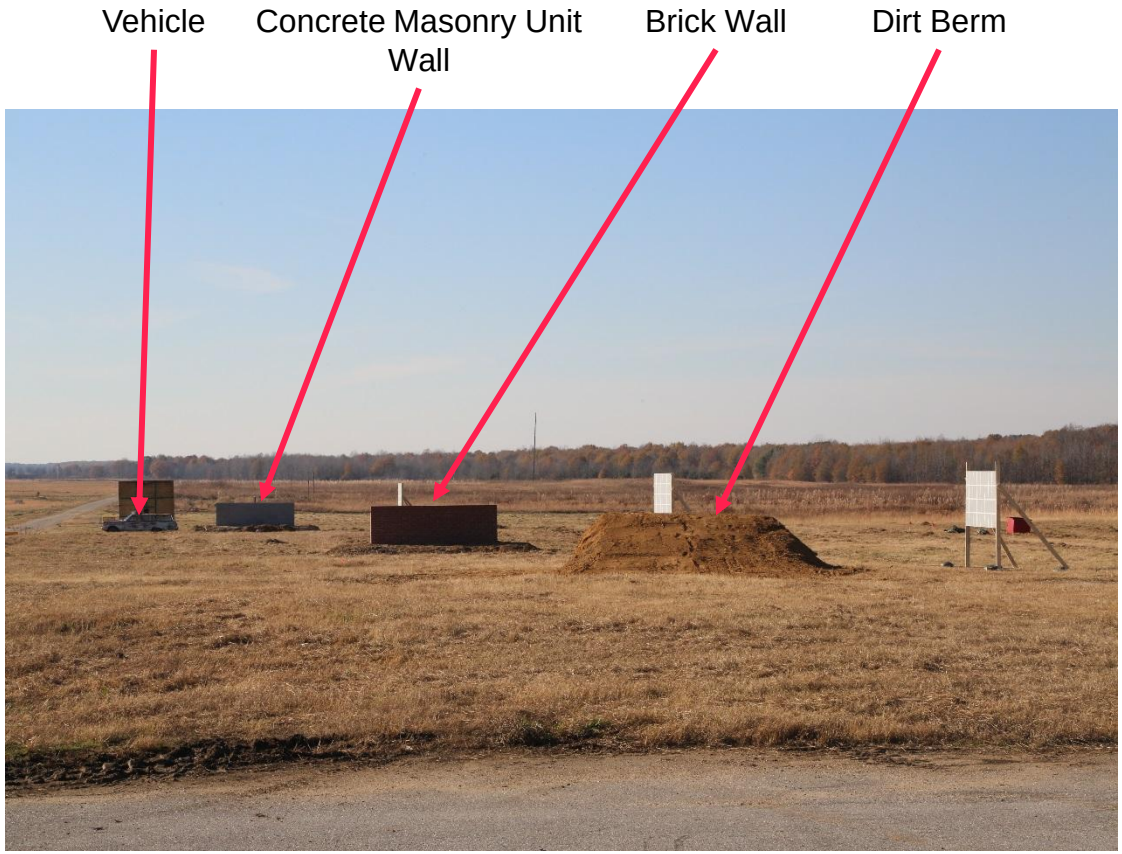
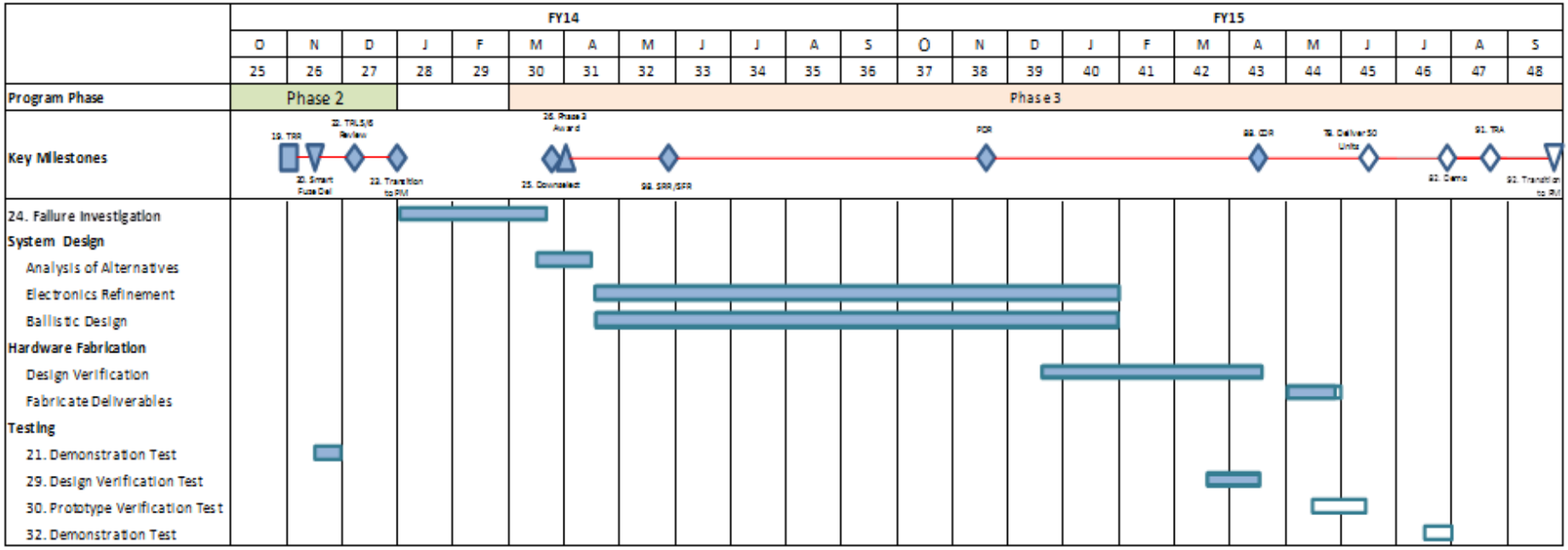
Final Demonstration

- August 2015
- Testing SAGM fuze w/M433 warheads against concrete masonry unit wall, brick wall, & dirt berm.
- SAGM w/inert warheads will be tested against vehicle (due to EOD safety)
- Lethality comparison b/w standard M433 & SAGM configurations will be assessed.



Timeline



- Project began FY12
- Awarded to two design teams; down-selected to one - end of March 2014.
- Project ends FY15.

Conclusion

- Transition to Project Manager – Maneuver Ammunition Systems (PM–MAS)
  - Technology readiness assessment – TRL6 target
  - Full SAGM cartridge technical data package
  - Detailed final report
  - SAGM cost estimate
  - On track to transition technology and meet above exit criteria.