120 MM XM325 OBJECTIVE NON-LINE-OF-SIGHT MORTAR CANNON TECHNOLOGY (ON-MT) PROGRAM

BRIEFING FOR THE GUNS & MISSILES SYMPOSIUM - 23 APRIL 2007

Providing America Advanced Armaments for Peace and War

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ON-MT MORTAR CANNON
OVERVIEW

• BACKGROUND: IN 2001, ARDEC TECHNOLOGY BASE DEVELOPED A
  PROGRAM TO DEMONSTRATE KEY 120 MM BREECH LOADED MORTAR
  TECHNOLOGIES, INCLUDING A CANNON, AUTOLOADER, FIRE CONTROL AND
  THE INTEGRATION OF THESE ITEMS. FOCUS HERE IS CANNON.

• SEPARATE BRIEFING ON INTEGRATION
  – SYSTEM INTEGRATION SESSION, THOMAS DEVOE

• GOALS & OBJECTIVES: DEVELOP A LIGHTWEIGHT 120MM MORTAR CANNON
  FOR USE ON A 20 TON VEHICLE
  – WEIGHT: < 800 POUNDS
  – BREECH LOADED
  – RETAIN MORTAR ROUND AT ALL ELEVATIONS
  – HIGH RATE OF FIRE
  – NO ALTERATION TO EXISTING AMMUNITION
  – NO EXPENDABLE DEVICES (STUBCASE, CLIPS, ETC)
  – IGNITION TRAIN RELIABLE & SAFE
ON-MT MORTAR CANNON FEATURES

• CANNON DESIGN FEATURES:
  – SCREW BLOCK BREECH – LIGHTWEIGHT + RELIABLE
  – MORTAR TUBE THICKER & LONGER THAN 120 MM M121
    • HIGH RATE OF SUSTAINED FIRE (SIMILAR TO DROP FIRE)
    • LONGER TRAVEL FOR INCREASED RANGE
    • INCREASED STIFFNESS FOR DIRECT FIRE
  – ROUND RETENTION FEATURES
  – CARTRIDGE FALL BACK FEATURES
  – UNIQUE IGNITION SUB-SYSTEM
  – COUNTER RECOIL BREECH OPENING VIA CAM PLATE
• CANNON RECEIVED TYPE DESIGNATION XM325 IN 2004
ON-MT MORTAR CANNON
FEATURES

CAM PLATE & ELECTRIC ACTUATOR

SCREW BLOCK BREECH

DEBANGE OBTURATOR (SPINDLE NOT SHOWN)
ON-MT MORTAR CANNON
MORTAR BOMB RETENTION SHOE

SPECIAL RETENTION SHOE & SOLENOID HOLDS THE BOMB IN POSITION
ON-MT MORTAR CANNON
VACUUM - BOMB POSITIONING DEVICES

CUSTOM DESIGN
VACUUM VALVE ASSEMBLY

MECHANICAL FALL BACK LATCH

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ON-MT MORTAR CANNON
IGNITION SYSTEM

FIRING PIN
ROTATES TO
FIRE POSITION
AFTER BREECH
CLOSURE

RELIABLE
SPINDLE &
DEGANGE
OBTURATOR

CAM PLATE
COUNTER RECOIL
BREECH OPENING

Solenoid
ACTUATES
FIRING PIN

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FINITE ELEMENT ANALYSIS OF DEBANGE SEAL
CONDUCTED TO ASSESS:
• ROBUST OPERATION WITH CLOSURE PRE-LOAD
• MIN & MAX MATERIAL CONDITIONS
• EFFECTS OF THERMAL EXPANSION (RATE-OF-FIRE)
• ADEQUATE SEAL ACROSS ALL ZONES
ON-MT MORTAR CANNON
COMPONENT ANALYSIS - MECHANISM

- Extensive testing of breech mechanism was conducted to assess reliability & function:
  - All elevations
  - Worn springs
  - Poor lubrication
  - Temperature extremes
ON-MT MORTAR CANNON DEVELOPMENT SCHEDULE

- Design – Benét Labs October 2003 - May 2004
- Fabrication – Watervliet Arsenal & Benét Labs – May – August 2004
- Developmental Testing (Benét Firing Facility – Malta, NY):
  - Firing Test: 08 September - 18 November 2004
  - Total Shots Fired: 192
ON-MT MORTAR CANNON
DEVELOPMENT TESTING

XM325 CANNON S/N 1 IN PROOF FIRING
WRIGHT MALTA TEST STATION
SEPTEMBER 2004
**ON-MT MORTAR CANNON**

**DEVELOPMENT SCHEDULE (cont’d)**

- Systems Integration & Autoloader Tests (Picatinny Arsenal Firing Range)
  - Cannon shipped 02 March 05
  - Integration Complete 15 May 05
  - Firing Test 16 May – 14 June 2005
  - Total Shots Fired: 15 (including Proof Rounds)
- Elevation and High Rate-Of-Fire Testing – Aberdeen Test Center
  - Firing Test: July – August 2005
  - Total Shots Fired: 174 rounds
  - Demonstrated 12 round per minute
ON-MT MORTAR CANNON
SYSTEM INTEGRATION & TESTING

SEPARATE BRIEFING COVERING THE OTHER SUBSYSTEMS AND SYSTEM INTEGRATION – SYSTEM INTEGRATION SESSION

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ON-MT MORTAR CANNON
SUMMARY

• XM325 CANNON:
  – ALLOWS LOADING OF ALL CURRENT 120 MM MORTAR AMMO WITHOUT MODIFICATION
  – PROVIDES ROUND POSITIONING AND FALLBACK PREVENTION
  – HAS A SAFE, RELIABLE ROBUST IGNITION SYSTEM
  – FEATURES A CAM PLATE FOR COUNTER RECOIL OPENING
  – HAS BEEN TESTED WITH ELECTRICAL ACTUATOR
  – HAS BEEN DESIGNED AND TESTED FOR HIGH RATES OF FIRE
XM325 MORTAR CANNON AND THE ON-MT SYSTEM HAVE BEEN DEMONSTRATED TO MEET ALL FUTURE COMBAT SYSTEM REQUIREMENTS FOR A NON-LINE-OF-SIGHT MORTAR!!

THE XM325 CANNON HAS BEEN SELECTED BY BAE AND FCS LEAD SYSTEM INTEGRATOR TO BE THE PRIMARY WEAPON OF THE NLOS-M MORTAR VEHICLE!!