



## **U.S. Navy, Northrop Grumman Successfully Test Systems Required to Operate X-47B Unmanned System From an Aircraft Carrier**

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### **Manned Surrogate Using X-47B Software Makes Trial Landings on USS Eisenhower**

NAVAL AIR STATION PATUXENT RIVER, Md., Jul 5, 2011 (GlobeNewswire via COMTEX) --

The U.S. Navy and Northrop Grumman Corporation (NYSE:NOC) have successfully completed a demonstration of the ship-based software and systems that will allow the X-47B unmanned air vehicle to operate from the deck of an aircraft carrier.

The test, conducted July 2 in the western Atlantic with the Navy carrier USS Dwight D Eisenhower (CVN-69), culminated with several successful launches and recoveries of a manned surrogate aircraft equipped with X-47B precision navigation control software.

"This manned surrogate test event is a significant and critical step toward landing the X-47B on the carrier deck in 2013," said Capt. Jaime Engdahl, U.S. Navy, program manager, Navy Unmanned Combat Air System (N-UCAS). "It represents the first end-to-end test of the hardware and software systems that will eventually allow unmanned systems to integrate safely and successfully with all aspects of carrier operations."

Strong collaboration between the engineers of U.S. Naval Air Systems Command (NAVAIR) and Northrop Grumman was key to the successful test, he added. Northrop Grumman is the Navy's prime contractor for the Unmanned Combat Air System Carrier Demonstration (UCAS-D) program. A Navy/Northrop Grumman test team conducted first flight of the X-47B in February.

"The precision navigation and control capability demonstrated by the UCAS-D team represents a potential 'breakthrough' capability for the Navy," said Janis Pamiljans, vice president, N-UCAS for Northrop Grumman's Aerospace Systems sector. "It could be applied, in theory, to any manned or unmanned carrier-compatible aircraft, which could have a dramatic effect on the tempo and efficiency of future carrier operations."

According to Glenn Colby, NAVAIR's aviation/ship integration lead, the biggest challenge associated with landing an unmanned system on a carrier deck is automating -- and removing any ambiguity from -- flight procedures and communications between aircraft and ship that have traditionally been performed manually by pilots and the ship's air operations personnel.

"Today's carrier environment relies on human operators to monitor and ensure safe flight operations," said Colby. "As we begin to integrate unmanned systems into this very restrictive manned environment, we have to ensure that the software controlling these new systems can recognize and respond correctly to every type of contingency."

Colby and his team at NAVAIR's N-UCAS Aviation/Ship Integration Facility (NASIF) at Patuxent River, prepared for the surrogate testing through a steady build-up of rigorous software simulations and flight tests.

First, they used early versions of the software that the X-47B will use to operate at the carrier to simulate command and control, air traffic control and navigation exchanges between the aircraft and the carrier. Then they progressed to more robust simulations that included X-47B avionics and an X-47B mission operator station, all in the NASIF lab.

Next were flight tests of X-47B hardware and software installed on a King Air Beech 300 aircraft. The King Air flew in the vicinity of CVN-69 -- both pier-side in Norfolk, Va., and while underway -- to test mission management, command and control, communications, air traffic control and navigation functions between the X-47B software and the ship.

In addition to the King Air, the test team used a surrogate F/A-18 aircraft equipped with X-47B software and avionics to evaluate the most challenging areas of launch and recovery operations. Initial testing at Patuxent River focused on verifying that aircraft sensors, navigation, guidance and control systems were ready for shipboard testing.

"Using a manned surrogate platform to test the unmanned systems avionics and software gives us an extra layer of safety as we test the X-47B software to ensure that it responds correctly and safely to different flight conditions," explained Colby.

Results from the surrogate testing will be used to continue to refine the mission management, navigation, guidance and control software that the X-47B will use to perform its first carrier landings in 2013.

The Navy awarded the UCAS-D prime contract to Northrop Grumman in August 2007. The contract calls for the development and flight testing of two strike-fighter-sized X-47B unmanned aircraft. In 2013, the program is scheduled to demonstrate the first carrier launches and recoveries by a tailless, unmanned aircraft. Autonomous aerial refueling demonstrations are planned for 2014. For the latest X-47B news and information, please visit [www.as.northropgrumman.com/products/nucasx47b/](http://www.as.northropgrumman.com/products/nucasx47b/).

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