

# Boeing JSF Team Surpasses Propulsion Test Milestones

The Boeing Joint Strike Fighter (JSF) program today announced the successful completion of two significant propulsion tests. Both are important milestones in the company's quest to build the next-generation fighter for the U.S. armed services and their allies.

The completion of the testing marks the third successful test sequence involving JSF propulsion system components conducted in 1997. Attaining propulsion system performance verification through model and full-scale tests is an integral step toward achieving flight certification for the Boeing JSF.

The first test, conducted at the Boeing Nozzle Test facility in Seattle, involved the direct-lift system components, which, when combined with the Pratt & Whitney SE614 engine, comprise the propulsion system for the Boeing JSF. The SE614 is a derivative of the F119 Pratt & Whitney engine that powers the F-22 air dominance fighter.

Testing of the lift components spanned three months and met the program performance objectives for verifying successful Short Takeoff and Vertical Landing (STOVL) capabilities for the Boeing JSF propulsion system. Designed and built by Rolls-Royce, the lift components - specifically the lift module and spool duct - connect the JSF gas generator to the 2-D cruise nozzle, and convert the engine's horizontal thrust to vertical thrust for both vertical landings and short take-off.

The scale model was used to assess the performance and operability of the lift module and spool duct during conventional flight, STOVL operations, and transition from one flight mode to the other. The full range of JSF nozzle pressure ratios, mass flows and lift module positions also were evaluated.

The second series of tests, conducted at the Arnold Engineering Development Center (AEDC) in Tullahoma, Tenn., showcased the performance of the high-speed inlet/forebody compression system for the Boeing JSF which, during flight, provides air to the engine, enabling it to generate thrust to power the aircraft.

The three-week-long test employed a 13-percent scale model and encompassed the full range of JSF flight speeds and attitudes. During approximately 211 hours of testing, actual test speeds included subsonic, transonic and supersonic rates, with model attitudes ranging from 20 degrees nose down, to 60 degrees nose up, and up to 25 degrees of sideslip.

The high-performance capabilities afforded by the wind tunnel at AEDC also enabled the Boeing JSF team to test the high-speed inlet in a variety of conditions including simulated takeoff operations in the low-speed position, used to achieve increased engine thrust during vertical flight operations. Data gathered during testing is critical to defining the operational extremes of the aircraft/engine combination including component compatibility and the optimum speeds at which they can operate and deliver precision performance.

"We are extremely pleased with the results of these tests," said Steve Kyle, JSF propulsion and integrated product team (IPT) manager for Boeing. "The results validate the operability goals we set for our propulsion system components and concept design, and demonstrate that the system is in line to meet and exceed the performance objectives."

Ground testing of the full-scale SE614 engine and lift system begins in 1998 and will provide additional system verification and operational performance data.

On Nov. 16, 1996, Boeing was awarded a \$662 million contract from the Department of Defense to proceed with the Concept Demonstration Phase (CDP) of the Joint Strike Fighter program. During the four-year CDP, Boeing will demonstrate critical technologies, processes and characteristics of its plan to produce an affordable JSF. The company also will define a multi-service preferred system concept for the next phase of the JSF program, the Engineering and Manufacturing Demonstration (EMD) program.

The CDP contract also calls for Boeing to build and flight-test two airplanes. One aircraft will demonstrate characteristics of both the Air Force and allied Conventional Takeoff and Landing (CTOL) and the Navy's carrier-based (CV) variants. The second aircraft will demonstrate the STOVL variant envisioned for use by the Marine Corps and the United Kingdom Royal Navy. A competition winner will be selected in 2001, with actual fighter deployment set for 2008.

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