



Enhanced Expeditionary Engagement Capability (E3C)

AT A GLANCE

WHAT IS IT?

E3C will demonstrate advanced fire support capabilities, including extended range, precision guidance, improved effectiveness and operational utility for Marine Corps weapons through technology integration and system firing demonstrations. The first system being developed is the Advanced Capability Extended Range Mortar (ACERM), an 81 mm mortar with performance approaching that of the 120 mm mortar. Supporting developments include the Low Cost Semi-active laser Seeker (LCSS) and Miniaturized Mission Setter (MMS). Planned follow-on developments include a precision 60 mm mortar and improved 83 mm Shoulder-launched Multipurpose Assault Weapon round.

HOW DOES IT WORK?

E3C development efforts use an evolving family of performance-enhancing technologies to improve the accuracy and effectiveness of the systems being developed. ACERM uses dual-mode guidance, advanced aerodynamics and improved propellants to increase the performance significantly beyond that of current systems. Advancements in low-cost SAL seekers, low-cost control actuation systems and micro-electromechanical systems-based fuzing allow this performance to come at a low cost and in a reasonable size and weight. Rocket motors and discarding tail kit assemblies are also being evaluated for possible use.

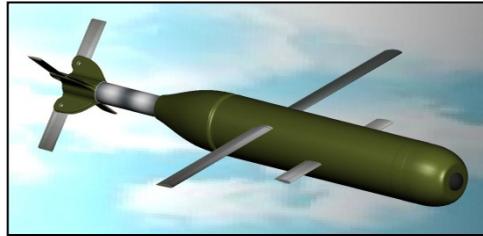
WHAT WILL IT ACCOMPLISH?

- ACERM:**
- 100-200 percent increase in range
 - 1-5m CEP
 - <\$15,000 unit cost
 - ~120 mm effectiveness

- MMS:**
- Cargo pocket-sized setter

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ACERM



MMS

The E3C program is a long-term effort focused on increasing the effectiveness of expeditionary weapon systems while maintaining a low unit cost. Currently in development is a state-of-the-art 81 mm mortar, the ACERM. Supporting developments include the MMS and the LCSS. Development efforts planned include a new SMAW round, a laser-guided 60 mm mortar and a precision 40 mm round.

The ACERM puts precision indirect fire organically in the control of the battalion commander. With a pedigree from the Flight Controlled Mortar (FCMortar) project and the Precision Universal Mortar Attack (PUMA) Future Naval Capability, the ACERM is a new design that will demonstrate what is possible in this caliber. Adding precision while increasing the range by 100 to 200 percent will allow the battalion or even the company commander to engage targets in a dispersed environment without having to relocate the mortar team as often. Combining an optimized warhead design with precision delivery provides for a more effective weapon system while minimizing collateral damage.

The MMS is being developed to support the ACERM. The 81mm mortar system has the option of being foot-mobile. The existing setter systems are all too large to support foot-mobile activities. The development of a "cargo pocket"-sized MMS will provide the portability necessary.

Semi-Active Laser (SAL) guidance is required to overcome the inherent limitations of combining GPS guidance with current target location error levels. Fielded SAL seekers are too expensive for use in smaller-caliber weapons. The LCSS makes the design breakthroughs necessary to provide this capability at a cost of less than \$1,000 per seeker.

Research Challenges and Opportunities:

- Generating sufficient lift and maintaining or increasing warhead performance while meeting weight and length goals
- Meeting all performance and cost goals at the same time
- Developing a propellant that will provide sufficient initial velocity without exceeding the tube pressure limits

ACERM:

- New all-up cartridge for 81 mm
- GPS and SAL precision delivery
- Less than 10 km maximum range
- Active flight path management
- Advanced warhead
- Proven technology pedigree
 - Very Affordable Precision Projectile, FCMortar, PUMA and UTAS 120 mm

MMS:

- Reduces Enhanced Portable Inductive Artillery Fuze Setter/Lightweight Handheld Mortar Ballistic Computer down to less than 2 pounds
- Maintains human portability of precision 81 mm
- Android operating system allows future multifunction device
 - DAGR, mission planning, digital call for fire, intel display



LCSS:

- Body-fixed, strap down STANAG 3733 SAL seeker
- Estimated production cost \$1,000/unit at 10,000 unit purchase
- Compatible with laser markers down to 10mJ/pulse
- 11 prototypes delivered to government and industry for testing
- Integral height-of-burst sensor development underway