F-35 JSF's Final Shape Validates Concept-Demonstration Goals

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Engineers have finalized the external design of the F-35 Joint Strike Fighter, with the resulting configuration nearly indistinguishable from the X-35 JSF demonstrator that underwent flight-testing in 2000 and 2001. Design changes -- though small -- will bring overall performance gains to the stealthy fighter.

Lockheed Martin Aeronautics Co., a business area of Lockheed Martin Corp. , is developing the F-35 in conjunction with principal partners Northrop Grumman and BAE SYSTEMS.

The F-35 "lines freeze" milestone was achieved, as scheduled, on June 27, 2002. The design has been evolving incrementally since the configuration that flew as the X-35 demonstrator. Finalized changes include:

-- Extending the forward fuselage by 5 inches to better accommodate avionics and sensors, and moving the horizontal tail rearward by 2 inches to maintain stability-and-control with the newly extended forward fuselage.
-- Raising by about 1 inch the top surface of the aircraft along the centerline, increasing fuel capacity by 300 pounds and extending range.
-- Adding slightly more twist to the wing camber on the CV (aircraft-carrier version) to improve both handling qualities and transonic performance.
-- Adjusting the positioning of the vertical tails slightly to improve aerodynamic performance.

Earlier in the design phase, engineers also reduced the length of the engine inlet ducts, saving weight and improving performance.

"During the Concept Demonstration phase of this program, we believed the only way to validate the aerodynamic performance of our concept was to test- fly an aircraft that was representative of the one we intended to produce," said Tom Burbage, Lockheed Martin executive vice president and JSF program general manager. "When you look at this final design and compare it to the one we flew, it's clear that the two aircraft are essentially identical, save for some fine-tuning. That means the outstanding performance of our X-35 JSF concept demonstration aircraft can also be expected of our production model, the F-35."

John Fuller, vice president of Air Vehicle for the F-35 JSF program, added, "Lines freeze was a challenging milestone, and we achieved it relatively early in the program. This now allows us to reduce the risk for structural loads development before we face the next major program milestone next March, Preliminary Design Review."

The next-generation F-35 is a stealthy (radar-evading), supersonic multirole fighter designed to meet the U.S. government's requirements for a new generation of transformational weapons. The single-engine JSF will be manufactured in three versions: a conventional-takeoff-and-landing (CTOL) variant for the U.S. Air Force, an aircraft-carrier version for the U.S. Navy and a short-takeoff/vertical landing (STOVL) version for the U.S. Marine Corps.

The cornerstone of the F-35 is affordability, achieved in large part through a very high level of common parts and systems across the three versions of the aircraft.

The F-35 is designed to replace aging fighter inventories, including U.S. Air Force A-10s and F-16s, U.S. Navy F/A-18s, U.S. Marine Corps AV-8B Harriers and F/A-18s, and United Kingdom Harrier GR.7s and Sea Harriers.

Pratt & Whitney and General Electric are developing two separate but interchangeable propulsion

systems.

Lockheed Martin Aeronautics Co., headquartered in Fort Worth, Texas, is a leader in the design, development, systems integration, production, and support of advanced military aircraft and related technologies. Its customers include the military services of the United States and allied countries throughout the world. Products include the F-16, F-22, F-35 JSF, F-117, T-50, C-5, C-130, C-130J, P-3, S-3 and U-2.

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