



Testing the future

Test and evaluation teams do much more than aircraft flight testing

By Jennifer Hawton

In St. Charles, Mo., what looks to be a full-sized fighter aircraft is mounted on a 30-foot (9-meter) pedestal. But it's not a statue.

To make testing of complex antenna systems on aircraft more efficient and economical, a Boeing team at the antenna range designed and built this ground-based tool—to which they mount a fully functioning aircraft. It allows the team to reposition the aircraft quickly and easily to verify its many antenna systems all work regardless of the aircraft's configuration and alignment. The testing approach eliminates the need for expensive, time-consuming flight tests.

"It takes a lot of effort and knowledge to make sure we test every antenna combination from every angle," said John Vortmeier, the field lead for the antenna range. "But this team knows every trick in the book. Maybe we wrote the book."

Vortmeier's team is part of Boeing Test & Evaluation, the centrally managed test and evaluation organization. Probably best known for the flight-test work it's conducting on the 787 Dreamliner and 747-8, it also performs critical test and evaluation work at more than 70 sites across the United States, including St. Charles.

The efforts of the test teams play a large role in ensuring that Boeing ultimately delivers on the promises made to its customers.

One of those sites is in Philadelphia, where a test and evaluation team works with Boeing's largest wind tunnel, the largest privately owned one in the United States. At 20 feet (6 meters) high and 20 feet wide, it can create winds in excess of 250 mph (400 kph).

Built in 1968, the wind tunnel has been used for more than 80,000 hours of component and model testing.

"You name it, we've tested it," said Bill Grauer, wind tunnel manager. "We've tested every airplane in the 7-series from the 727 to the 787. We've tested fighters, helicopters, ships and ground vehicles."

Data obtained from these tests are often used to provide customers technical information about a Boeing product before it goes into production. Testing at the tunnel also supports in-service products by testing changes, such as the effects of adding antennas.

Boeing also owns wind tunnels in the transonic and supersonic

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PHOTOS: (Left) An employee stands inside Boeing's wind tunnel in Philadelphia, the largest privately owned wind tunnel in the United States. **BOB FERGUSON/BOEING (Above)** Boeing Test & Evaluation engineers Jerry Bathon, left, and John Vortmeier at Boeing's outdoor antenna range at Smartt Field in St. Louis. **PETER GEORGE/BOEING**



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— Mark Hopper, manager of the Structures and Material laboratory, Boeing Test & Evaluation

ranges, which gives the company a unique strategic advantage. Grauer noted that since the Philadelphia wind tunnel became part of Boeing Test & Evaluation, it's become better connected with the resources across the company.

“The enterprise organization provides the infrastructure and connections needed to make things go faster and more efficiently,” Grauer said. “It couldn't have come at a better time, since next year will be one of our busiest years.”

Meanwhile, another team is working to keep U.S. Air Force F-15Cs in service longer. Many of these jet fighters are approaching their original design life certification. The goal of the full-scale fatigue testing is to certify the airframe is capable of continued operations to 2025.

Before fatigue testing can begin, the test aircraft must be fitted with thousands of data-collection sensors. So far the Structures lab team has completed putting 270 sensors inside the wings. Rather than buying a new data system, the Structures lab is using a data-collection system created for 787 wingbox structure testing.

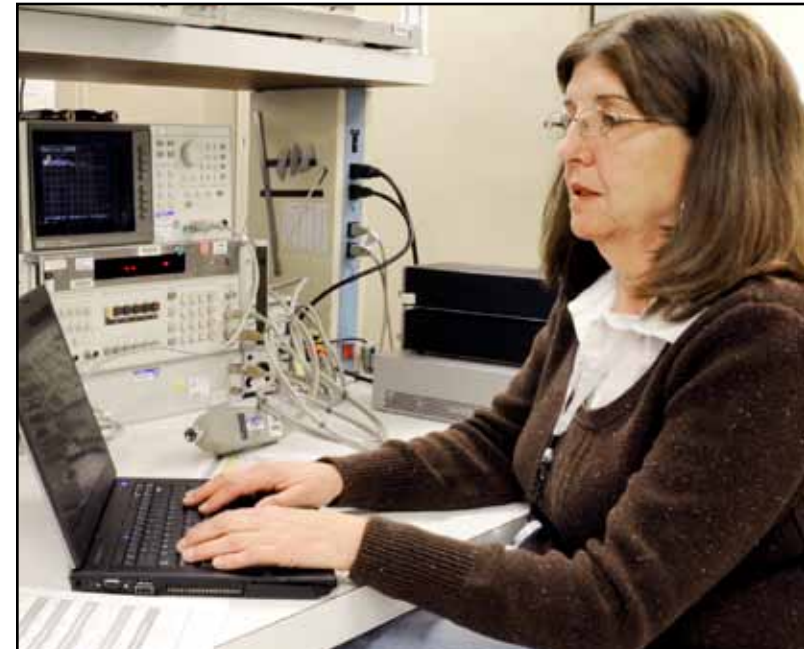
The Air Force has also awarded Boeing fatigue testing of the F-15E. The company's performance on the F-15C and its ability to quickly respond to the customer's needs on the F-15E “has brought another full-scale fatigue test into our lab,” said Mark Hopper, manager of the Structures and Material laboratory.

“This kind of work,” Hopper said, “helps ensure the future stability of the Structures laboratory and Boeing.” ■

jennifer.l.hawton@boeing.com

PHOTOS: (Above) Structures lab engineers Phil Webb, left, and Jerry Bast inspect sensors used to collect fatigue test data on an F-15C test article. **(Right)** Denise Robinson helps ensure that the tools at the Test Equipment Management Center in Huntsville, Ala., are in proper working order.

MIKE MCCORMICK/BOEING



Equipped for the future

To conduct their expansive range of tests, Boeing Test & Evaluation teams require specialized test and lab equipment, from oscilloscopes to multimeters. One of the organization's teams is in charge of these tools.

The Boeing Test Equipment Management Center, with locations across the company and a “storefront” on the Boeing intranet, can help find the right tool to test nearly anything.

“The current Web-based system allows us to quickly see test assets anywhere in the company,” said Jim Smith, equipment focal for the southern region. Visibility of all available test equipment helps Boeing standardize across the company and control costs by reducing duplication or the need to purchase equipment the company already has.

And “because we have a bird's-eye view of overall testing requirements, we can purchase equipment that can be used by the majority of teams,” said Mike Wallace, northwest equipment focal. “There is a lot of demand right now with so much flight testing on both the commercial and defense sides. I'm very pleased we can meet these needs because of our ability to share across business units. A few years ago we wouldn't have been able to meet these increased demands.”

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