

WSU News

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Air Force awards \$100 million to continue WSU NIAR's B-1 Digital Engineering program

By Strategic Communications



On March 9, 2022, the B-1 System Program Office (SPO), Tinker AFB, OK awarded a six-year, \$100 million follow-on contract to Wichita State University's National Institute for Aviation Research (NIAR) to continue the B-1's Digital Engineering (DE) transformation. The National Center for Manufacturing Sciences (NCMS) helped form the strategic partnership and created a flexible contract structure, which allows NIAR and the B-1 SPO to adapt requirements real time to meet critical warfighter needs.

According to Lt Col Joseph Lay, B-1 SPO Material Leader for Structures: "This project brings the B-1 into the same field as newly designed aircraft and allows digital modeling to predict future areas of concern. This will allow the SPO to proactively develop repairs, reduce the cost and schedule for parts procurement by eliminating the burden of interpreting legacy Air Force (AF) drawings, and increase the number of vendors who are capable of producing parts for the B-1 platform. DE will not only help reduce the time it takes to develop repairs but also to install them. We will be able to develop and test repairs well in advance virtually ensuring first time success and improving aircraft availability."

While new AF systems are born digitally, the transition to DE for legacy systems is complicated by various factors to include return on investment over the platform's lifecycle, vendor lock with the original equipment manufacturer (OEM), and understanding where to start on a task of this size and complexity. The B-1 is proving legacy aircraft can find a benefit and has become a trailblazer for other legacy platforms to follow.

"This is the largest award Wichita State has ever received, and it's in large part due to the university's groundbreaking work and recognition of digital transformation as an emerging field of research with enormous growth potential," said Dr. Rick Muma, president of Wichita State University. "Our work in the defense industry has been a tremendous applied-learning opportunity for our students, and it has strongly contributed to the economic prosperity of our state."

Creating flexible requirements with a cost ceiling allows the B-1 to execute only those tasks which provide maximum benefit to the warfighter. Initially, B-1 chose to focus on structures, one of the main issues impacting fleet availability. With successes in Desert Fox, Allied Force, Iraqi Freedom, Enduring Freedom, and Inherent Resolve, the B-1 rapidly flew more hours than anticipated, accelerating the need to extend the original certified test life earlier than expected.

"Wichita State University continues to support our nation's security priorities by offering innovative and effective solutions to the Air Force's most pressing challenges," said Senator Jerry Moran (R-Kan.). "The partnership that has grown between NIAR and the B-1 System Program Office is improving B-1 readiness will keep these legacy bombers in the fight for years to come."

While the SPO has made significant progress in the arenas of structural life, maintenance and reliability, DE will breathe new life into the fleet, rejuvenating the B-1 to fly until the future bomber force is ready.

Even in such short time, the SPO has already begun to benefit from DE activities. B-1 models have been delivered to aid in the design and manufacture of support fixtures for use at Depot Maintenance facilities and the first set of models are being supplied to third-party vendors to provide digital manufacturing data for complex components.

“NIAR is eagerly looking forward to continuing to support the B-1 SPO’s DE transformation by reducing cost, expanding the supply base, and increasing aircraft mission readiness. Over the past two years, the B-1 program team has developed smart ways to implement DE for maximum impact on legacy platforms. Flexibility afforded through the NCMS contract has allowed NIAR to adapt to changing priorities of the warfighter,” said Melinda Laubach-Hock, NIAR B-1 Program Director.

The B-1 SPO began their digital transformation in early 2020, creating a structural digital twin of a single wing. Since then the effort has expanded to include the structure of the entire airframe, the launch of an Integrated Digital Engineering Environment including a Product Lifecycle Management (PLM) tool, model based systems engineering (MBSE) efforts to create system modeling language (SySML) representations of various mechanical systems, technical order digitalization, the integration of systems and weapons to enhance the structural digital twin, structural and aerodynamic predictive simulation tool development, and other DE efforts.

“Wichita State’s partnership with the DoD supports sustainment efforts for legacy weapons systems, like the B-1, that will immediately impact the preparedness of the warfighter. In addition, these programs provide unique educational opportunities for students to work with seasoned professionals, developing a talent pipeline the DoD is capitalizing on, particularly in the emerging field of digital engineering,” said Dr. John Tomblin, Senior Vice President for Industry and Defense at Wichita State University.

“We are excited to continue this partnership and move the B-1 further into the virtual world. We could not have achieved this without the great partnership and team between the SPO, NIAR, and NCMS to make this all happen,” said Lt Col Lay.

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