Flight Controlled Mortar (FCMortar) for Precision Urban Mortar Attack (PUMA)

NDIA Fuze Conference
19-21 May 2009

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Flight Controlled Mortar
FCMortar

- What is FCMortar?
  - Guidance Kit for 81mm HE ammunition
    - Adds precision capability to M821A1/A2 & M889A1/A2 Family of Ammunition
    - Upgrade performed at Depot level
    - Core weapon system for Precision Urban Mortar Attack (PUMA)
- Why FCMortar?
  - 81mm mortar systems currently area fire weapons
    - Can't provide fire support in confined areas/difficult access terrain
    - No precision capability
  - Brings light-weight precision capability to the company/platoon level
    - Utilized within USMC Enhanced Company Operations (ECO) framework
    - Timely, Organic Fire Support

Does not replace existing 81mm Mortar Inventory

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Flight Controlled Mortar
"Difficult Terrain"

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Engagements in New Terrain Types Hampered by Topology

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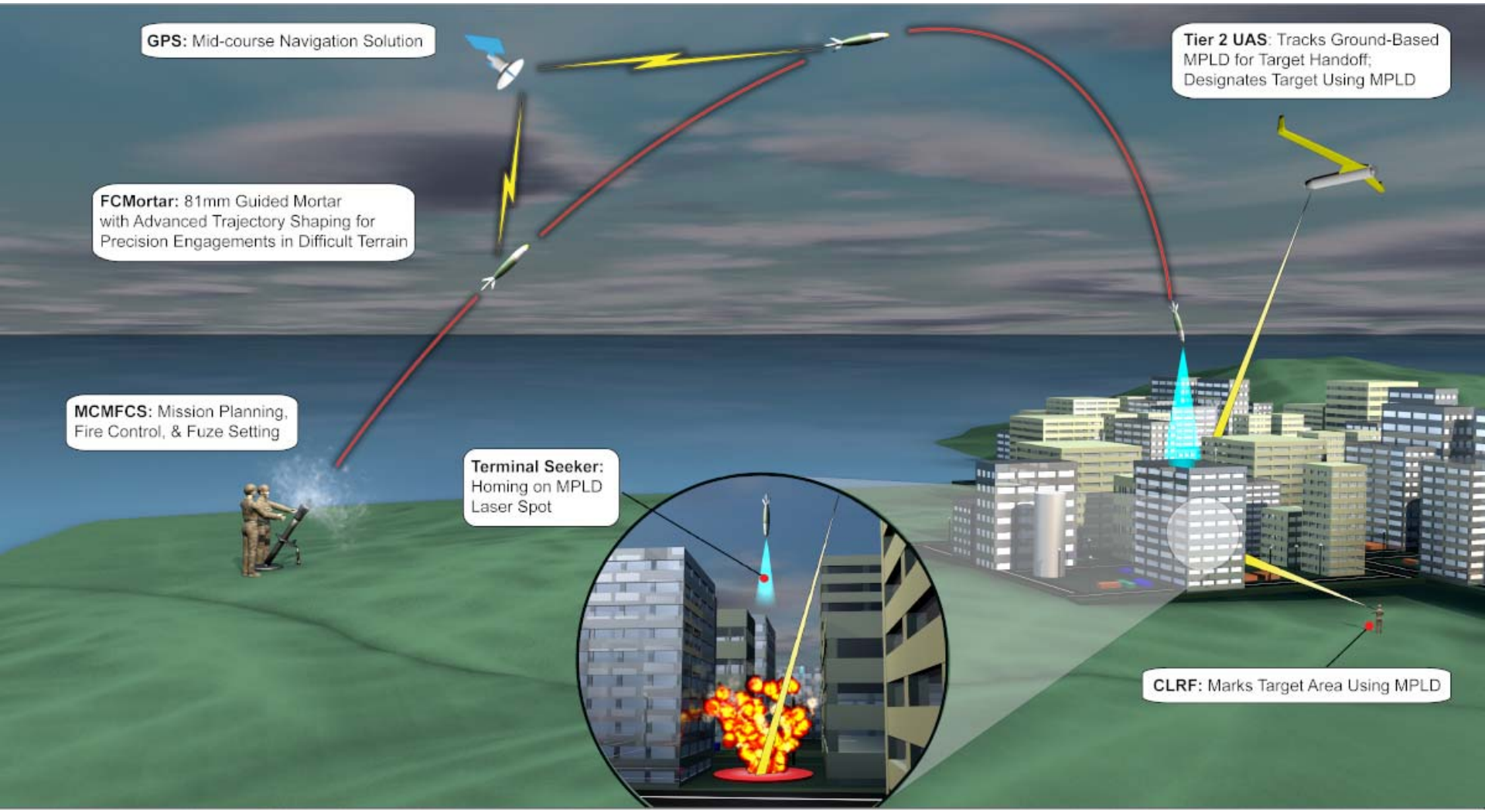
Precision Urban Mortar Attack
PUMA



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Flight Controlled Mortar
Projected Capabilities

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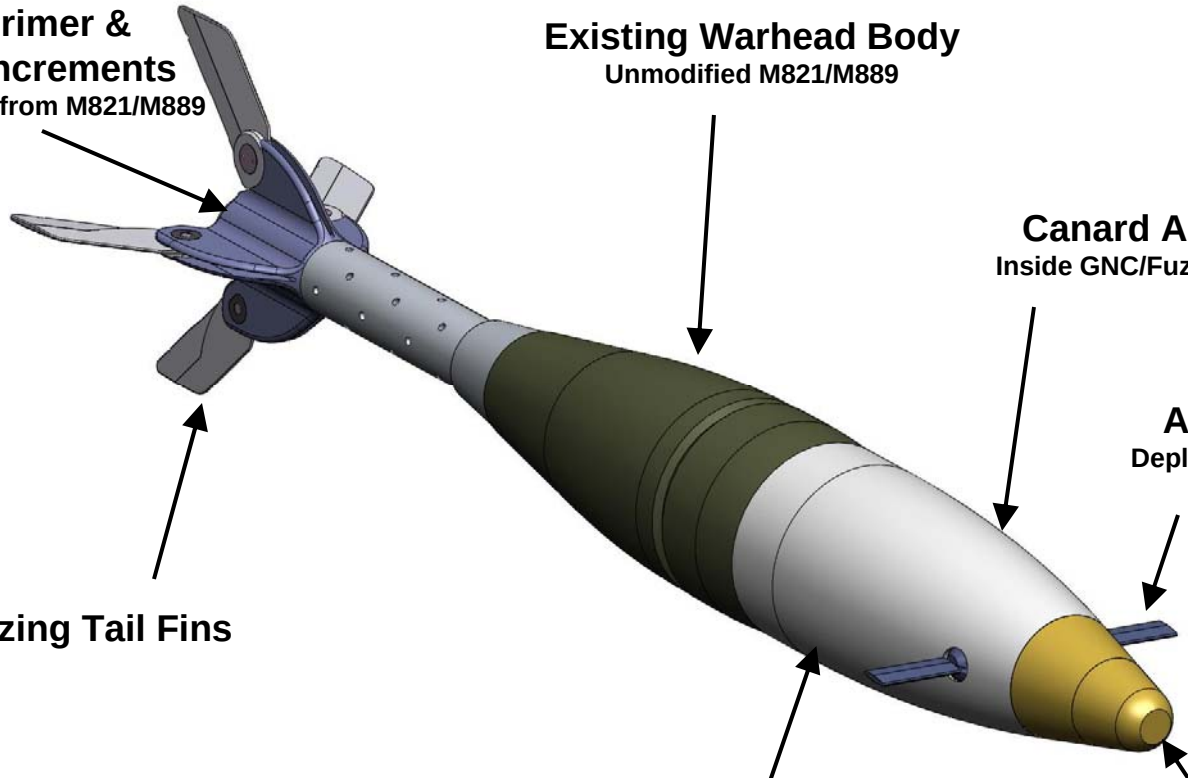
- Precision Delivery
  - GPS & SAL
    - SAASM + Anti-Jam GPS
    - Micro-Pulse Laser Designation (MPLD) Seeker
  - Access to new/difficult terrain types
    - Urban (MOUT), Canyons, Mountains, Reverse Slope
    - Accomplished through advanced trajectory shaping techniques
- Built on existing mortar capabilities
  - Retains fuzing functions & propulsion system
  - Comparable engagement ranges
- Cost Driven solution
  - $3,200 - $5,000 AUPC

Flight Controlled Mortar
Current Design Overview



Existing Primer & Propellant Increments
Leveraged directly from M821/M889

Existing Warhead Body
Unmodified M821/M889

Canard Actuator
Inside GNC/Fuze Assembly

Articulating Canards
Deployed at Start of Guided Flight

Stabilizing Tail Fins

GPS Receiver
Mayflower C/A
GPS Receiver for Phase I

Terminal Seeker
MPLD

Flight Controlled Mortar
DoD Development Team

- Sponsor
  - Office of Naval Research, Code 30 Fires
- Principal Investigator
  - Naval Surface Warfare Center Dahlgren Division
    - Code G33 – Precision & Advanced Systems Branch
- Guidance Kit Development, Integration, & Testing
  - Army Research Laboratory, Aberdeen Proving Ground
    - Advanced Munitions Concepts Branch
- Fuzing
  - Armament Research, Development and Engineering Center (ARDEC)
    - Fuze Division, Adelphi
- Terminal Seeker Development
  - Micro-Pulse Laser Designation
    - Naval Surface Warfare Center Dahlgren Division
      - Code G31– Expeditionary Weapon Systems Branch
        - » Targeting Engagement Systems Center of Excellence (TESCE)

Flight Controlled Mortar
Program Schedule

- Phase I (FY09-11)
  - Development of system architecture
    - Sub-system development & demonstration
  - Terminal seeker technology maturation
  - GPS only guided flight & trajectory shaping demonstrations

- Phase II (FY12-14)
  - Terminal Seeker Integration
  - Guided flight & trajectory shaping demonstrations w/ Terminal Seeker
  - PUMA Demonstrations
    - End-to-end demonstration including ground & UAS designation systems
    - Intended to be as realistic as feasible
  - Transition to Acquisition

Flight Controlled Mortar
Airframe Wind Tunnel Test (WT1)

- First Demonstration Event
  - ARDEC Sub-Sonic Wind Tunnel, Picatinny Arsenal
    - 9-12 February 2009
- Validated most aerodynamic predictions
  - Supports simulations showing vertical approach & range extension capabilities
  - Minor design change needed to enhance static margin
    - Tail-kit redesign completed

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Flight Controlled Mortar
Fuze Replacement

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- Forward section of guidance kit replaces existing M734/935 mortar fuzes
  - Maintains existing fuzing capability
    - PD, PD Delay, HOB
    - Additional modes possible
      - Time, Point-in-Space, etc…
  - Utilizes existing production components where feasible
  - New components currently being investigated for applicability
    - HOB antenna, 2nd Arming environment sensors, MEMS fuzing components

Flight Controlled Mortar

Summary

- Supplements existing 81mm mortar inventory with precision capability
- Allows engagement of targets in previously inaccessible terrain
- Reduces cost & creates a more mobile alternative to existing precision fire support systems
- Supports Enhanced Company Operations (ECO) Framework as part of PUMA system of systems approach