Direct Attack Moving Target Capability (DAMTC)

Executive Summary

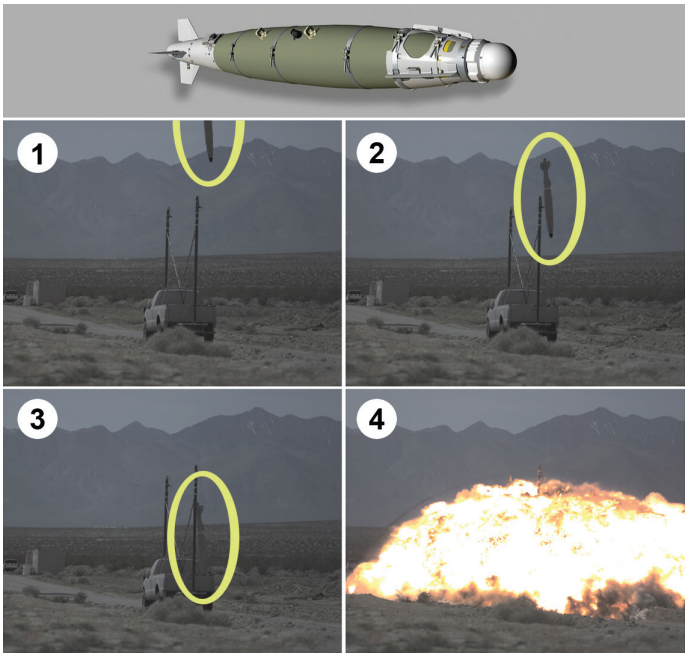
- The Direct Attack Moving Target Capability (DAMTC) is a non-developmental program that expands the employment envelope of the original Laser Joint Direct Attack Munition (LJDAM) that was fielded in response to an Urgent Operational Need (UON) requirement. DAMTC expands the UON LJDAM's capability from a simple moving target to a more challenging maneuvering target. A maneuvering target is a target that is moving but changes velocity, direction, or both during the time it is engaged.
- The Navy conducted operational testing between November 2011 and April 2012 resulting in a Full-Rate Production decision in June 2012.
- The Navy dropped 22 LJDAM weapons in FY12 during the DAMTC LJDAM operational testing.

System

- The JDAM is a low-cost, autonomously controlled, adverse weather, accurate guidance kit tailored for Air Force/Navy general purpose bombs to include:
  - 2,000-pound Mk 84 and BLU-109 bombs
  - 1,000-pound Mk 83 and BLU-110 bombs
  - 500-pound Mk 82, BLU-111, BLU-126, and BLU-129/B bombs
  - A GPS-aided inertial navigation system that provides primary guidance to the weapon. Augmenting the JDAM inertial navigation system with GPS signals enhances accuracy.
- Guidance and control designs enable accuracy of less than 5 meters when GPS is available and less than 20 meters when GPS is absent or jammed after release.
- The LJDAM provides the capability to attack moving targets by enabling such targets to be illuminated with laser energy that LJDAM's seeker detects and tracks. In addition to retaining the precision of JDAM when used against stationary targets, the LJDAM provides precise laser target designation to eliminate Target Location Error, ability to operate beneath a cloud layer, and the ability to select weapon impact angle in combination with laser-guided precision. LJDAM's laser guidance allows for self-lasing by the engaging aircraft or buddy-lasing by another aircraft or a ground-party.
- The Navy established DAMTC as a program of record in February 2010 and selected LJDAM as the non-developmental material solution.

Mission

- Combatant Commanders use JDAMs employed by fighter, attack, and bomber aircraft, to engage targets day or night, in all weather at the strategic, operational, and tactical levels of warfare.
- Combatant Commanders employ JDAM against fixed and relocatable soft and hard targets, to include command and control facilities, airfields, industrial complexes, logistical and air defense systems, lines of communication, and all manner of battlefield forces and equipment.
- Combatant Commanders employ the UON LJDAM to engage stationary targets using JDAM-type tactics, as well as to reactively engage stationary and moving targets.
- The Navy and Marine Corps intend to use the moving and maneuvering target capability of the DAMTC LJDAM for Close Air Support, Strike Coordination and Armed Reconnaissance, and Time Sensitive Target missions to strike armored and unarmored vehicles, both maneuvering and stationary, due to their potential to start maneuvering.



Major Contractor

The Boeing Company, Integrated Defense Systems – St. Charles, Missouri

Activity

- The Navy's Commander, Operational Test and Evaluation Force (COTF) initiated operational testing in November 2011. Testing incorporated 22 DAMTC LJDAM weapon deliveries using F/A-18 and AV-8B aircraft from VX-9 against 18 moving and 4 stationary targets. The Navy completed IOT&E testing in April 2012.
- The Navy established DAMTC as a program of record in February 2010, selecting LJDAM as the non-developmental material solution. An updated laser sensor lens necessitated limited integrated and developmental testing prior to commencement of operational testing.
- The LJDAM employment history showed significant degradation of the lens when deployed in harsh environments (such as Afghanistan). The Navy initiated a search for a replacement material and Boeing developed a Sapphire lens to replace the existing glass lens.
- The Navy conducted a six-weapon developmental test phase, using side-by-side comparison testing between the two lens types, immediately prior to the operational test phase to ensure the Sapphire lens does not negatively affect system effectiveness.
- COTF conducted all testing in accordance with the DOT&E-approved Test and Evaluation Master Plan and test plan.

Assessment

- Preliminary developmental test results using the new Sapphire lens indicate highly comparable sensor detection ranges to the previous material.
- The Sapphire material is expected to provide improved reliability in harsh environments during its intended service life. Laboratory environmental testing and flight test results demonstrated Sapphire performance met system-level requirements. However, due to limited flight testing, data are currently insufficient to assess the reliability of the new lens material.
- Operational test results showed the DAMTC LJDAM to be operationally effective in the self-lasing mode against targets that both moved and maneuvered during weapon flight. The DAMTC LJDAM's demonstrated accuracy was 5.8 meters, meeting the 6-meter accuracy requirement. Accuracy using the buddy-lasing mode was poor; however, the range restrictions and target limitations that prevailed during the four buddy-lasing weapon deliveries (and not present during the self-lasing deliveries) are believed to have contributed to the poor results. Demonstrated accuracy is sufficient to assure lethal effects against a DAMTC LJDAM maneuvering vehicle or stationary targets.
- Operational test results showed the DAMTC LJDAM to be operationally suitable. Using both operational test and integrated test phase weapons to estimate reliability resulted in a material reliability of 98 percent (46 of 47), exceeding the 90 percent requirement. The only hardware failure was a live weapon that did not detonate upon impact. An overall system reliability of 77 percent is the result of three different operator error failures and a single large miss distance of unknown origin. It should be noted that there is not a requirement specified for system reliability.
- Operational testing highlighted two deficiencies related to human factors. The first is the dense wiring inside the tail-kit of the LJDAM weapons that makes verifying fuze arming and function settings extremely difficult, especially at night. The umbilical wire bundles result in a very crowded tail compartment making it difficult to read the settings. Workarounds were all deemed unacceptable because they either prevent the aircrew from positively confirming proper fuze settings or interfere with the configuration of the original assembly of a live weapon.
- The second human factors deficiency is the high cockpit workload associated with delivering a DAMTC LJDAM, though this is comparable with the high workloads found with other laser-guided weapons. Some reduction should be achievable through aircraft Operational Flight Program improvements but targeting pod limitations appear to drive most of the inherent workload.

Recommendations

- Status of Previous Recommendations. The Navy completed the FY11 recommendation.
- FY12 Recommendations. The Navy should:
  1. Conduct additional testing using buddy-lasing from rear aspect geometries to distinguish between the effects of the range restrictions and target limitations and the use of the buddy-lasing tactic on the DAMTC LJDAM's accuracy.
  2. Re-design the wiring bundle in the weapon's tail compartment to enable an accurate visual pre-flight check of the weapon's fuze settings.