

# Lockheed Martin Begins Inspecting F-22 Composite Parts With Unique Laser Tool

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Lockheed Martin Aeronautics Company has begun inspecting composite F-22 parts using its patented laser ultrasonic technology system, known as LaserUT(TM). This technology enables affordable, high-volume inspection of complex-contoured composite parts.

This marks the first production aircraft parts that have been inspected using the advanced laser testing system, following years of research and prototyping by Lockheed Martin and its predecessors at Fort Worth. The company has nine patents issued or pending for this technology.

The next-generation combat aircraft will have a high percentage of graphite-epoxy composite material in their structures. Extensive inspection is required to ensure no flaws exist in the many layers that comprise the finished composite components. The LaserUT system requires very little set-up time and performs high-resolution inspection in a tenth of the time compared to current water ultrasonic inspection systems.

"We recently inspected a large section of the F-22 engine inlet duct in less than two hours using LaserUT compared to 24 hours with the first-generation inspection equipment," said Russell W. Ford, vice president of Aerostructures Manufacturing at Lockheed Martin Aeronautics Company. "With this 90 percent reduction in inspection time, we expect to shorten manufacturing span times by many weeks and to realize substantial cost savings over the course of F-22 and Joint Strike Fighter production. Also, the accuracy of the system will help us achieve even higher standards of quality."

The LaserUT system at Fort Worth, the first of its kind, can handle complex-shaped parts up to 54 by 27 by 21 feet. It is located in a multimillion-dollar facility that has been under construction since early 1998. The technologies were developed with company funds and support from the Air Force Research Laboratory's Materials and Manufacturing Directorate at Wright-Patterson Air Force Base, Ohio.

The system is controlled by a Silicon Graphics Onyx II supercomputer capable of advanced, real-time signal processing and data analysis. The computer uses a 64-bit R10000 processor with a throughput capacity of at least 6.4 gigabytes per second.

The system has a user friendly operator interface that provides the classic ultrasonic presentations. It also provides real-time feedback to the operator, or design and process engineers, for rapid configuration and process changes.

"This inspection system is expected to offer high payoffs in materials selection," said Bob Rearden, vice president and F-22 program manager. "We originally designed a complex section of the inlet duct as a titanium weldment because it was not practical to inspect this configuration made from composite materials. But now we anticipate switching this component to composite material with significant reductions in cost and weight."

Lockheed Martin Aeronautics is continuing research and development in this high payoff inspection technology to further reduce inspection times to meet JSF affordability requirements. More systems will be added as production rates of the next-generation fighters increase. LaserUT is being considered for other aerospace facilities in Lockheed Martin.

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