Expeditionary Fighting Vehicle (EFV)

Executive Summary

- The Marine Corps Operational Test and Evaluation Activity (MCOTEA) observed promising results during a Water Directional Stability test in October 2008. MCOTEA also observed a developmental test event that used the existing prototype vehicles ("SDD-1" vehicles) to examine system performance during riverine operations.
- Program Manager Advanced Amphibious Assault (PM-AAA) completed developmental underwater explosion (UNDEX) shock testing in July 2009 on an SDD vehicle to examine system-level shock response and to verify performance requirements.
- Near-term testing of planned updates to the SDD-1 vehicles to demonstrate approximately 40 modifications addressing performance and reliability shortfalls has slipped to FY10.

System

- The Expeditionary Fighting Vehicle (EFV) is an amphibious combat vehicle for the Marine Corps.
- The Marines intend the EFV to be capable of high-speed water transit at over 20 knots and have land mobility capabilities comparable to the M1A1 tank after transitioning out of the water.
- The EFVC (command variant) is operated by a crew of three and transports a commander and his staff of eight Marines.
- The EFVP (personnel variant) is operated by a crew of three and carries a reinforced rifle squad of 17 Marines.
- The EFVP has a stabilized 30 mm chain gun and coaxial 7.62 mm machine gun in the turret.

Mission

Units equipped with EFVs will transport elements of an amphibious assault force from ships over the horizon to inland objectives. Commanders will use the:

- Personnel variant as an armored fighting vehicle ashore in support of land combat providing transportation, protection, and direct fire support
- Command variant to provide command, control, and communications capabilities to support ground combat tactical command posts

Prime Contractor

- General Dynamics Land Systems, Woodbridge, Virginia

Activity

- The prime contractor continues to build seven redesigned prototype vehicles ("SDD-2" vehicles) to support developmental and operational testing that is scheduled for FY10 through FY14.
- MCOTEA participated in combined developmental and operational testing in October 2008 in which a modified SDD-1 prototype vehicle demonstrated a correction to the steering deficiency discovered in the 2006 Operational Assessment. MCOTEA also observed a developmental test event that used the SDD-1 vehicles to examine system performance during riverine operations. This event was conducted at the Aberdeen Test Center, Maryland, and then at Camp Lejeune, North Carolina.
- PM-AAA completed developmental UNDEX shock testing in July 2009 on an SDD vehicle to examine system-level shock response and to verify performance requirements. The LFT&E Integrated Product Team participated in the UNDEX test planning and will be provided data from these tests.
- A Ballistic Vulnerability Test (BVT) has been planned using two of the SDD vehicles. The BVT will include emerging threats including roadside and underbody IEDs and mines, and

a substantial small arms and fragment simulator ballistic test effort.

Assessment

- Near-term testing of planned updates to the SDD-1 vehicles to demonstrate approximately 40 modifications addressing performance and reliability shortfalls has slipped to FY10. Of particular concern is that three of four developmental and operational test events that were planned for FY09 were postponed until FY10. These events were expected to provide information to reduce risk for the SDD-2 vehicles, but now will not.
- The riverine operations event provided useful information on the effects of riverine debris on the propulsion system and engine operations. Initially, ingested debris accumulated on the radiator, causing engine operating temperatures to rise. Debris also damaged the water jet and its housing. Between the Aberdeen Test Center phase and the Camp Lejeune phase, the program installed protective grates to prevent ingestion of large debris into the waterjets, and screens to reduce the accumulation of debris on radiators. Additional modifications are planned to further limit the accumulation of silt on the radiator. These changes will be examined during subsequent riverine testing using SDD-2 vehicles.
- Component-level testing and a Design for Reliability effort are ongoing to improve system reliability. There has been no system-level reliability testing since CY06, and none will start until the end of CY10. The program plans to demonstrate a mean time between operational mission failures of 22 hours or higher using SDD-2 vehicles before the next milestone review in FY12.
- The 2006 Operational Assessment revealed the EFV's inability to consistently get on plane in water without employing a driving technique that caused uncontrolled vehicle turns and unsafe operating characteristics. This problem was caused by the weight of the combat-loaded vehicle. System requirements have been reduced to lower vehicle weight. During the first of two planned water directional stability developmental and operational test events in October 2008, promising results were observed from a design modification (trim tabs installed on vehicle's transom flap). A second, multiple vehicle water directional stability developmental and operational test event will be conducted in 2QFY10.

Recommendations

- Status of Previous Recommendations. The Marine Corps is addressing all previous recommendations.
- FY09 Recommendations.
  1. The EFV is being developed to provide a forcible entry requirement, but there has been no end-to-end testing of the vehicle's weapon system in the water. The program should demonstrate this water gunnery capability before the Milestone C low-rate initial production decision.
  2. In response to the threat posed by IEDs and mines, the program is analyzing a protective underbody armor appliqué for installation and use during land operations. Given the possible impact of an underbody appliqué on other aspects of the vehicle's performance, the design, construction, integration, and testing of the appliqué should be completed as soon as possible and tested rigorously.