Navy SBIR/STTR Success

Comprehensive Inspection of Turbine Hot Section Blades and Vanes Using Active Thermography

The T^3S system, through an automated and modular design, reduces scheduled inspection times of turbine blades from days or weeks to under a minute.

Topic Number: N06-T011

SBIR Investment:
$474,977

Phase III Revenue:
$3,600,000

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About the Technology:

Turbine engines in modern Navy combat aircraft such as the JSF operate at higher temperatures than previous generations, so it is essential that all components meet design and performance specifications in the manufacturing phase, before they are installed in aircraft, and throughout their service lifetime. Unfortunately, the technology that is currently used to inspect turbine components is time-consuming, labor-intensive, and in some cases, not adequate for newer hardware. This led Thermal Wave Imaging (TWI) to develop a hybrid thermographic inspection system that can diagnose most, if not all, typical blade/vane defect conditions in a single inspection.

Naval Benefit

The hybrid thermographic inspection system reduces inspection time, simplifies and consolidates training and certification requirements, and eliminates reliance on visual or manual inspections. Prior to the development of this system, turbine blades were inspected using an array of nondestructive tests ranging from sophisticated instrumentation to manual tests. This meant that the inspectors had to be trained and certified in several disciplines, and several different types of inspection equipment had to be purchased and maintained. The inspection process could take days or weeks to complete. TWI's new system is automated, resulting in the complete suite of inspections being performed in under a minute. It is also modular, so only the necessary inspections are installed in the station.

Transition

This STTR-funded technology eventually evolved into the T^3S - a Thermographic Turbine Test Station that performs a comprehensive suite of turbine airfoil inspections on a single, consolidated system. The system performs inspections for hole blockage, wall and coating thickness, crack detection, TBC delamination and adhesion, and structural integrity. TWI's TAFIS Thermal Air Flow Inspection System, specifically designed to detect blocked cooling holes in turbine airfoils, is built on the T^3S platform. TWI is currently working with Pratt & Whitney and Rolls Royce for both military applications within the DoD as well as commercial applications .

Thermal Wave Imaging, Inc.

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