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ON THE COVER: Hard hats were donned and shovels were grasped during a ceremonial groundbreaking event at Spirit’s recently announced facility in Saint-Nazaire, France.

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As just about anyone working at Spirit knows, there is a vital step that must be taken every time a new aircraft product is being prepared for the marketplace. It’s a step that is laborious, expensive and time-consuming. And, on occasion, it’s a step that sends engineers back to the proverbial drawing board.

That “step” is actually a sophisticated, multi-layered series of tests that are conducted on aircraft parts. As both a team partner and supplier to its various customers, Spirit is required by its own guidelines, the customer and government regulations to conduct rigorous tests ultimately leading the FAA to certify an aircraft for flight worthiness.

An innovative research institute with headquarters at Wichita State University – the National Institute of Aviation Research (NIAR) -- provides testing, research and certification services for the aviation industry. Spirit and other Kansas-based aviation companies have taken advantage of the institute’s capabilities to further their testing programs.

Spirit is testing the wing flap at NIAR test facilities inside Hawker Beechcraft property in Wichita for two business jet programs it has won contracts for.
Larry Braden, NIAR manager of the full-scale structural test laboratory, said the wing flap proof tests have been completed. Static certification soon will begin, followed by a long series of fatigue tests at the Aircraft Structural Testing & Evaluation Center.

Having NIAR nearby is a more than a convenient benefit, said Gary Michaels, Spirit engineering test lead at NIAR.

“Probably the most beneficial part is without companies like NIAR, Spirit might not have been able to take the project in the beginning,” Michaels said.

“Spirit has a full test lab but it’s full of other programs. Having NIAR in our backyard is extremely beneficial.”

NIAR is responsible for performing four distinct tests for the flap and also for tabulating the data and providing it to Spirit.

Michaels said the tests break out into several different parts: a static test where the flap with loaded with simulated aerodynamic forces; actuator tests that simulate defective or faulty actuators; and long-term durability fatigue tests. In all, the test projects into a three- to four-year cycle.

The lengthy cycle is necessary because the FAA requires the wing to simulate the number of flights or cycles of flight times of the airplane – eight years or 30,000 flight hours. “We’re actually testing way beyond what the aircraft is expected to see in service,” Michaels said.

Collaboration with NIAR is cost-effective for aircraft companies, Braden agreed. “It’s expensive for an individual company to maintain expertise in a large number of areas throughout the company’s life,” he said. “Product development is very cyclic. When a new product develops, you need a certain group of individuals initially and you may not need them again for five to 10 years when you develop the next one. But the company needs to maintain that somehow.”

Considering the tremendous costs involved in developing new technologies, protection of intellectual property has taken on a crucial role for Spirit. One might believe that mixing scientific experts allied to varied interests on a common project might create some legal entanglements. But Farhad Tadayon, Spirit’s NIAR liaison, said the company takes seriously its responsibility to protect company intellectual rights.

“We have legal agreements that each individual signs which protects our property rights,” Tadayon said. “The same is true for corporate and entity rights.”

Spirit is taking test results, Braden said, and using the data to verify model analysis for eventual presentation to the FAA.

Q&A with NIAR

The National Institute for Aviation Research (NIAR) at Wichita State University, which was created in 1985, calls itself the most capable university aviation research center in the United States. Dr. John Tomblin heads up the enterprise. He has a Ph.D. and MS in mechanical engineering from West Virginia University and a BS in aerospace engineering from the same institution. He sat down with Spirit Communications for a Q&A session:

Q: What is NIAR, and what does the institute provide?
A: What we do is provide testing, research and certification services to the aviation industry. Being in the air capital of the world, NIAR is naturally a hub for that type of activity in a university type setting, but it operates more like a business.

Q: How did NIAR begin?
A: NIAR started as an idea to begin a research institute in the aircraft capital of the world, focused toward providing research, testing and certification services to the aviation industry. Its uniqueness is its setting in a university environment in a non-biased playing field. If you look around town, there are many direct competitors with each other in the aviation market. But at NIAR, they can come together for noncompetitive research to advance products made here in Wichita.

Q: Explain some of the different research labs and support units you support.
A: NIAR operates six locations around Wichita. We have our main facility here on the campus of Wichita State University. We operate a full-scale and aging aircraft facility at Hawker Beechcraft, a facility in Newport Beach, Calif., that does CATIA training, a facility in Augusta, Kan., that does aging aircraft work, as well, plus some nondestructive testing at other sites around town. We’re also linked as a partner with the National Center for Aviation Training that’s currently being built along with Sedgwick County at Jabara Airport.

Q: Was any of that testing done on its own prior to NIAR?
A: A lot of times when they wanted to do testing, and NIAR wasn’t here, (companies) went outside the state. So the beauty of having NIAR here is it keeps everybody geographically centered toward being here in Kansas.