

Integrated Subsystems Reduce Risk, Cost And Vulnerability For Lockheed Martin JSF

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Lower procurement and life-cycle costs, reduced takeoff weight and increased survivability are among the projected benefits of a technologically advanced integrated aircraft subsystems package for the Lockheed Martin Joint Strike Fighter (JSF).

A contractor team of Honeywell, Northrop Grumman, Hamilton Sundstrand and Pratt & Whitney successfully completed testing of the JSF Integrated Subsystems Technology (J/IST) Thermal/Energy Management Module (T/EMM). The tests culminated in a demonstration to the JSF Program Office and both JSF weapon system contractors.

The technology combines traditionally separate systems -- environmental control, secondary or emergency power, multiple hydraulics and multiple power-generation -- into a single system.

"We've now shown that this system not only offers distinct performance advantages over conventional systems, but also costs less -- up front and down the line," said Frank J. Cappuccio, vice president and program manager for the Lockheed Martin JSF. "It fits perfectly with our effort to drive down program costs and keep quality and capability high."

The Joint Advanced Strike Technology (JAST) program office (now the JSF program office) funded the J/IST program in 1995 to provide technology maturation for key JSF subsystems technologies, including:

- T/EMM (Honeywell) -- An integrated turbomachine providing auxiliary and emergency electrical power and environmental conditioning
- Fan-duct heat exchanger (P&W) -- Development of both inconel and titanium heat exchangers to mount inside the F119 engine fan duct and provide the heat sink for the T/EMM system
- Engine-mounted switched reluctance starter/generator (Hamilton Sundstrand) -- Electrical power generation system providing dual, electrically isolated, 270 volts DC aircraft power (Also operates as a motor, when electrically driven by T/EMM, to start the F119 engine).

In earlier JAST-funded studies, the JSF weapon-system contractors agreed that the maturation of integrated subsystem technologies could produce a 3 to 5 percent reduction in aircraft procurement costs, 10 to 13 percent lower life-cycle costs (versus legacy aircraft), a 5.5 percent decrease in gross takeoff weight and a 10 to 16 percent reduction in aircraft vulnerable area.

During testing, the J/IST contractor team successfully demonstrated all eight operating modes of the integrated subsystem, including:

- Self-starting
- Ground-maintenance electrical power
- Electrical start of the F119
- Avionics and cockpit cooling
- Emergency electrical power from a stored-energy source
- Transition from stored energy to air-breathing mode
- Cool-down motoring of the F119
- Electrical power transition from the engine-mounted starter/generator to the T/EMM internal starter/generator.

Test results validate the system concept and provide a significant risk-reduction step for the Lockheed Martin JSF Preferred Weapon System Concept.

Lockheed Martin received one of two JSF Concept Demonstration contracts awarded by the Department of Defense in November 1996. The Lockheed Martin JSF team includes Northrop Grumman and BAE SYSTEMS. Flight evaluation of the demonstrator aircraft is scheduled to take place in 2000, with government selection of a single contractor for the Engineering and Manufacturing Development phase set for 2001.

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For information on Lockheed Martin Aeronautics Company, visit: <http://www.lmaeronautics.com/>.

For information on Lockheed Martin Joint Strike Fighter program, visit: <http://www.jsfteam.com/>.

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