US ARMY RDECOM

U.S. Army Research, Development and Engineering Command

J·S·S·A·P JOINT SERVICE SMALL ARMS PROGRAM

Malcolm Baldrige National Quality Award 2007 Award Recipient

ARMAMENT RESEARCH, DEVELOPMENT AND ENGINEERING CENTER PICATINNY ARSENAL, NJ

TECHNOLOGY DRIVEN. WARFIGHTER FOCUSED.

Advanced Lethal Armaments for Small Arms

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Joint Armaments Conference, Exhibition and Firing Demonstration

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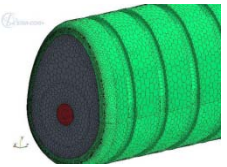
Advanced Lethal Armaments for Small Arms (ATO-R) Project

Purpose: Demonstrate component technologies that mitigate small arms capability gaps

Goal: TRL 4 (Demonstrate in Lab Environment)

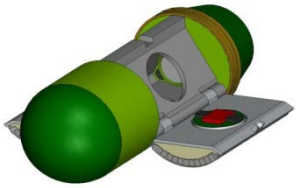


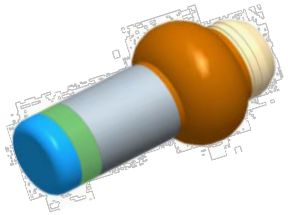
Objective: Enhance effects on target

Primary: Deliver Effects On Target

Secondary: Mitigate Recoil

Tertiary: Program Terminal Effects Prior To Launch

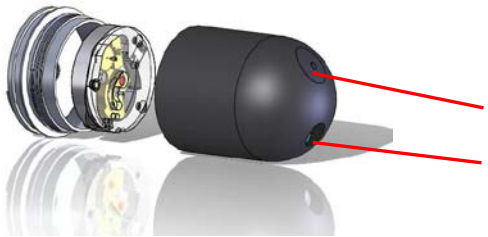




Timeline: 2008-2011

Innovators: Government, Academia, and Industry

Payoff: When fully integrated in current and future systems, these components will act as force multipliers for the war-fighter and provide enhanced effects on target



Technical Approach
(Metrics and Objectives)

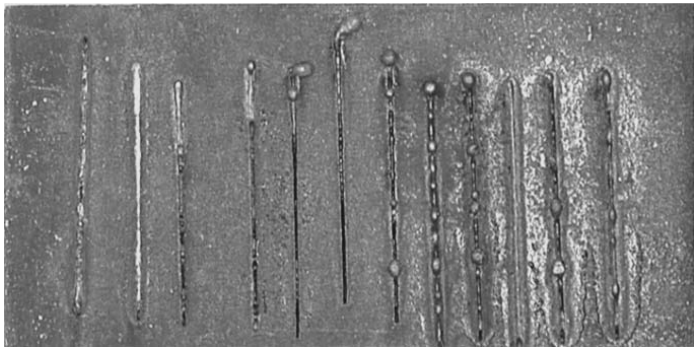
Measure	Current	Threshold	Objective	TRL
Small Fragmenting Munitions - P(I)	Pi/Lethal Area	25% over current systems	> 25% over current systems	Start: 2 End: 4
Control of Directionality of Fragments	None	Angle of Fall to Gravity	Optimize on Target	Start: 2 End: 4
Reduced Recoil / Weight	Extrapolate from current capability	Reduced by 20%	Greater than 20%	Start: 2 End: 4
Combined Lethal & Non-Lethal Warhead	None	Less Lethal to Lethal	Optimize on Target	Start: 2 End: 4

Project Portfolio

Project	Innovator
40mm Precision Grenade	Georgia Tech Research Institute
40mm Directed Frag Munition	Battelle
MEMS Set Back Generator	ARDEC/Adelphi
Optically Fused Air-Burst Munition	Metal Storm
40mm Combined Lethal/Non Lethal	Dindl Firearms Manufacturing Inc
40mm Combined Lethal/Non Lethal	AAI
Barrel Cooling	Oak Ridge National Lab
Course Corrected Projectile	AAI
40mm Dynamically Reshaped Warhead	Dindl Firearms Manufacturing Inc
Enhanced Fragmentation Munition	AAI
Controlled Fragmentation by Laser Scoring	Los Alamos National Lab
Advanced Warhead Effort	ARDEC
FLUENT Gas Modeling	ARDEC
40mm Selectable Warhead	ARDEC
Cal .50 Barrel Stabilizer	Idaho National Labs
Adv Recoil Attenuation	Knights Armament Company
Recoil Reduction	ARDEC
Cal .50 Limited Range Projectile	ARDEC

Recent Projects

Los Alamos National Lab



Objective

Demonstrate controlled fragmentation by laser scoring

Concept

Improve fragmentation via metallurgical and mechanical fracture points

Progress: TRL 3

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Objective

Improve M433 shape charge and fragmentation

Concept

Optimize shape charge and sidewall fragmentation

Progress: TRL 3

AAI TEXTRON Systems

Objective

Combine lethal & non lethal capability into a single cartridge selectable at launch

Concept

12 Gage lethal/ non lethal cartridge

Progress: TRL 3

Recent Projects

Metal Storm

Objective

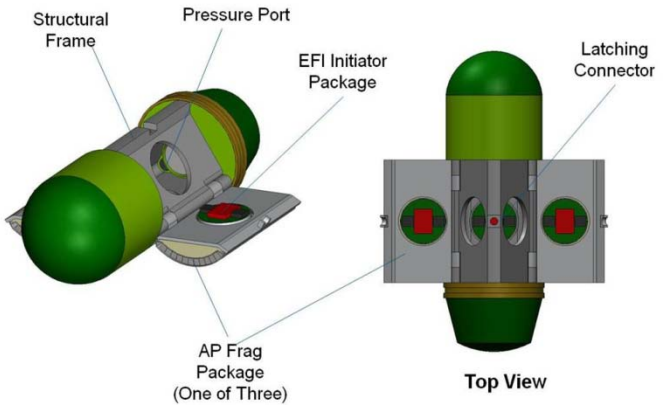
Demonstrate directional fragmentation & advanced fuzing

Concept

Initiate 40mm grenade via proximity senor

Progress: TRL 4

Battelle



Objective

Deliver more fragments on target

Concept

Directed fragmentation

Progress: TRL 3

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Recent Projects

Dindl Firearms Manufacturing, Inc.

Objective

Improve 40mm P(I)

Concept

Dynamically reshape warhead before detonation

Progress: TRL 4

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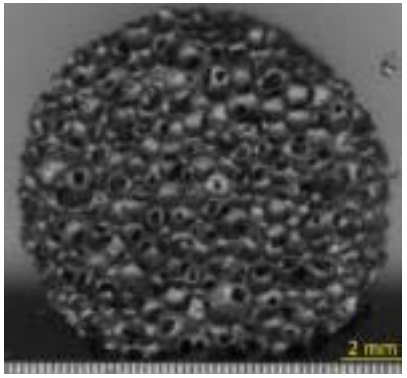
Oak Ridge National Lab



Objective

Rapidly cool weapon barrels

Concept

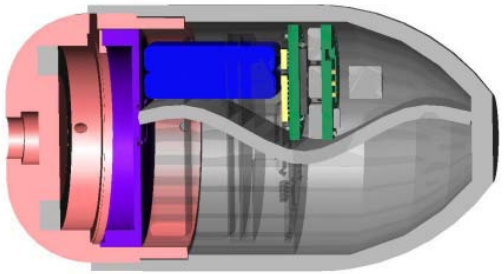
Wrap barrels in graphite foam

Progress: TRL 4

- 2x Increase in Thermal Conductivity
- Technology Transitioned to Rapid Equipping Force & PM-SW

Recent Projects

Georgia Tech Research Institute



Objective

Improve P(I)

Concept

Reduce delivery error

Progress: TRL 2

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Knight's Armament Company

Objectives

- Improve Recoil Measurement Techniques
- Assess Recoil Mitigating Devices

Concept

Design weapon fixture to assess recoil using alternate metrics

Progress: TRL 4

Recent Projects

Idaho National Lab

Objective

Reduce Cal .50 Dispersion by 50%

Concept

Gun Barrel Stabilizer

Progress: TRL 4 by 2012

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Projects	Objective
MEMS Set Back Generator	Power from Set Back
Advanced Warhead Effort	Improve 40mm P(I)
FLUENT Gas Modeling	Model Muzzle Gas Flow
40mm Selectable Warhead	Program Warhead
Recoil Reduction	Demonstrate recoil mitigating concepts (7.62mm Weap)
Cal .50 Limited Range Projectile	Self destruct projectile at range to reduce surface danger zone

Transitioned Projects

- MEMS Setback Generator ➔ STAR-ATO
- Barrel Cooling ➔ Rapid Equipping Force & PM SW
- FLUENT Gas Modeling ➔ Enabling technology for ARDEC & SOCOM and DOE (Oak Ridge National Lab)

Summary & Path Forward

- **ATO-R to conclude at end of FY11**

  Final report to be published on National Small Arms Center (NSAC) website & DTIC
  - Promote future collaboration efforts
  - Available Summer of 2011
- **Best-of-breed technologies to transition to FY12 - FY15 Small Arms Grenade Munitions Integration and Evaluation Demonstration Program**
  - Mature technologies from TRL 3 to TRL 6
  - Integrate component technologies into system level technology
  - Open and fair competition for contract awards to be administered through the NSAC

Path Forward?

- *We are getting answers from industry, academia and government*
- *ATO components technology is maturing*
- *Take best component technology and start integrating onto weapons platform to support multiple missions!*