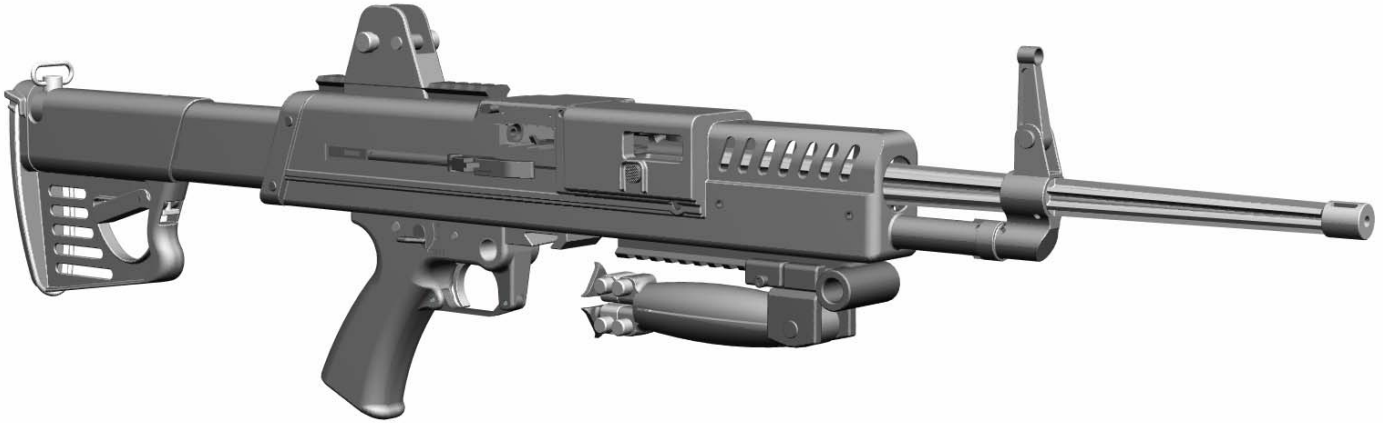
Lightweight Small Arms Technologies

(Formerly known as…Lightweight Machine Gun and Ammunition)



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Goals

Goals:

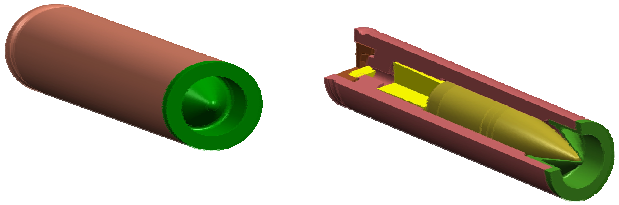
- 35% weapon weight reduction
- 40% ammunition weight reduction
- Reduced training & maintenance
- Maintain cost of current systems

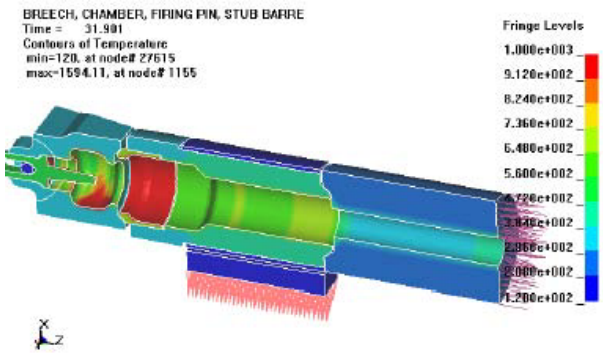
Approach:

- “Clean Slate” design
- Reduced weight as the priority
- In depth trade studies
- Extensive modeling & simulation

Focus on Technology Enablers

- Ammunition design
  - Cased Telescoped
  - Caseless Telescoped
- Weapon design
  - FEA for strength
  - Thermal analysis
- Reduced training & maintenance
  - Simpler designs and reduced parts count
  - Early inclusion of supportability considerations
- Maintain cost of current systems
  - Minimize use of “exotic” materials
  - Cost included in trade offs





Program Status

- System Integration Contracts Awarded April 2004
  - AAI Corporation of Hunt Valley, MD
  - General Dynamics Armament and Technology Products of Burlington, VT
- Phase 1 – Design Phase
  - 9 months long, virtual prototyping of weapons & ammunition
  - Downselected to AAI Corp. concept in February 2005

→Phase 2 – Develop, Fabricate & Test Phase

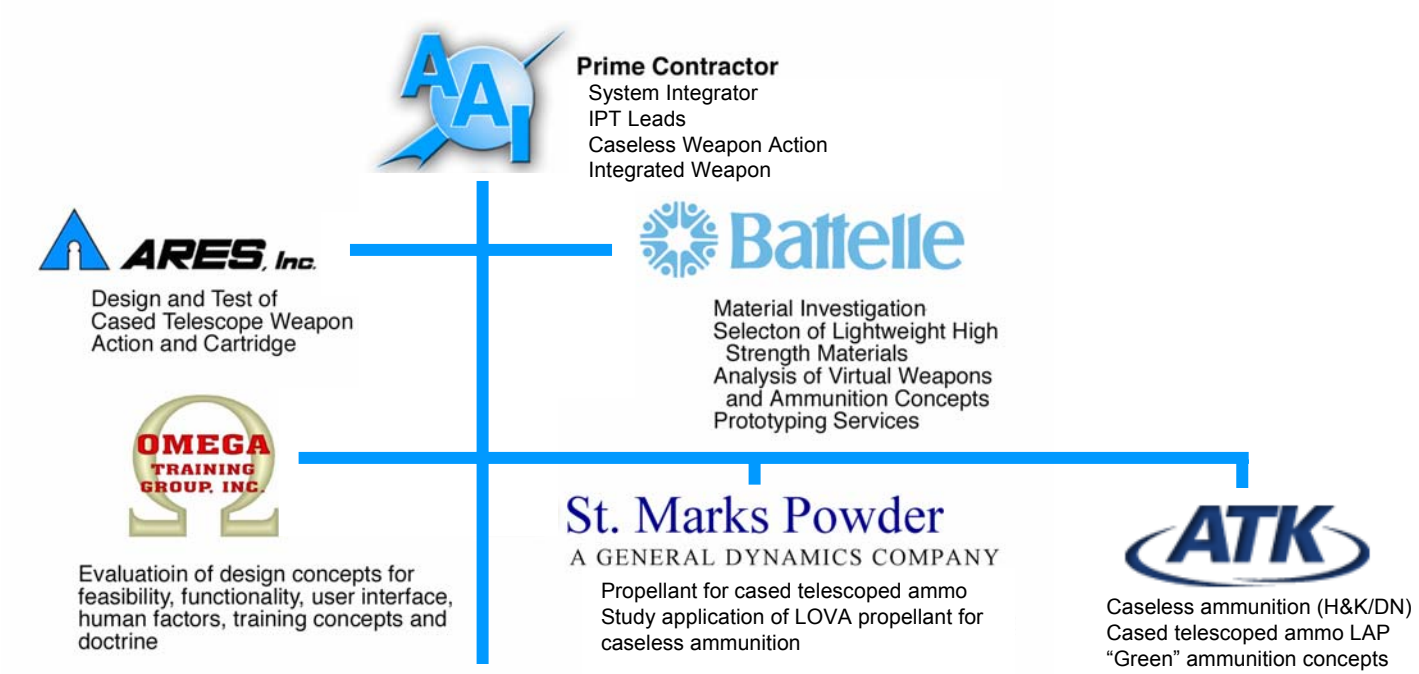
  - Continue development and fabricate subcomponents
  - Subcomponents and ammunition will be tested
  - System integration planning and preliminary testing
- Phase 3 – System Integration Test Phase
  - Testing will encompass all Milestone B requirements
  - Completed at end of FY07

Company Machine Gun

- Determine Feasibility of “Company Machine Gun”
  - Medium Machine Gun performance in Light Machine gun “package”
  - Initial study underway to identify optimum caliber
  - Results will be modeled to determine impact on weapon design

- Methodology
  - Compile Light and Medium Machine Gun performance data
  - Conduct analysis using empirical equations
  - Determine smallest caliber that meets penetration and KE requirements at range
  - Conduct Hydro code modeling to validate selection

AAI Team

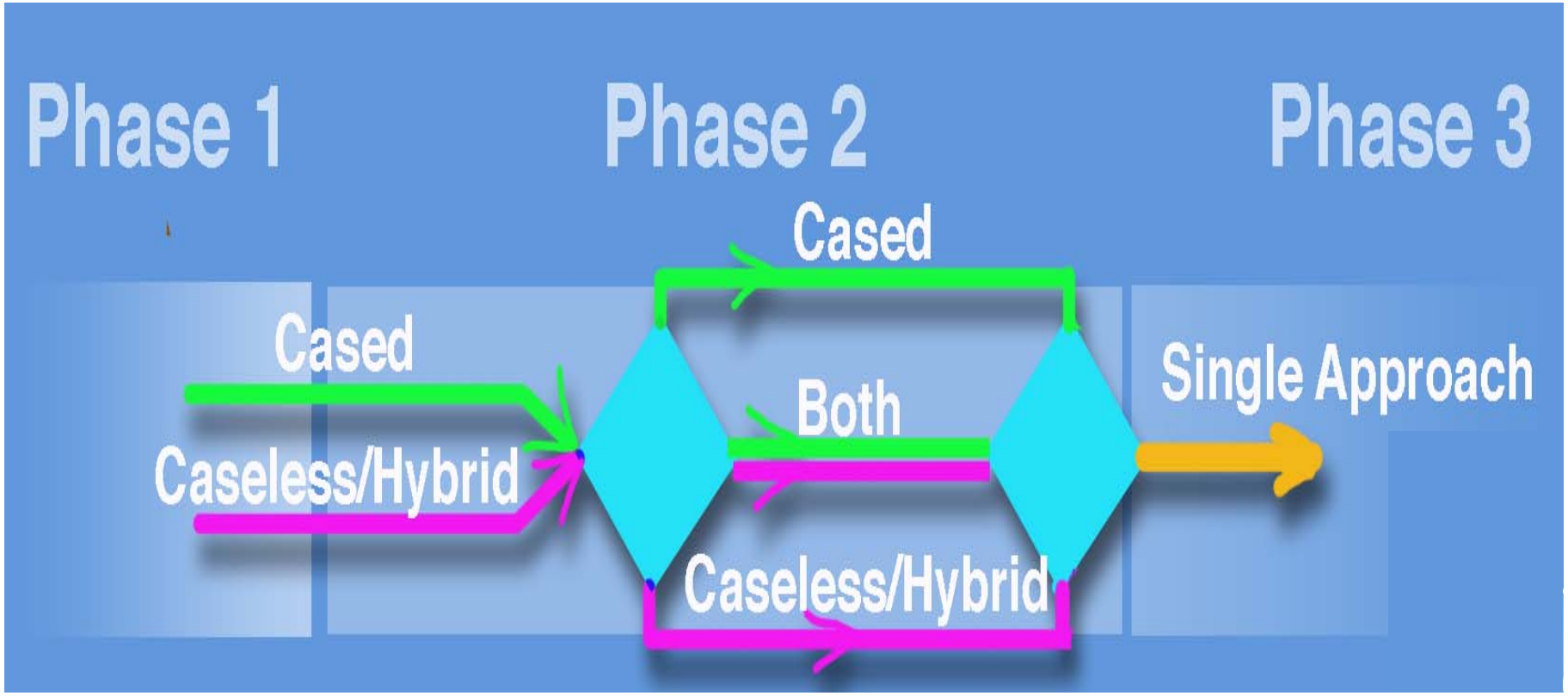


Related Activities

- ARDEC In-House Caseless Ammunition program (H&K/DN)
- CRADA with ARDEC- H&K/DN Propellant characterization
- Johns Hopkins Applied Physics Lab- Interior Ballistics Modeling
- ARL cartridge case and barrel material programs
- JSSAP BAA Component Contracts

Parallel Cased and Caseless Technology

Select Single Concept for Phase 3



Supportability Integrated with Design/Test Activities

System Tradeoff Considerations

Key Tradeoff Parameters

- Lethality
- Supportability
- Interfaces
- Operating System
- Scalability
- Integration of Electronics
- Cased/Caseless Commonality

Virtual Design Activities

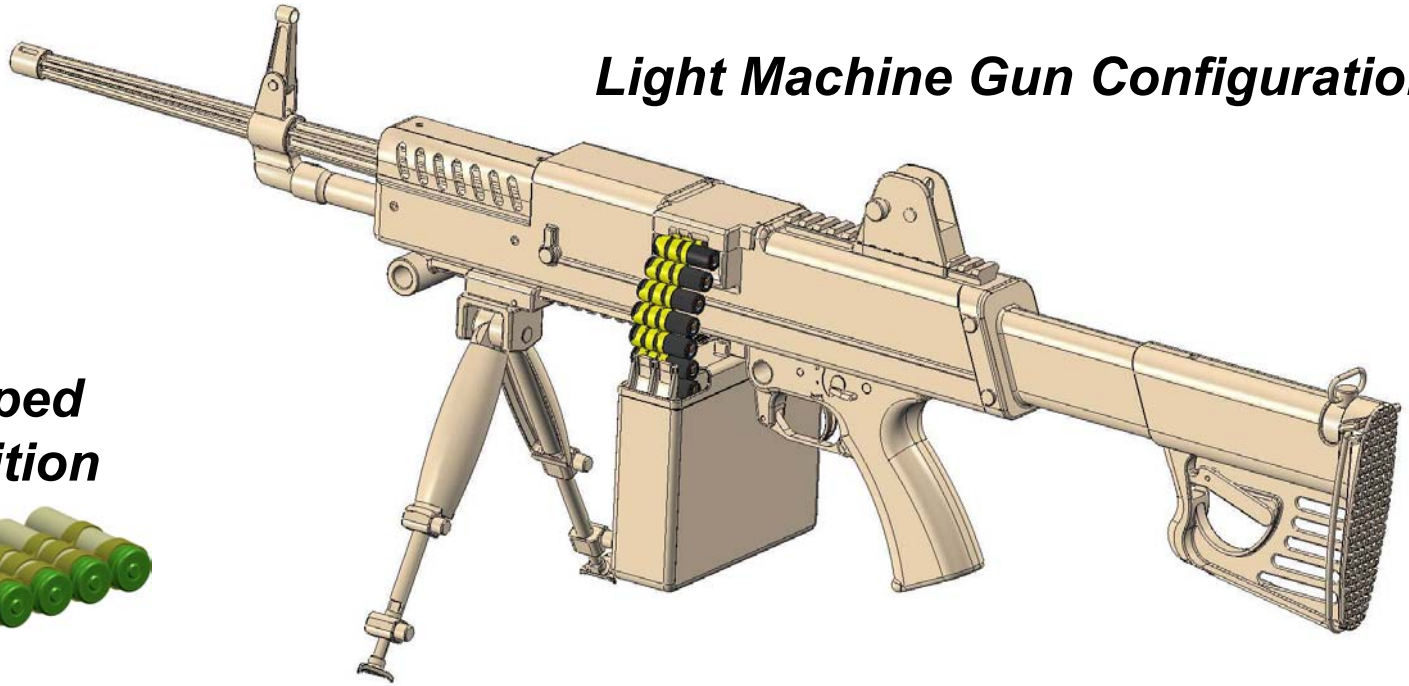
- 3D CAD Models
- Structural Analyses
- Thermal Analyses
- Kinematic Analyses
- Rapid Prototype Models
- Supportability Analyses

Selected Approach

- *Telescoped Ammunition*
- *5.56mm caliber, M855/856 bullets*
- *Rotating Chamber*
- *650 rds/min, Belt Feed*
- *Maximize CT/CL Commonality*

System Design Overview

Light Machine Gun Configuration

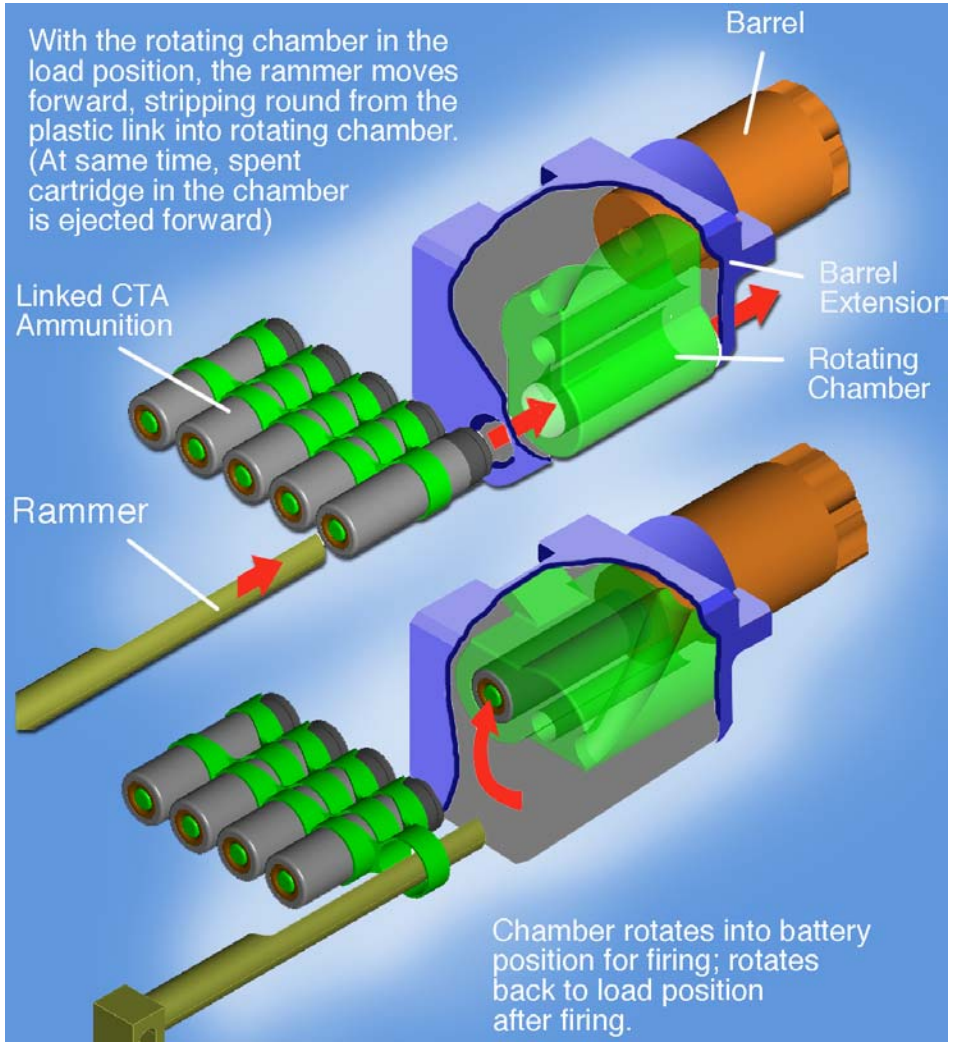


5.56mm Telescoped Ammunition

Cased Ammo Variant

Caseless Ammo Variant

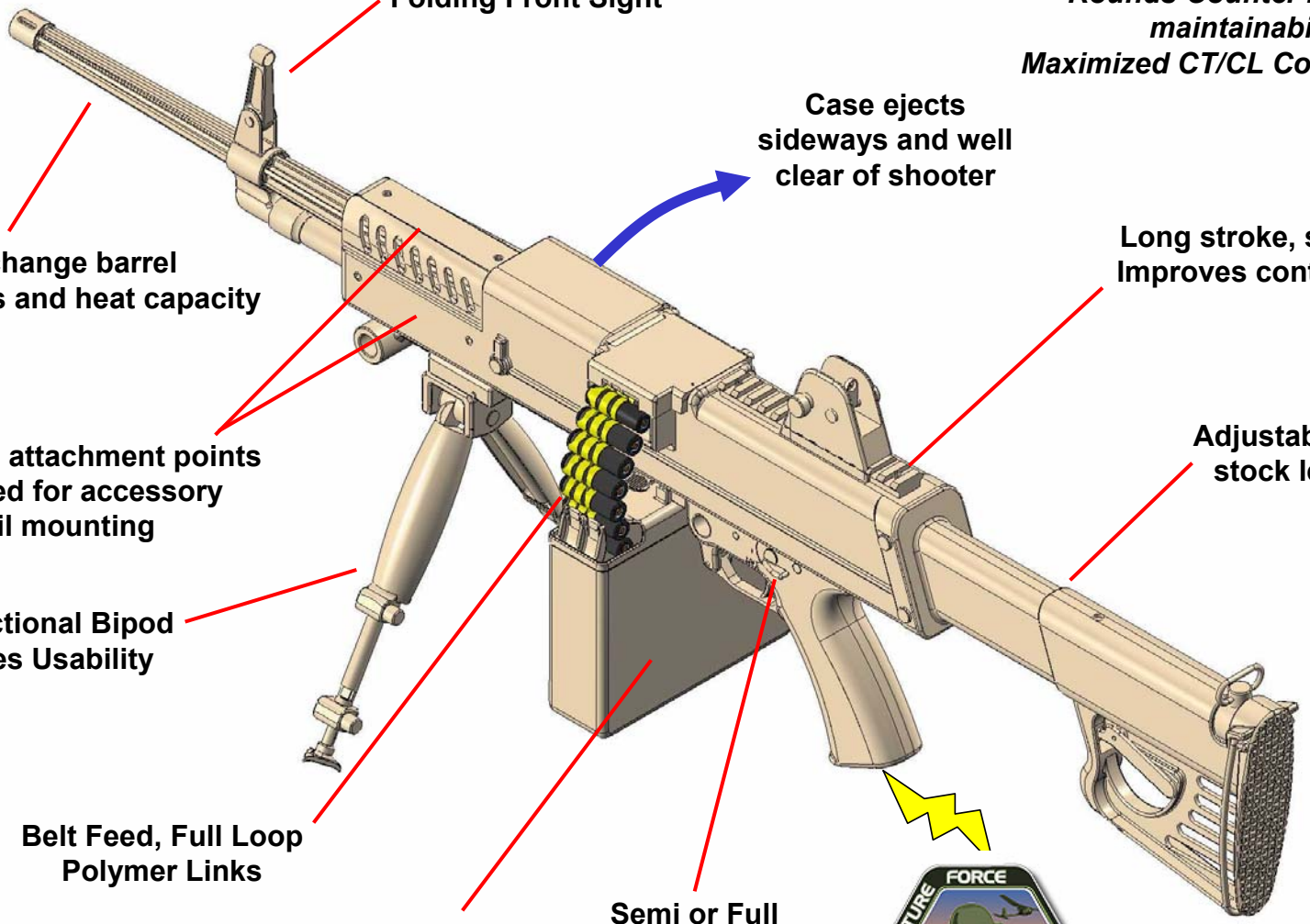
Weapon Operating System Approach



Weapon and ammo designed as a system

- **Rotating chamber**
- **Straight-thru feed and ejection**
- **Gas operated**
- *Provides positive control of all motion including ejection*
- *Isolates chamber from barrel heat*
- *Eliminates need for extractor groove in cartridge*
- *Allows common CT/CL approach*

Weapon Features



Folding Front Sight

Rounds Counter improves maintainability
Maximized CT/CL Commonality

Case ejects sideways and well clear of shooter

Quick change barrel
High stiffness and heat capacity

Long stroke, soft recoil
Improves controllability

Structural attachment points provided for accessory rail mounting

Adjustable butt stock length

Multifunctional Bipod
Improves Usability

Belt Feed, Full Loop
Polymer Links

100 Round
Soft Pouch

Semi or Full
Auto Fire

FFW Interface
Reserved for future
Implementation

Ammunition Tradeoff Considerations

Key Tradeoff Parameters

Cartridge Configuration

- Full Case
- Hybrid/Combustible Case
- Full Caseless
- Bullet Interface

Propulsion Approach

- Propellant Chemistry
- Propellant Packaging
- Primer

Virtual Design Activities

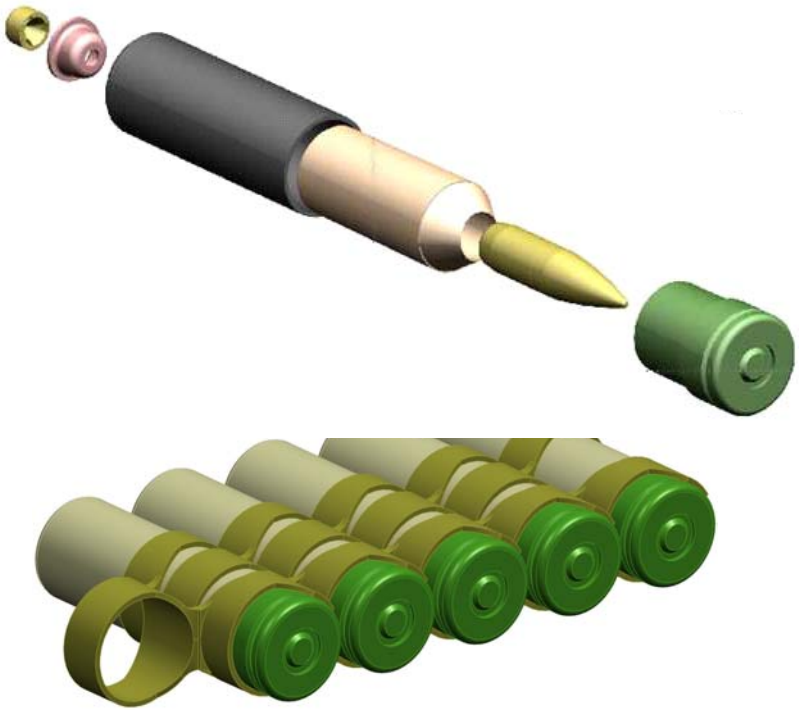
- 3D CAD Models
- Structural/Dynamic Analyses
- Interior Ballistics Analyses
- Supportability Analyses
- Limited Firing Tests to Validate Key Models

Selected Approach

- *Length Based on M856 Tracer Bullet*
- *Common CT/CL Cartridge Length*
- *CT- Full Polymer Case Configuration*
- *CL- High Ignition Temperature Propellant (HITP)*

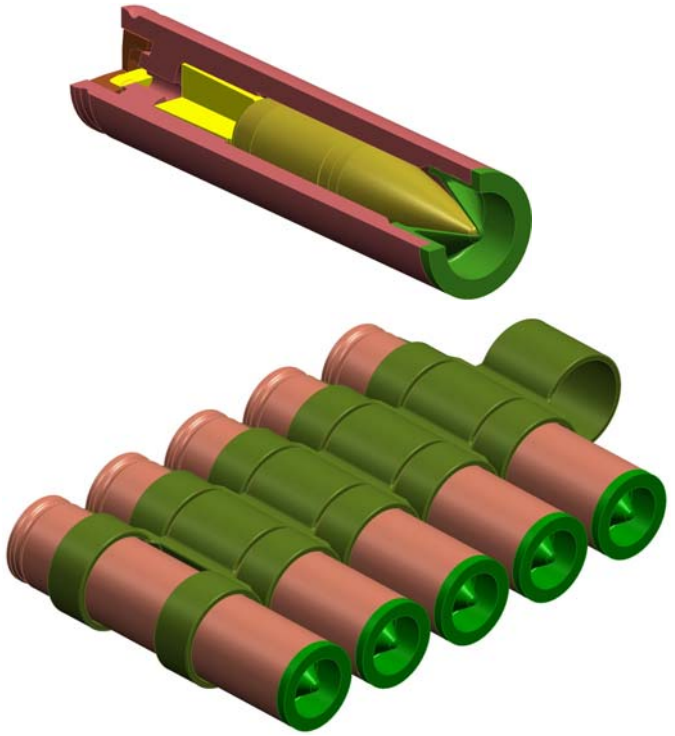
Ammunition Features

Cased Configuration



- Conventional technology in telescoped configuration
- Significant weight reduction
- Lower Risk

Caseless Configuration



- High Ignition Temperature Propellant Technology
- Higher Weight Reduction
- Higher Risk

Summary

- System design meets all program requirements and exceeds many
  - Exceeds weight goals
  - Improves lethality
  - Improves logistics
  - Improves ergonomics
  - Maintains comparable production costs
- Maintaining parallel, synergistic Cased Telescoped and Caseless development plan
  - Emphasizes commonality
  - Reduces program risk
- Scalable design provides significant modularity and commonality
- Cohesive Government/industry team ensures success in development, user acceptance, and production

Comments/Questions?