

Black Hawk Upgrades (UH-60M) Utility Helicopter

Executive Summary

- DOT&E published a combined OT&E/LFT&E report in May 2007 and found that the UH-60M Block I is operationally effective, suitable, and survivable.
- The Army completed the IOT&E in December 2006, flying 262 hours with five UH-60M Black Hawks. The IOT&E included 45 operationally realistic missions with 117 aircraft sorties and a 10-day field exercise.
- The UH-60M successfully accomplished 41 of 45 (91 percent) of assigned combat missions. The aircraft exceeds performance requirements for internal lift, external lift, and self deployment.
- The UH-60M is more reliable than the current UH-60L. Mission aborts and other reliability failures occurred infrequently. Aircraft were available for mission execution over 95 percent of the time.
- Operational and live fire testing demonstrated that the UH-60M is survivable in expected threat environments and that overall susceptibility to surface-to-air threats is lower when compared to the legacy UH-60A/L aircraft.
- The Army is extending the LFT&E program during FY08 to address pre-planned product improvement changes that may affect vulnerability of the aircraft, including the new composite tailcone and tail rotor drive shaft, fly-by-wire flight control system, and the main and tail rotor servo actuators.

System

- The UH-60M is a modernized UH-60 A or L model Black Hawk medium-lift helicopter.
- The Assault Helicopter Battalion is organized as three companies of 10 aircraft each.
- The acquisition objective is for 1,806 UH-60M Black Hawks, with 1,227 projected to be UH-60M variant and the remaining to be UH-60Ls. The program projects that 123 aircraft will be UH-60M Block I aircraft, and the remaining 1,104 will be UH-60M Block I Upgrade aircraft.
- The UH-60M Block I aircraft include:
 - A digital cockpit with Blue Force Tracker
 - Power and airframe improvements with the 701D engine, wide chord blades for enhanced performance, and



- monolithic machined parts that show improvement over the A/L model Black Hawk
- Improved survivability with enhanced laser warning and infrared suppression for anti-missile defense
- The Army plans future improvements, beginning in 2010, for a UH-60M Block I Upgrade. This design adds:
 - Fly-by-wire advanced flight controls
 - A Common Avionics Architecture System and networked digital connectivity for enhanced commonality with other Army aircraft
 - Improved handling qualities optimized for minimum pilot workload and increased safety in degraded environments
 - Composite tailcone and main rotor and tail rotor drive shafts and main and tail rotor actuators

Mission

Assault Aviation and General Support Aviation Battalions will use this aircraft to conduct the following missions:

- Air Assault lift for 11 combat soldiers or equipment less than 9,000 pounds for mobile strike and counter mobility operations
- Sustainment Operations to resupply the force through internal and external cargo lift capability
- Casualty and medical evacuation
- Command and control

Activity

- DOT&E approved the UH-60M Upgrade Test and Evaluation Master Plan (TEMP) on December 13, 2005, and the UH-60M test plan on October 11, 2006, in preparation for the IOT&E.
- The UH-60M program completed Infrared (IR) signature measurements and testing in November 2006 to compare current UH-60L fleet IR signatures with the UH-60M.
- The Army completed the IOT&E in December 2006, flying 262 hours with five UH-60M Black Hawks. The IOT&E included 45 operationally realistic missions with 117 aircraft sorties and a 10-day field exercise.
- The Army completed developmental testing of a satellite-based communications system. This system is

compatible with Army digital architecture and allowed Blue Force Tracker installation on the IOT&E aircraft.

- Additional operational testing included:
 - Live fire testing of the M-240 Machine Gun mounted on the UH-60M during January 7-8, 2007, at Fort Rucker, Alabama. This test confirmed adequate integration of the M-240 Machine Gun, laser sight, and the laser warning receiver.
 - HH-60 Medical Evacuation (MEDEVAC) operational test during January 23-26, 2007, at Fort Rucker, Alabama. MEDEVAC crews conducted five missions with live patients during day and night conditions to confirm MEDEVAC configuration and integration.
 - Integration of the Volcano Mine Dispensing System on February 12, 2007, at Redstone Arsenal, Alabama. During multiple minefield emplacement missions, crews were able to successfully dispense 96 mines with the UH-60M.
 - Operational testing of the Common Missile Warning System (CMWS) and the ARC 231 Radio, March 21-23, 2007, at Fort Rucker, Alabama.
- The LFT&E strategy approved by DOT&E in May 2000 includes a waiver from full-up system-level testing. The Army is extending the LFT&E program to address pre-planned product improvement changes that may affect vulnerability of the aircraft, including the composite tailcone and tail rotor drive shaft, fly-by-wire flight control system, and the main and tail rotor servo actuators. This testing and System Integration Laboratory qualification is planned to begin during FY08.

Assessment

- The UH-60M Block I IOT&E and live fire testing were executed in accordance with the DOT&E-approved test plans. UH-60M Block I test plans and execution were adequate to assess operational effectiveness, suitability, and survivability.
- DOT&E published its combined OT&E/LFT&E report in May 2007 and found that the UH-60M is operationally effective, suitable, and survivable.
- The UH-60M is operationally effective. The UH-60M successfully accomplished 41 of 45 (91 percent) of assigned combat missions. The aircraft exceeds performance requirements for internal lift, external lift, and self deployment. During IOT&E missions, the UH-60M experienced some subsystem degradation, but degradation did not prevent mission accomplishment. Subsystem issues included integration of digital messaging, communications systems, and flight management systems.
- The UH-60M is operationally suitable. The UH-60M is more reliable than the current UH-60L. Mission aborts and other reliability failures occurred infrequently. Aircraft were

available for mission execution over 95 percent of the time. Some subsystems warrant redesign or improved training to make them more usable by operational crews. An ergonomic redesign of the crew chief seat and restraint harness for easier ingress and egress of the crew chief station, and continued refinement of subsystem training for aircrews is warranted.

- Operational and live fire testing demonstrated that the UH-60M is survivable in expected threat environments and that overall susceptibility to surface-to-air threats is lower when compared to the legacy UH-60A/L aircraft. Susceptibility improvements are largely the result of the integration of the CMWS on the UH-60M. The APR 39A radar warning receiver demonstrated poor performance and was no better in operational testing on the UH-60M than legacy aircraft.

Recommendations

- Status of Previous Recommendations. The Army has effectively resolved issues from FY05 recommendations. There were no recommendations for FY06.
- FY07 Recommendations. The May 2007 DOT&E combined OT&E and LFT&E Report included a set of 14 recommendations to the Army to improve operational effectiveness, operational suitability, and survivability. These included:
 1. Improve network connectivity and develop tactics, techniques, and procedures for secure communications and digital messaging in an aviation environment.
 2. Ergonomically redesign the crew chief seat and restraint harness for easier ingress and egress of the crew chief station.
 3. Continue development of, and improve training on, subsystems for:
 - Communications suite (loading frequencies and digital messaging systems)
 - A communication subsystem reset capability after system startup
 - Flight Management System and Aviation Mission Planning System
 - Aircraft survivability equipment to include improving the reporting accuracy of the radar warning receiver
 4. Reduce the potential for transmission gearbox chip detector screen blockage resulting from ballistic hits to the main transmission assembly and address issues with cascading damage to the tail rotor drive system.
 5. Install an additional fire detector and fire suppression agent dispenser nozzle to the engine nacelle compartment and add fire detection and extinguishment to the fuel plumbing enclosure.