• Objectives: Provide an overview of recent activities to develop and field technologies to reduce the weight of the US Army and Marine Corps Mortar Systems. In addition to the weight reductions, performance and cost impacts will be addressed.

M224 60 mm Lightweight Company Mortar System
60 mm M225 Mortar Cannon
System Weight: 46 lbs

M252 81 mm Medium Extended Range Mortar
81 mm M253 Mortar Cannon
System Weight 93 lbs

M121 120mm Heavy Mortar (Carrier)
120 mm M298 Mortar Cannon
System Weight 330 lbs
System Weight Reduction – 60 mm - Cannon

M225 Cannon with Trigger Fire System
M225A1 Cannon with Trigger Fire System

Other lighter alloy parts
- Clamp Screw
- Clamp
- Gasket
- End Plug

Nickel Based Super Alloy Tube Fins Removed

1.2 lbs WEIGHT SAVINGS
M253 Cannon with Blast Attenuator Device
M253AX Cannon with Integral Blast Attenuator Device

- High Strength Steel Alloy Tube
- Integral Blast Attenuation Device

Improved Breech Cap Design

4.3 lbs WEIGHT SAVINGS
M253A1 Cannon with Integral Blast Attenuator Device

Integral Cap Saves Weight

Nickel Based Super Alloy Tube Fins Removed

5.8 lbs WEIGHT SAVINGS
System Weight Reduction – 60 mm - Bipod

High strength Aluminum alloy changes drove weight reduction

15.2 LBS

11 LBS
M177 Bipod  27.0 lbs / 12.2 kg

177A1 Bipod  21.3 lbs / 9.7 kg
M7
- Material: Aluminum 2014-T6
- Diameter: 19 Inches
- Weight: 14 lbs

M7A1
- Material: Aluminum 7175-T74
- Diameter: 18”
- Weight: 8 lbs

M8
- Material: Aluminum 2014-T6
- Size: 10” x 7”
- Weight: 3.8 lbs
- Capability: charge 0 and 1

M8A1
- Material: Aluminum 7175-T74
- Diameter: 12”
- Weight: 5 lbs
- Capability: Charges 0-4
System Weight Reduction 81 mm Baseplate
System Weight Reduction – 120 mm - Bipod

M191 Bipod with Cannon mounted
MFCS-D PDMA – 200 lbs

System Weight Savings (up to) 70 lb

M191A1 Bipod with MFCS PDMA – 130 lbs

Cannon Mounted MFCS-D PDMA – 113 lbs

System Cost Target <$14K

M191A1 MFCS PDMA – 34.4 lbs
Summary – Current/Fielding
Mortar Lightweighting Technology

Cannon: Nickel Alloy (Inconel®)
- 1.2 lb (8.3%) weight reduction
Bipod: Light weight materials & composites
- 4.2 lb (27.6%) weight reduction
Baseplate: High Strength Aluminum Alloy
- Baseplate 6.4 lb (44.4%) weight reduction

US Army Lightweight Steel Cannon
- 4.3 lb weight reduction (12.8%)
USMC Nickel Alloy (Inconel®) Cannon
- 5.8 lb weight reduction (16.5%)
Bipod Light weight materials & composites
- 5.7 lb weight reduction (21.1%)
Baseplate - High Strength Aluminum Alloy
- 3.5 lb weight reduction (12.1%)

60 mm Mortar System Total
- 11.8 lb (26.8%) weight reduction

81 mm Mortar System 13.5 lb (14.8%)

Cannon: Unchanged
Bipod + Fire Control Assembly
Light weight materials & composites
- 70± lb weight reduction
Baseplate: High Strength Aluminum Alloy
- 50% Cost Reduction

120 mm Mortar System Total
- 8.9 lb (20.3%) weight reduction
- Cost Targets in tradeoff

April 2011 US Army fielded
June 2011 USMC fielded
Systems are in qualification & verification testing
Final stages of design for Critical Design Review
OBJECTIVES:
• At least 40% weight reduction over current steel 81mm system
• Provide War Fighter the firepower of an 81mm at the approximate weight of the 60mm system.
• Improved maneuverability and war fighter survivability
• Fires 800 series ammunition
• Fit, form and function are the same as legacy steel 81mm mortar system components
OBJECTIVES:

• At least 40% weight reduction over current aluminum 81 mm system

• Provide War Fighter the firepower of an 81mm at the approximate weight of the 60 mm system.

• Improved maneuverability and war fighter survivability

• Fires 800 series ammunition

• Fit, form and function are the same as legacy steel 81 mm mortar system components

Unique Composite Design

Prototype Ready For Test

Modular Composite Option
Prototypes in Process

High Strength Aluminum Alloy < 20lbs
OBJECTIVES:

• At least 25% weight reduction over current steel 81 mm system

• Provide War Fighter the firepower of an 81 mm at the approximate weight of the 60 mm system.

• Improved maneuverability and war fighter survivability

• Fires 800 series ammunition

• Fit, form and function are the same as legacy steel 81mm mortar system components

M177AX Bi-pod with composite legs approximately 20 lbs
Optional – Compression Molded Composite Housing
• Tube with Ablative Liner
  – SOCOM Oriented Effort
  – Develop a limited life – One (1) basic ammo load – Tube
  – Extremely lightweight
  – Very low cost – essentially a disposable tube
  – 2 different concepts being explored: Carbon-Carbon & Unique Lined Tube
  – Scale model components of option A currently in ballistic testing at Benet firing range
• Breech: 120 mm Future Mortar
  – Cylinder Ball with swiveling socket
  – Ruggedized mechanism
    • Gearbox converts 70 degrees of lever rotation to 180 degrees at the switch
    • Gearbox will contain Safe, Drop and Lever Fire switch
• Tube: 120 mm Future Mortar
  • Planned for Extended Range (TBD)
  • Higher Elastic Strength Pressure profile
  • Improve blast attenuation - maximize allowable number of rounds (ANOR) daily
• Base Plate: 120 mm
  • Modify M9X baseplate design to accommodate higher pressures
• Ammunition:
  • Extended Range Ammunition being developed

Traditional ball is replaced with a cylinder to better distribute load (mating socket must swivel in baseplate)
QUESTIONS?