The 787 Dreamliner static-test airplane entered its test fixture in April in the Everett, Wash., factory. Work continues on preparing the non-flying vehicle for a series of tests designed to stress the airframe by replicating and exceeding by 50 percent the most extreme conditions any 787 is expected to see in the life of the fleet.

ED TURNER PHOTO

Ready for the stress

787 Dreamliner put through its paces, as its first flight nears

By Lori Gunter

Before it can fly, the all-new 787 Dreamliner must be proven to be flightworthy. Although much of this testing can be done at a component level in laboratories, the ultimate tests—static tests and "gauntlet" tests—are run on full-size 787 airframes.

The nonflying static-test vehicle entered its test fixture in April at the Boeing factory in Everett, Wash. Work continues on preparing it for a series of tests designed to stress the airframe by replicating, and exceeding by 50 percent, the most extreme conditions any 787 is expected to see in the life of the fleet.

In addition to finishing some structural work on the static-test airplane, a Boeing crew has been placing the hundreds of actuators and sensors needed to create and measure the stresses on the airframe.

"We need to get through three of the static-test conditions before we can fly," said Mark Jenks, vice president of 787 development. The first one is what's known as "high blow," which applies 14.9 pounds per square inch (1 kg per square centimeter) internal pressure to test the fuselage structure as a pressure vessel, or its ability to maintain cabin pressurization when flying at altitude. On subsequent test conditions, the internal pressure will be combined with fuselage bending and torsion to simulate worst-case flight maneuvering loads critical for wing/fuselage bending, Jenks said. Additional test conditions will be run after first flight but before aircraft certification is granted by government aviation authorities.

Jenks reported the program is confident in the performance of the airplane because of testing that has already taken place. "The composite structure has performed exceptionally in our laboratory testing and in the static testing we have performed on different sections," he said. "I am confident we will find the structure is robust and ready for flight."

Gauntlet testing, which happens on board the first airplane that will fly, includes three stages: the factory gauntlet, the intermediate gauntlet and the final gauntlet. During gauntlet testing, airplane electrical power distribution and utilization are tested and pushed, and systems are put through their paces for one last time before flight.

During factory gauntlet testing, the flight-test organization examines the onboard systems and runs tests that verify the systems perform as expected. With intermediate gauntlet testing, the airplane is moved out to the flight line. There the engines are powered up and in turn provide the airplane with electrical power. During final gauntlet testing, the systems are left running for eight straight days for extensive testing.

"Most people have no idea how much testing we do before we ever fly the airplane," said Jenks. "They just know that when they step on board a Boeing airplane it is going to be safe and reliable. They're right—it is. But that doesn't just happen; it takes the hard work and expertise of an incredible team.

"The Federal Aviation Administration and other regulatory authorities require us to do much of this testing, but we have our own even more demanding standards in many cases," he said. "We take our testing very seriously, because it gives us confidence for the life of the program." ■

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