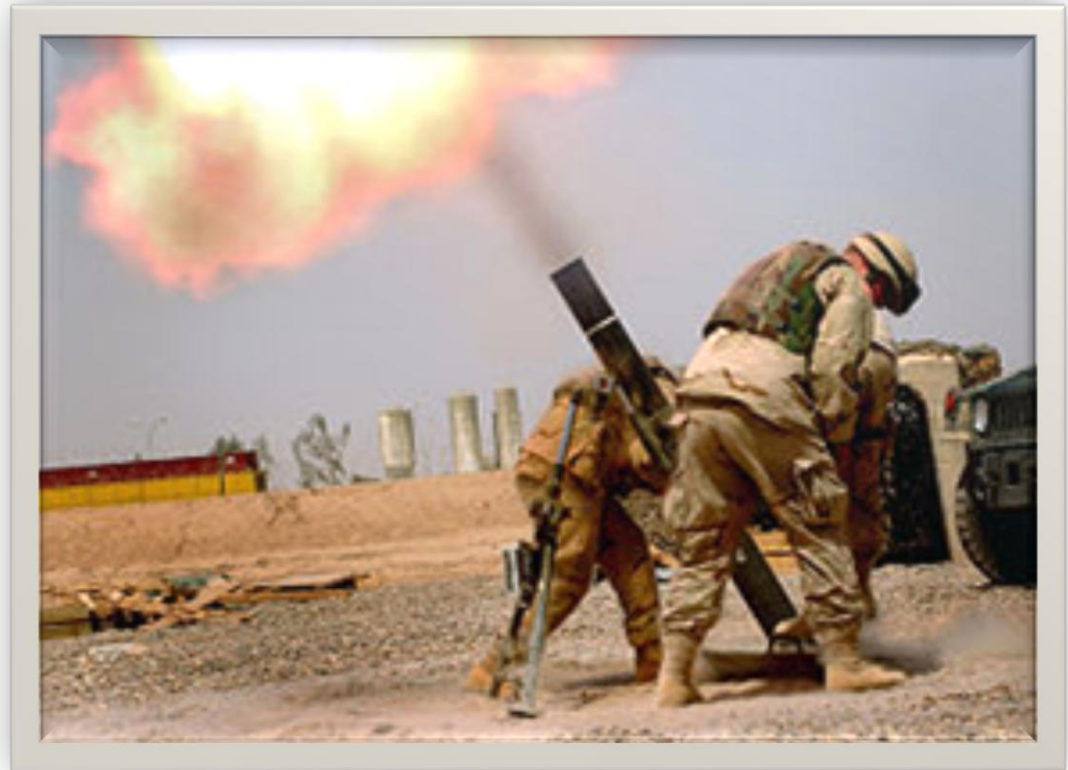


## Leveraging Proven Systems to Develop a Guided Mortar for APMI



- **Overview of Accelerated Precision Mortar Initiative (APMI) Program**
- **Mortar Guidance Kit (MGK) – ATK’s Solution to APMI**
- **Leveraging Proven Systems – Design Methodology**
- **Development Timeline**
- **Summary of Test Results**
- **Current APMI Program Status**



# Current Threat Requires Precision Capability



- Seeks cover in reinforced structures and vehicles
- Executes widely dispersed, often well-equipped, small unit operations
- Seeks sanctuary in urban and complex terrain
- Intentionally uses civilians as obstacles
- Exploits terrain and geography
- Capitalizes on media's response to U.S. military power.



**Logistics challenges and the need to avoid collateral damage make it difficult, if not impossible, to provide indirect fire support using conventional munitions**



# Accelerated Precision Mortar Initiative (APMI)



## APMI responds to an Operational Need Statement (ONS) from troops deployed in Afghanistan

- Requested a responsive, all-weather precision 120mm mortar capability
- Need precision capability to
  - Minimize collateral damage
  - Respond to smaller, fleeting targets
  - Reduce risk to soldiers by providing first round effects, and
  - Reduce logistics burden

## APMI is a complete precision system

- 120mm XM395 precision munition
- Fuze setter and fire control software



**APMI provides affordable precision capability for the battalion commander**

# APMI – A System of Systems



**XM395, 120mm HE Cartridge**



**UMR *Four* Systems**



**M32  
Lightweight  
Handheld  
Mortar Ballistic  
Computer  
Software v4.0**

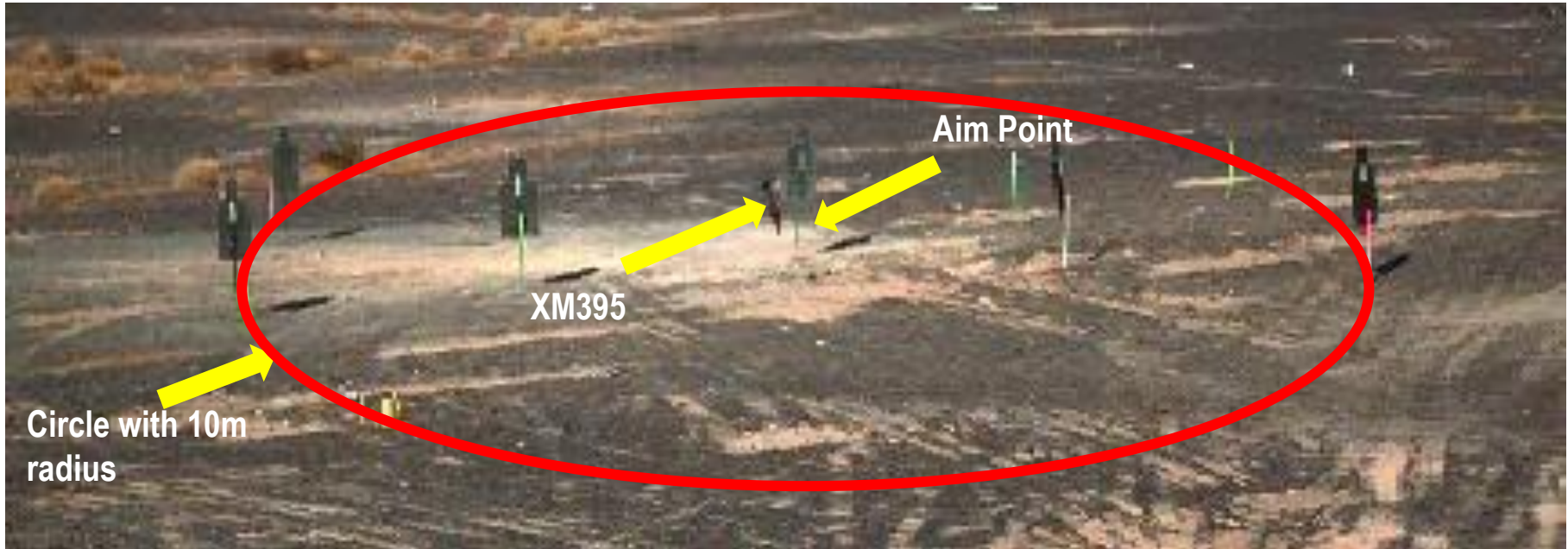


**Mortar Fire Control System  
M150/M151 Dismounted  
Software v6.1**



**Precision Lightweight Universal  
Mortar Setter System  
(XM701 PLUMSS)**

# XM395 Required Capabilities



- **Accuracy:** 10m Circular Error Probable (CEP) (Threshold); 5m (Objective)
- **Lethality:** Similar kinetic effects of current munitions
- **Maximum Range:** 6.2km (Threshold); 7.0km (Objective)
- **Guidance:** GPS Selective Availability Anti-Spoofing Module (SAASM)
- **Compatibility:** US 120mm Smooth Bore Mortar System

**XM395 meets or exceeds all threshold requirements**



# XM395 – JDAM for the Infantry Soldier

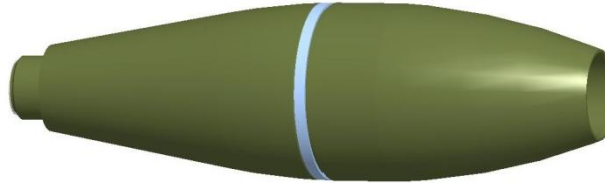


**Folding Fin Tail**



- Proven folding fin design induces body spin
- Standard M1020 igniter
- Proven high-hat M47 charge increments

**M934 Body**



- Standard M934 body
- Obturating ring for pressure seal
- Comp B explosive fill
- Modified for deep intrusion fuze

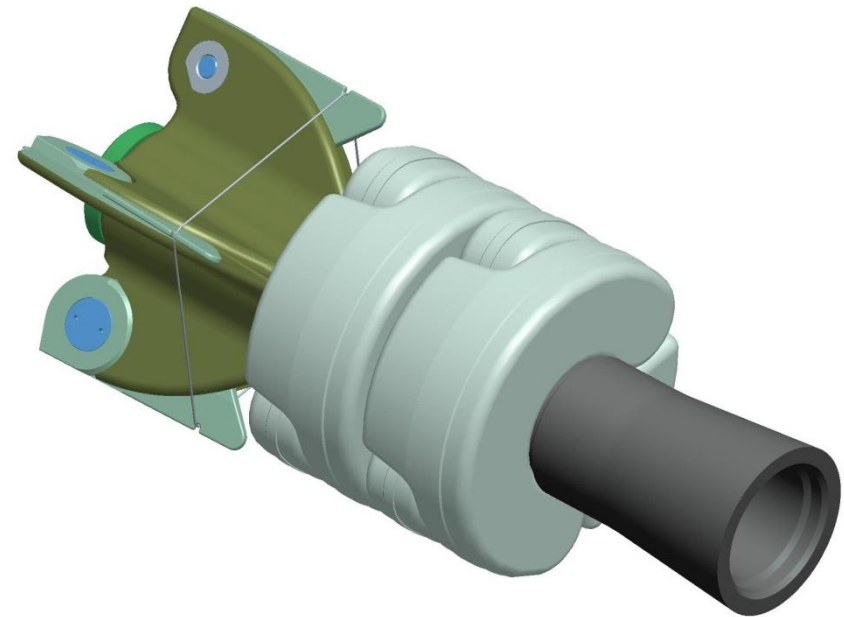
**Guidance Fuze Assembly**



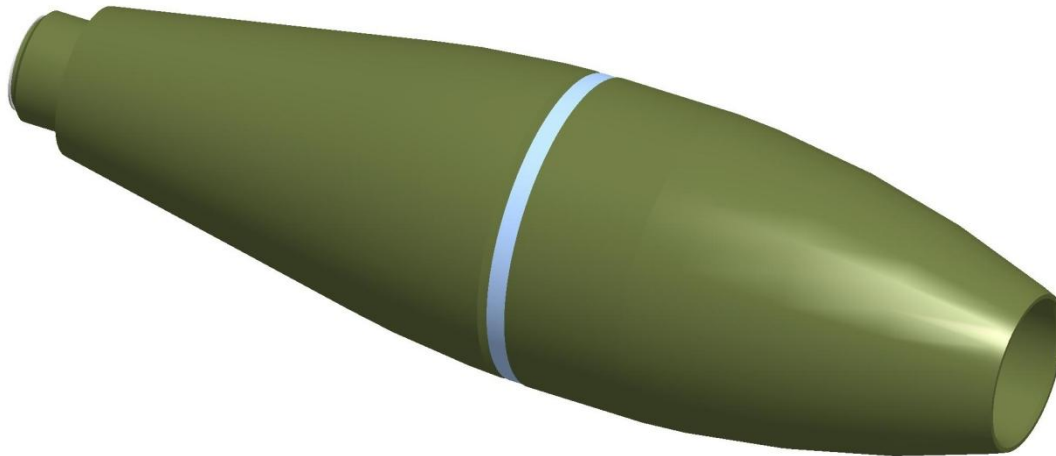
- PGK nose assembly with minor modifications
- Fixed canard assembly
- GPS receiver
- Safe & Arm
- PGK booster assembly
- Canard cover Enhanced Portable Inductive Artillery Fuze Setter (EPIAFS) interface

**Direct application of ATK's PGK guidance fuze reduces cost, risk, and schedule**

- Folding fin assembly developed under Precision Guidance Mortar Munition (PGMM) program
- Gun-hardened design proven successful in numerous PGMM shots
- Modified for MGK:
  - Shortened fin span
  - Optimized hub cant to improve spin rates
- ***Benefits of Leveraging:***
  - ***Proven design concept***
  - ***High confidence of passing qualification testing, such that separate fin/tail assembly testing wasn't necessary***

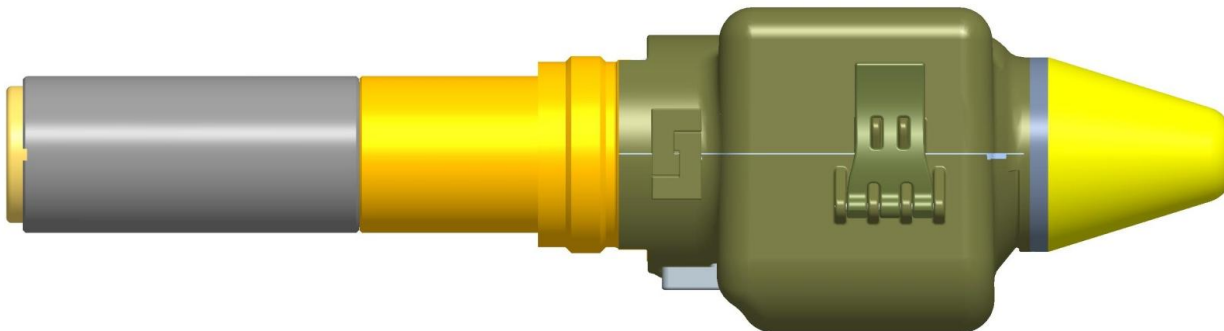




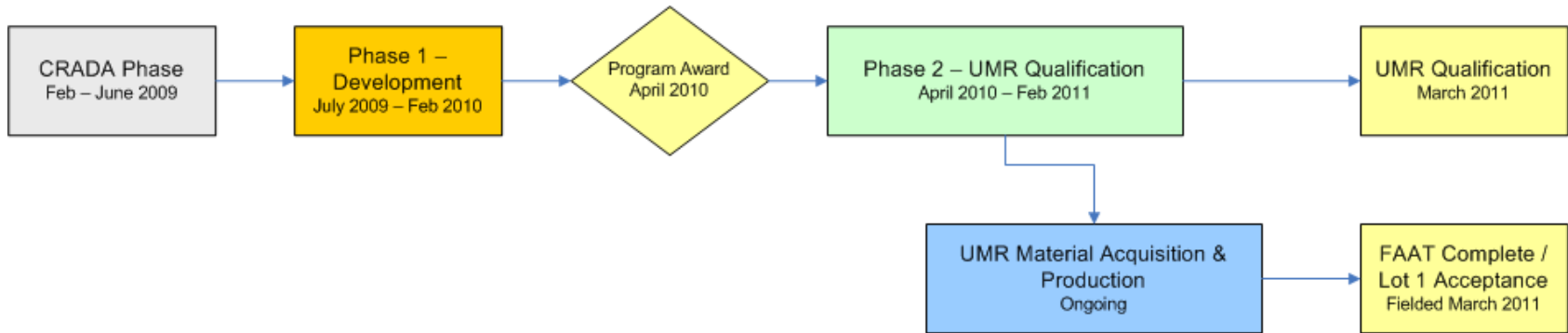


- Modified for MGK – Explosive content machined away to create deep intrusion fuze well
- ***Benefits of Leveraging:***
  - ***Utilizes current M934 loaded mortar bodies***
  - ***Only requires simple modification to enable interface with MGK fuze***
  - ***Maintains lethality of existing M934 cartridge***

- Fuze assembly adapted from Precision Guidance Kit (PGK), which is designed to guide a 155mm spin-stabilized projectile
- Modified for MGK:
  - Added thermal battery for power management
  - Integrated common mortar S&A to accommodate lower spin rates
  - Modified fuze thread interface
  - Optimized electronics for operating in a mortar environment
- **Benefits of Leveraging:**
  - **Utilize proven guidance, navigation, and control system**
  - **System proven on PGK under more severe artillery launch environment**
  - **Commonality of parts allows for purchasing efficiencies**



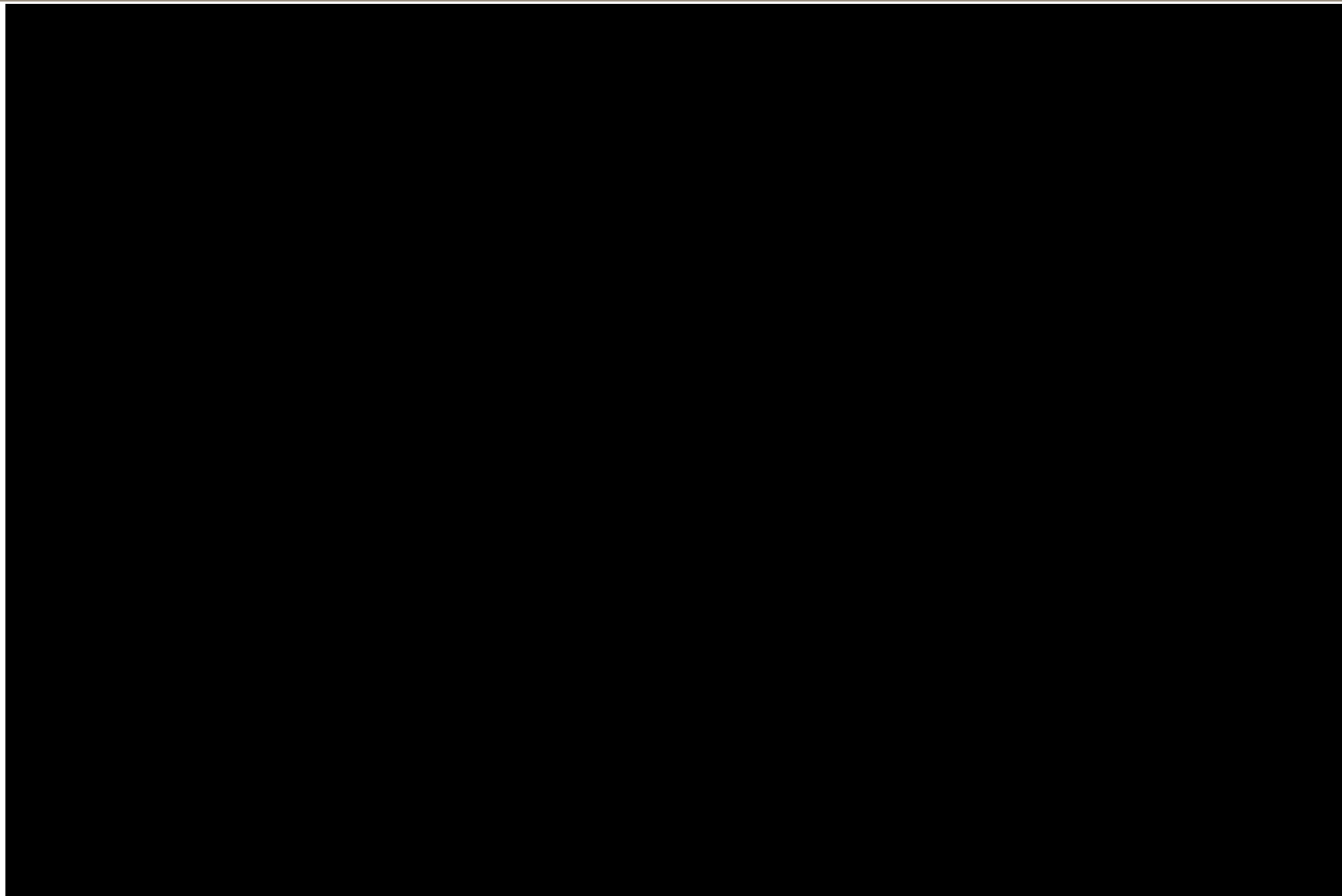
# Reduced Development Timeline



- APMI is part of an Urgent Material Release (UMR) due to the critical operational need
- ATK was selected as winner of competitive demonstration in April 2010
- Completed UMR system qualification testing in February 2011
- UMR Qualification received and Lot 1 fielded to theater in March 2011
- ***Less than 1 year from Qualification Program Award to first unit fielded***

**Use of existing proven systems allowed for rapid development to meet APMI urgent need request**





# Qualification Testing Summary



## Qualification Objectives

- **Demonstrate performance to CEP and reliability requirements** in operational environments such as temperature extremes, blowing rain, sand and dust, thermal shock, low altitude, high elevation
- **Demonstrate no safety issues** with cartridge after exposure to sequential environments representing extreme storage, transportation and handling; Electromagnetic Environmental Effects (E3) and other safety-related exposures; fuze safety – jolt, jumble, thermal shock, temperature and humidity cycling, vibration



Requirement	CEP $\leq 10$ m	Reliability $\geq 90\%$
~60 Rounds Fired for Performance Scoring		
~150 Rounds Fired Overall in Qualification – <b>ALL SAFE</b>		

**APMI meets or exceeds all threshold requirements**

# XM395 Program Status



- ATK under contract for full UMR production quantity– February 2011
- Urgent Material Release of APMI approved – March 2011
- First lot of production hardware shipped to Afghanistan – March 2011
- Production builds continue at ATK facilities





- APMI addresses an Urgent Material Release to provide the Army war fighter with a precision mortar capability
- ATK was able to respond rapidly to this request by integrating proven systems to shorten the lifecycle to field deployment
- Keys to Rapid Development and Deployment
  - Leveraging success of other programs by implementing proven design concepts
  - Optimizing existing systems to be more effective in a new application
- XM395 is now in production and in the field
- APMI gives the battalion commander needed precision capability
  - Effective attack of fleeting targets with limited collateral damage and first round effects
  - Fewer rounds to complete mission with significantly reduced logistics burden



**APMI will change the way infantry units fight**

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