

Team Uses Historic NASA Tunnel to Test Blended Wing Body

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Concept painting of BWB (Blended Wing Body) aircraft by Bill Kluge, NASA LaRC.

A historic NASA wind tunnel is helping test the prototype of a new, more fuel-efficient aircraft design. Boeing Phantom Works, St. Louis, has partnered with NASA's Aeronautics Research Mission Directorate and the U.S. Air Force Research Laboratory, Wright Patterson Air Force Base, Ohio, to explore and validate the structural, aerodynamic and

operational advantages of an advanced concept called the blended-wing body. A blended-wing body looks different than most airplanes, as it has a modified triangular-shaped wing.

The team has produced two high-tech, 21-foot wingspan prototypes of the blended-wing body for wind tunnel and flight-testing. The Air Force has designated the vehicles as the "X-48B."

"One big difference between this airplane and the traditional tube and wing aircraft is that, instead of a conventional tail, the blended-wing body relies solely on multiple control surfaces on the wing for stability and control," said Dan Vicroy, senior research engineer at NASA's Langley Research Center in Hampton, Va. "What we want to do with this wind-tunnel test is to look at how these surfaces can best be used to maneuver the aircraft."

X-48B Ship No. 1 began wind-tunnel testing April 7 at the Langley Full-Scale Tunnel. The Langley Full-Scale Tunnel, operated by Old Dominion University in Norfolk, Va., was built in 1930. It has been used to test World War II fighters, the Mercury space capsule and concepts for a supersonic transport. When testing is completed in mid-May, the prototype will be shipped to NASA's Dryden Flight Research Center, Edwards Air Force Base, Calif., to serve as a backup to Ship No. 2, which will be used for remotely piloted flight tests later this year.

Both phases of testing are focused on learning more about the low-speed flight-control characteristics of the BWB concept.

"The X-48B prototypes have been dynamically scaled to represent a much larger aircraft and are being used to demonstrate that a blended-wing body is as controllable and safe during takeoff, approach and landing as a conventional military transport airplane," said Norm Princen, chief engineer for the X-48B program at Boeing Phantom

Works.

The cooperative agreement on the X-48B program culminates years of research by NASA and Boeing. The Air Force is interested in the concept for its potential future military applications.

"We believe the blended-wing body concept has the potential to cost effectively fill many roles required by the Air Force, such as tanking, weapons carriage, and command and control," said Captain Scott Bjorge, AFRL's X-48B program manager. "This research is a great cooperative effort and a major step in the development of the blended-wing body. AFRL is inspired to be involved in this critical test program."

Cranfield Aerospace Ltd., Cranfield, England, built the ground breaking X-48B prototypes in accordance with Boeing Phantom Works' specifications. Made primarily of advanced lightweight composite materials, the prototypes weigh about 400 pounds each. They are powered by three turbojet engines and can fly up to 138 mph and as high as 10,000 feet.

Source: NASA

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