COMBUSTIBLE CASED 105 MM AMMUNITION DEVELOPMENT

IN SUPPORT OF THE ARMY TRANSFORMATION

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SUBJECT AREAS OF DEVELOPMENT

- **CCC DEVELOPMENT FOR 105MM TANK AMMUNITION FOR THE MGS IN SUPPORT OF THE IBCT.**

- **CCC DEVELOPMENT FOR 105MM CTA AMMUNITION FOR MRAAS IN SUPPORT OF THE FCS.**

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Advantages of CCC For 105mm Conventional Tank Ammunition

- **Use of a combustible casing over a metal casing can reduce the total weight of the round by as much as thirteen (13) percent, depending on the round.**
- **Increased muzzle velocities can be achieved when using a combustible cartridge case due to the energy contribution of the CCC during the ballistic cycle.**
- **Wear reducing additives can be integrated into the CCC formulation to reduce barrel wear and allow the use of more energetic propellants.**
- **Eliminates case jamming in the chamber as the casing is consumed during firing. This allows for higher chamber pressures, hence increased muzzle velocities.**
- **Incorporation of CCC design improvements.**

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Objective

- **Development of a 105mm CCC for conventional tank ammunition in support of the IBCT. Demonstrate the feasibility and advantages of the CCC for 105mm tank ammunition.**

- **Effort will be a systems approach for development of CCC, CCC/stub base interface and CCC/projectile interface.**

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Design Philosophy for Conventional 105mm CCC

- **Use of proven design features of 120mm CCC for tank ammunition.**
- **Design compatible with existing manufacturing techniques.**
- **Design for performance, quality and competitive costs.**
- **One or two designs of CCC suitable for the whole 105mm ammunition spectrum.**
- **Innovative approach for the interfaces with the projectile and the stub base.**
- **Autoloader compatible.**

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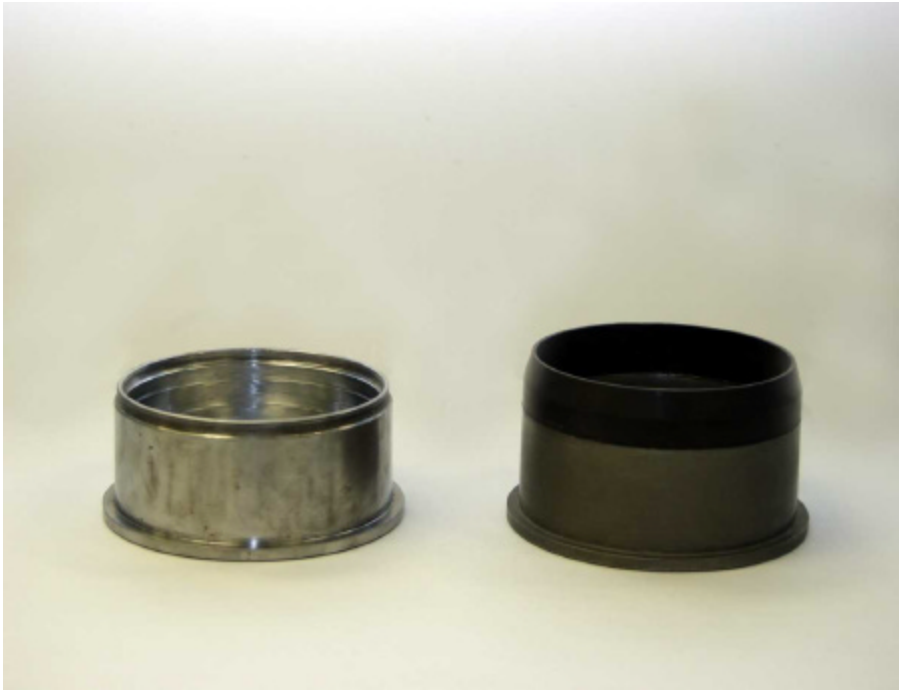
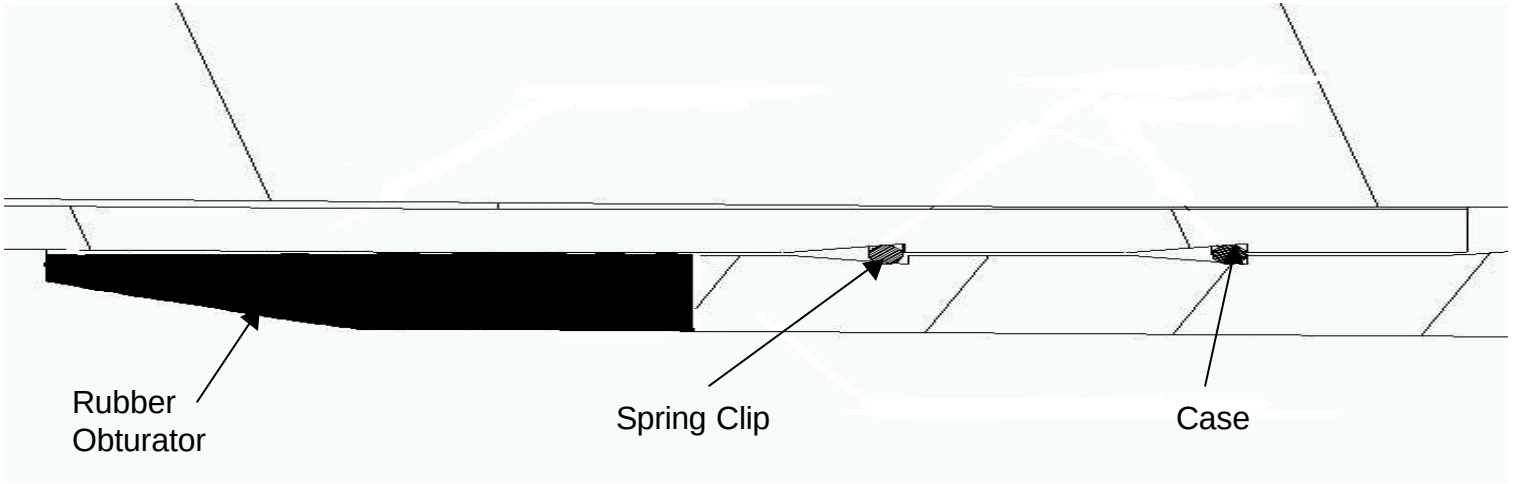
Stub Base

- **Breech sealing provided by a rubber obturator.**
- **Easily producible with the current technology.**
- **Use of steels, heat treatment and coating methods proven by the 120mm Tank Ammunition Family.**



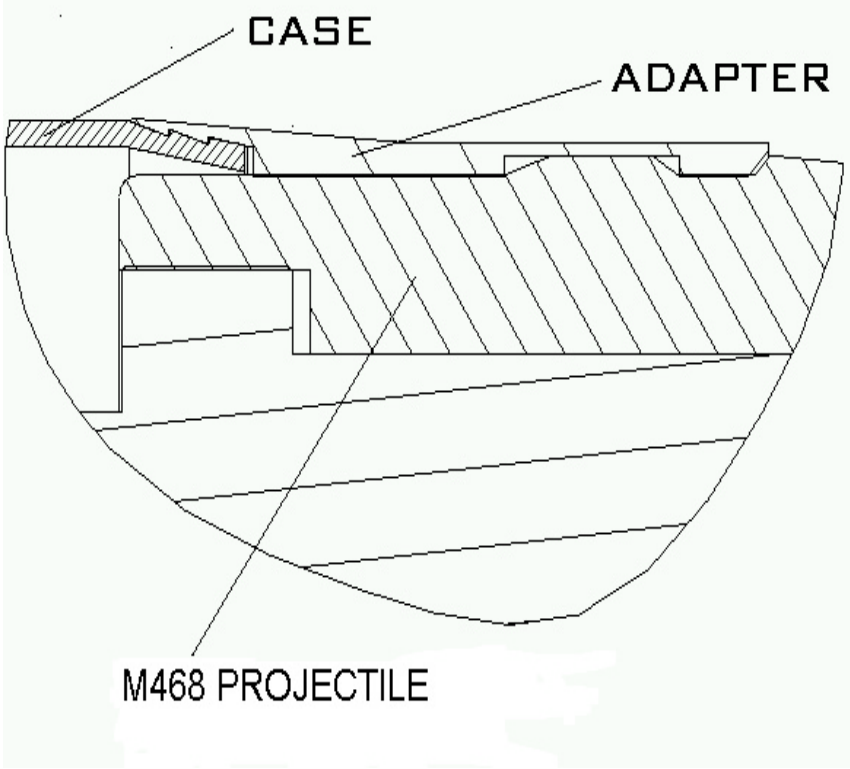
CCC/Stub Base Interface Design

- **Strong self-aligning joint design with enough flexibility to allow for shock loads.**
- **Limited axial movement.**
- **Ease of assembly.**
- **Use of mechanical interlock and flexible adhesive for “rugged” design.**



CCC/Projectile Interface Design

- **Prototype design uses machined polymer adapter.**
- **Strong joint capable of surviving shocks due to autoloader, vehicular movement, ramming, and rough handling.**
- **Possibility of retrofitting existing rounds (ex. M393 A2) with a CCC without modifications to the projectile.**
- **Producible through injection molding of moderately priced polymers.**
- **Does not interfere with the projectile's ballistic performance.**



CCC Fitted M467 Practice Round

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Testing Completed To Date

- **Pull Test of CCC and Stub Base interface design successful. Pull force of 2021 lbf achieved.**
- **Completed Sudden Stop (Load Impact) Test. Simulates ram velocity of MGS autoloader and verified CCC/Stub Base joint configuration. Ram velocities in excess of 6.6 ft/s achieved.**
- **Pendulum Test was conducted as indicator of the "overall robustness" of the round configuration. 105mm M467 Practice Round assembled with CCC was suspended from a radius arm and swung into a solid stop with the point of impact the C.G. of round. Survived sequential impacts without any visible damage.**

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Near-Term Actions to be Completed

- **Cycle Test Rounds in Mobile Gun System (MGS) autoloader to demonstrate compatibility.**
- **Assembly of Test Rounds (Canister or HEP) with CCC for live fire testing by ARDEC.**
- **Continue sequential rough handling testing to further verify "robustness" of design.**

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105mm Cased Telescoped Ammunition Combustible Cartridge Casing for Multi-Role Armament and Ammunition Suite

Objective: Develop combustible cartridge case solution for the 105m in support of TACOM/ARDEC.

Challenge: Potential for weapon jamming exists with independent end caps/seals in the Post-Fired configuration

ARDEC/Armtec CCC concept is to use an internal structure to connect metallic/elastomer end seals.

Design Advantages:

- **Early ballistic cycle sealing**
- **LAP friendly assembly**
- **Better dimensional control**
- **Internal volume maximized**
- **Metal to Metal load path**

105mm CTA CCC for MRAAS

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105mm CTA Round Components

Post Fired Configuration

105mm CTA CCC for MRAAS

ARDEC/Armtec Team Status/Accomplishments to Date:

- **Team will coordinate efforts through CRADA, design reviews and continued meetings.**
- **Completed design of CCC molding tooling. Tooling is fabricated and combustible cartridge case bodies molded.**
- **Completed design/fabrication of end caps/seals and internal structure.**
- **Plan is to assemble complete test rounds for firing in the May 02 time frame.**

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