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120mm XM360 Primary Weapon Assembly
XM1202 Mounted Combat System (MCS) of Future Combat System (FCS)
Briefing to NDIA Joint Armaments Symposium
18 May 2010

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Three (3) of the systems have large caliber main guns:

NLOS - M – Non Line Of Sight Mortar Carrier

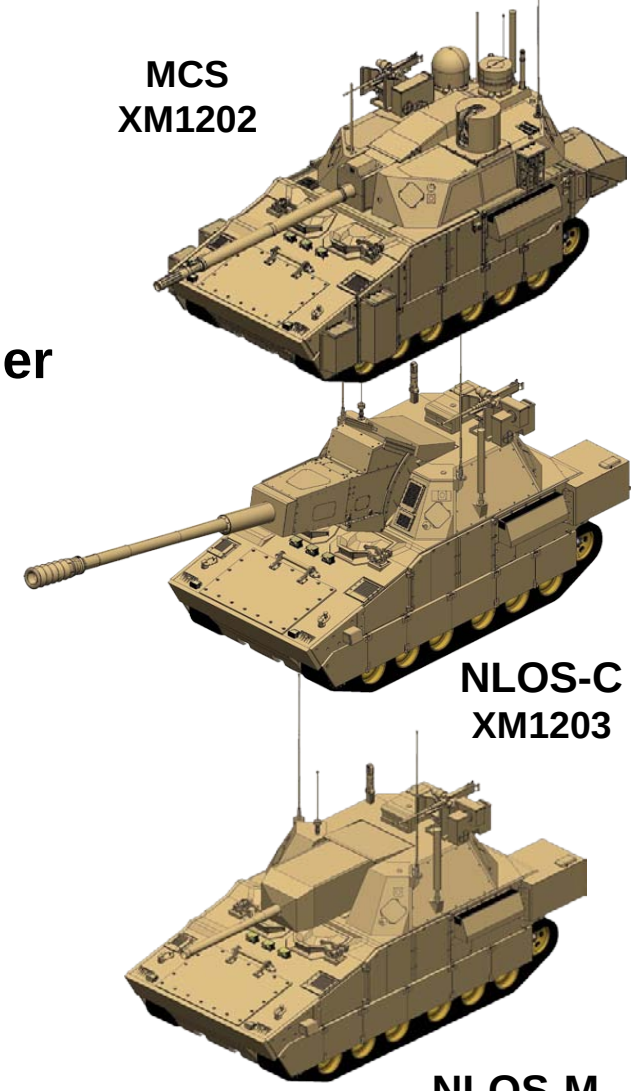
- 120 MM Mortar

NLOS – C – Non line of sight cannon

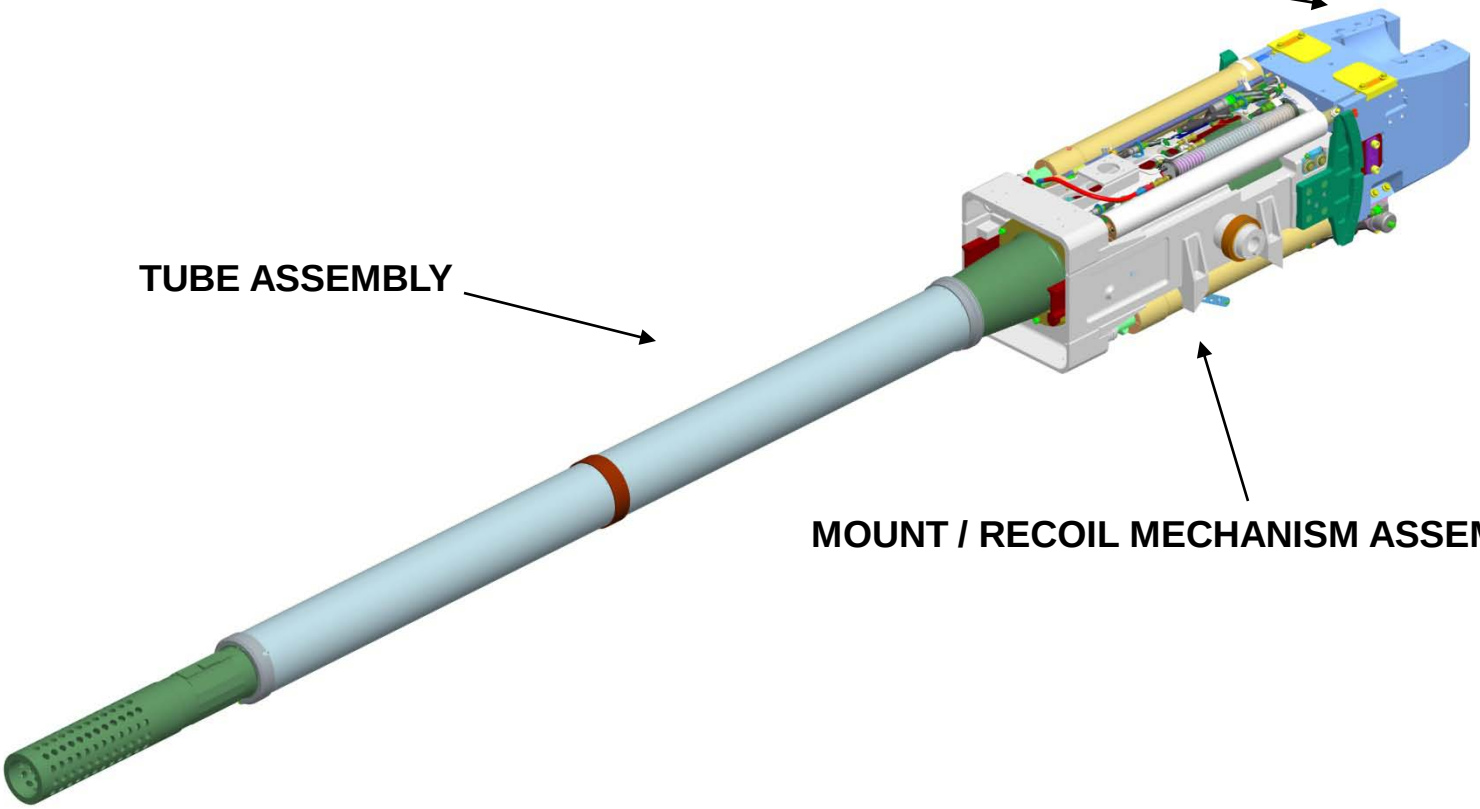
- 155 MM Gun

MCS - Mounted Combat System

– 120 MM Gun



120mm XM360 Gun Assembly

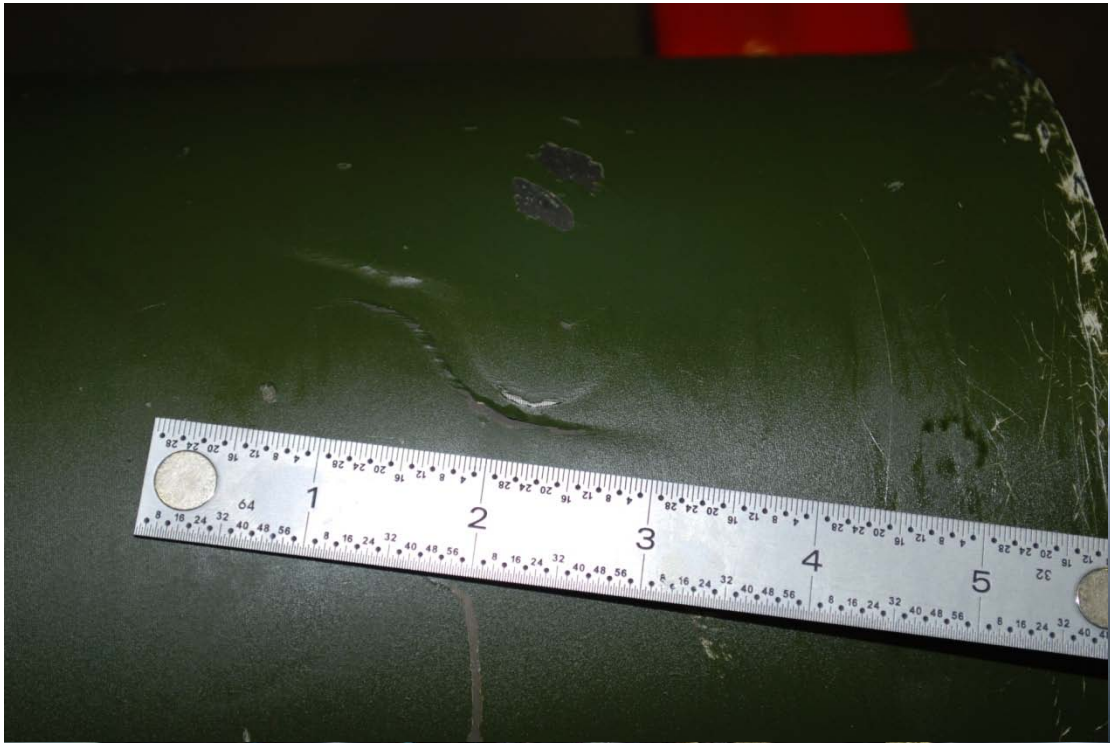


XM360 Primary Weapon Assembly Accomplishments

- Completed delivery of 3 gun assemblies
- Completed integration of 1 Gun Assembly into XM1202 Firing Platform Turret
- Completed two (2) Tube Pre-Fatigue Firing Tests
- Completed two (2) Tube Laboratory Hydraulic Fatigue Tests
- Completed one (1) Breech Laboratory Hydraulic Fatigue Tests
- Completed Durability (simulated damage) Test of Composite Tube Section
- Completed one (1) Gun Mount Durability Firing Tests
- Completed phase 1 of Extreme Temperature Firing Tests
- Completed Scavenger Headwind Testing
- Completed Bore Clear Camera Testing
- Completed Breech Actuator/Mechanism Durability Cycling test
- Tube Frequency Response Testing
- Supported XM360 on XM1202 Firing Platform
  - Integration
  - Shock – Vibration – Road Simulator
  - Firing Tests

XM360 Primary Weapon Assembly Tube Fatigue Test Results

- Two (2) Tubes Completed Fatigue Tests
  - Pre-fatigue Firing
  - Hydraulic Cycling
- Tested 5 critical sections
  - Chamber
  - Origin
  - Composite Wrap (2)
  - Muzzle (MRS)
- Materials Properties taken of tube sections after failure



RESULTS – XM360 Tube Met Life Requirements

XM360 Primary Weapon Assembly Tube Fatigue Test Results

- One (1) Breech Test in process (>50% complete)
  - Hydraulic Lab Cycling

RESULTS – XM360 Breech on track to meet Fatigue Life Requirements

- Gun Tube Composite Wrap TRL-6 Testing (Mar. 2006 to Dec. 2006) Firing Damage applied to a Composite Tube Section – Non-Autofrettaged Zone
  - Gun Fired 250 Rounds (198-M829A3, 37-M831A1, 5-M865)
  - Applied 10,000 lab Fatigue cycles to Muzzle end section. No fatigue damage noted.
  - Firing Damage applied to tube @ APG (7.62mm armor piercing round) – “Glancing Blow”
  - Fatigued Tested 200 cycles – No Fatigue damage noted.

RESULTS – XM360 Composite Damage not a significant hazard

XM360 Primary Weapon Assembly Extreme Temperature Testing

- XM360 Installed in Aberdeen Test Center Climate Chamber:
  - Completed Hot, Cold Test Firing
  - Completed extreme elevation tests

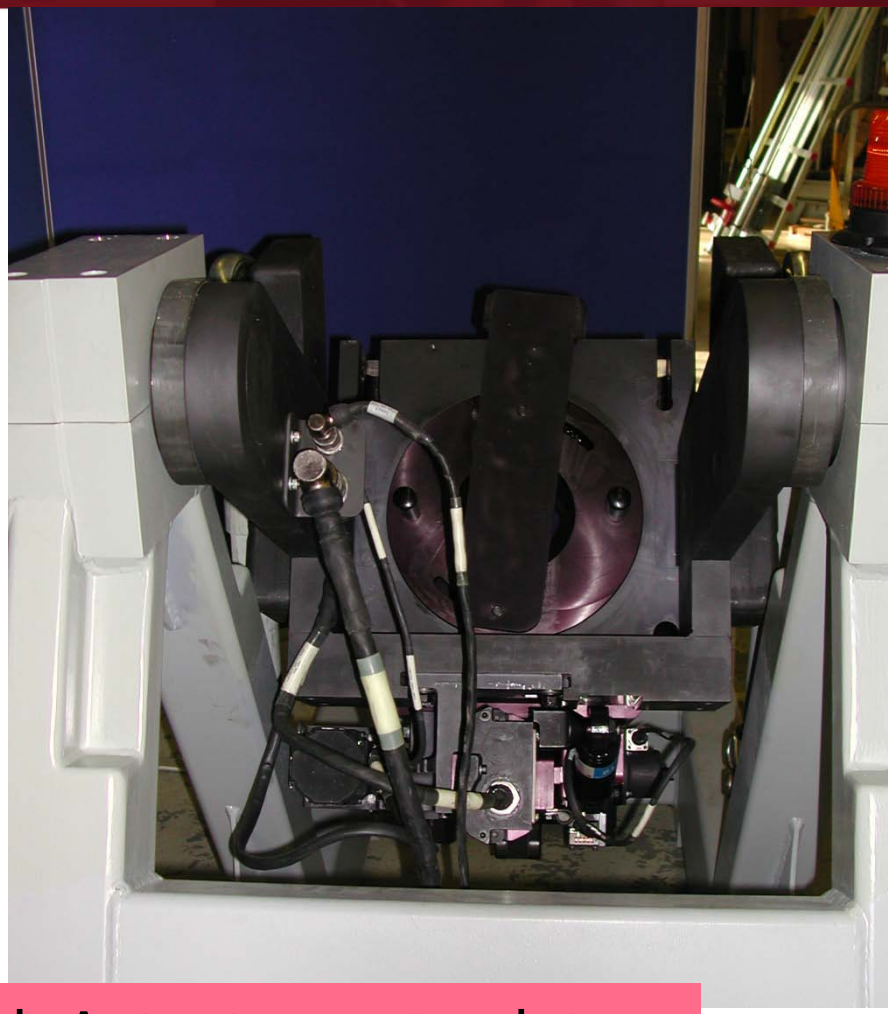
RESULTS – XM360 met Climatic Extreme Requirements

XM360 Primary Weapon Assembly Mount Durability Test

- XM360 Gun Mount fixtured in Impact Simulator at Rock Island Arsenal and cycled 20 times prior to firing tests to check function and performance.

RESULTS – XM360 Mount Performance met Requirements

XM360 Primary Weapon Assembly Breech Mechanism Cycling Test



- Breech Actuator & Mechanism fixtured in test stand & actuator cycled at various elevations
- Completed 18,557 cycles without stoppage

RESULTS – XM360 Breech Actuator on track to meet Reliability Requirements

XM360 Primary Weapon Assembly Breech Mechanism Test Results

- During Firing Tests – some mechanism housing structural failures occurred
- Subsequent Investigation found unique firing loads being transferred from tube into mechanism & exciting the housing
- Analytical models were developed to duplicate the event and used to redesign the housing
- FEA modal resonant freq – 400Hz Strain measurements at ATC – 356Hz

RESULTS – XM360 Mech Housing redesigned & tested - strain gages verified lower stresses

- ARDEC/Benet Labs partnered closely with vehicle developer – GDLS – and ammunition developers to ensure early:
  - Integration across sub-systems & interfaces
  - Performance of all subsystems optimized

RESULTS – XM360 Gun Assembly Integrated with gun drives very early in design process:
•Software tuned in early
•Interfaces Optimized

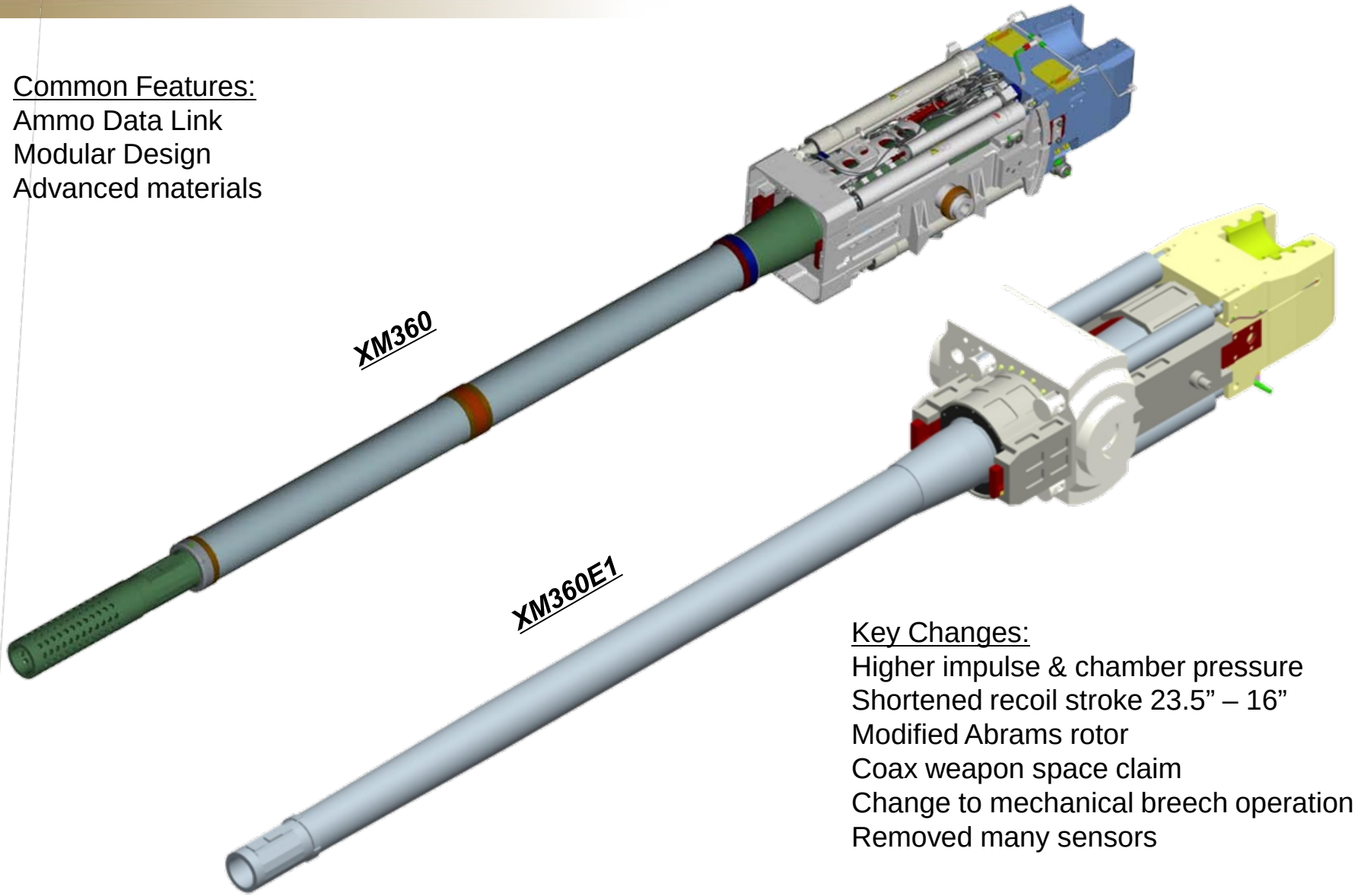
XM360 Primary Weapon Assembly System Level Testing

- XM360 Mount in XM1202 Turret with autoloader, active gun & turret drives (video)

- Original FCS Requirements:
  - Provide the firepower of the M256 cannon on the M1A2 in a light weight, compact package - fire all current & developmental 120mm ammunition
  - Provide reduced impulse to a 20 ton class vehicle (muzzle brake) – provide remote actuation and operation (600vdc electric supplied)
- NEW REQUIREMENTS:
  - Provide increased firepower in a light weight, compact package - fire all current & developmental & next generation 120mm ammunition
  - Provide capability of firing on M1 series Tank with hatches open (no muzzle brake)
  - Provide mechanical breech operation

XM360E1 Concept Development

Common Features:
Ammo Data Link
Modular Design
Advanced materials



Key Changes:
Higher impulse & chamber pressure
Shortened recoil stroke 23.5” – 16”
Modified Abrams rotor
Coax weapon space claim
Change to mechanical breech operation
Removed many sensors

Summary

- From 2004 – 2009, combined results of Government sponsored Tech Base Work and XM360 PWA SDD Program a total of 1,952 rounds fired (1,182 rounds SDD Program)
- Four (4) complete design iterations were completed
  - Vehicle Dynamic Response Demonstrator (joint PM MAS – GDLS – Army Tech Base)
  - Advanced Technology Demonstrator (Army Tech Base)
  - Lightweight Armament Enhancement Program (Army Tech Base)
  - FCS Primary Weapon Assembly (GDLS CRADA)
- Most key requirements were verified by test:
  - Weight
  - Accuracy
  - Ammunition Compatibility
  - Tube Fatigue Life
  - Breech Fatigue Life
  - Integration in lightweight turret
- Post FCS – the XM360 is being re-developed into the XM360E1 variant for the next M1 Abrams Tank upgrade – Abrams Evolutionary Design (AED)

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