

## **Boeing 787 Dreamliner Demonstration Wing Box Complete; Testing Set to Begin**

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Boeing [NYSE:BA] and its partners have completed construction and will soon begin structural testing of a full-scale 787 Dreamliner composite wing box as part of the certification process of the all-new jetliner.

The test piece measures approximately 17 feet front spar to rear spar and 50 feet from airplane centerline to the tip of the composite structure. It is 4 feet deep at the thickest section. It will weigh 55,000 pounds, including a great deal of test-only hardware and instrumentation. It was designed and built by a joint team of Boeing, Mitsubishi Heavy Industries and Fuji Heavy Industries.

While it is full-scale, the piece represents a portion of the wing section, beginning at about the center of the airplane and stopping at approximately two-thirds of the span of the wing.

"In addition to determining the strength of the structure, the tests we are running will help us to verify the analytical methods we have used to calculate the loads that the structure will have to carry," said Mike Bair, vice president and general manager of the 787 program for Boeing. "This is how we work through ensuring that the structure performs exactly as we predict during the design effort.

"We start by testing small coupons and elements to characterize the material system; we proceed to testing small and medium size articles of configured structure; and then proceed to full-scale testing."

Boeing will conduct structural tests on two full-scale 787 airframes as part of its validation and certification process. Those test programs, like the testing being run on the half-span wing box, will demonstrate the performance of the structure through multiple lifetimes of normal operational loads and test the structure to the point of breaking.

"We analyze the wing for how much load the structure can bear and when and where it will break," Bair said. "The failure loads are equivalent to more than 150 percent of the maximum load we ever expect these wings to see in service, even in the event of an extreme emergency."

In addition to testing the strength of the wing, Boeing will use the test structure to validate the repair methods that have been developed for the materials being used on the 787.

The upper and lower surface panels and the spars of the wing are made entirely of the same composite material being used on the fuselage. The wing ribs are monolithic aluminum structures, each machined from a single piece of aluminum plate. "Because the design is all-new, we feel it is important to get early test results," said Bair. "This test article will help us to refine our final designs and ensure we minimize the chance for surprises during the full-scale testing."

Structure representing the engine nacelle fittings and the main landing gear fittings, as well as other attachments, have also been added to the structure to allow testing of the joints of these structural elements.

It took approximately 18 months to build the test fixture and all of the associated structure. Testing begins in August.

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