The Revolutionary Boeing Canard Rotor/Wing Aircraft Begins Flight Testing

Nearly 100 years after the dawn of powered flight, a new generation of high-speed, unmanned air vehicle successfully began flight testing today. The Boeing Company's [NYSE: BA] Canard Rotor/Wing (CRW) concept demonstrator completed its first hover flight at the U.S. Army Proving Ground in Yuma, Ariz.

During the flight test, the CRW advanced technology demonstrator -- known as the X-50A Dragonfly -- flew for about 80 seconds at 8:10 a.m. MST. It lifted off vertically from the launch site to an altitude of 12 feet above the ground, hovered and then vertically landed, commencing the flight test program.

Under joint development by Boeing and DARPA (Defense Advanced Research Projects Agency), the CRW is a revolutionary aircraft that combines the speed and range of a fixed-wing aircraft with the flexibility of rotary-wing flight. This is because the CRW's rotor is designed not only to spin during vertical takeoffs and landings but also to stop turning during flight and convert to a fixed wing for high-speed cruise.

"Today's successful hover flight was an exciting first step toward meeting the goal of this flight test program," said Gary Gallagher, CRW Systems senior manager for the Boeing Phantom Works advanced research and development unit. "The ultimate objective is demonstrating the Dragonfly's ability to convert from rotary-wing to fixed-wing and back to rotary-wing flight."

About a dozen flight tests are scheduled for the X-50A Dragonfly. Under the remote control of a pilot in the ground station cockpit, the vehicle will gradually perform more extensive hover flights, then forward moving rotary-wing flights, and finally a conversion to a fixed-wing flight and back again to a rotary-wing landing. Two such conversion flights are planned.

The X-50A Dragonfly vehicle is 17.7 feet long and 6.5 feet high and weighs 1,460 pounds. In addition to its 12-foot-diameter rotor/wing, it also has an 8.9-foot-span canard and an 8.1-foot-span horizontal tail. It is propelled by a conventional turbofan engine combined with The Boeing Company's unique reaction drive rotor system.

During rotary-wing flight, the engine's exhaust is diverted by the reaction drive system through the rotor system to exit through small nozzles in the rotor tips. As forward speed increases and the canard and tail pick up the aerodynamic load of the aircraft, the exhaust is gradually diverted completely through a nozzle at the back of the aircraft, propelling it even faster forward and allowing the rotor to stop and lock into place for fixed-wing flight. The reverse then occurs for conversion back to rotary-wing flight.

Gallagher explained that the CRW reaction drive rotor system eliminates the need for the traditional mechanical transmission, drive train and anti-torque device. "Reaction drive makes the CRW much lighter, simpler and more affordable to operate and support than traditional rotorcraft." Its greater speed, range and flight-mode flexibility will make it suitable for a wider range of missions.

Further expanding CRW's flexibility and versatility is the fact that it can be scaled for both manned and unmanned applications. As an unmanned air vehicle, the CRW would be able to perform such missions as reconnaissance, communications and data relay. In a manned configuration, it would be ideal for armed escort, command and control, logistics re-supply and medical evacuation.

"The CRW is truly a transformational aircraft for the 21st century," Gallagher said. "Boeing is proud to be working with DARPA to bring our war fighters this exceptional new capability."

The CRW is being developed by the Boeing Phantom Works, which is the advanced R&D unit and catalyst of innovation for the Boeing enterprise. By working with the company's business units, it provides advanced solutions and innovative, breakthrough technologies that reduce cycle time and cost while improving the quality and performance of aerospace products and services.

Phantom Works and DARPA have been developing the CRW concept under a 50-50 cost share agreement since May 1998.

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