



TOPIC NUMBER: N092-097

SBIR INVESTMENT: \$2,674,267

PHASE III FUNDING: \$810,945

DEPARTMENT OF THE NAVY

NAVY SBIR/STTR SUCCESS



LARGE-STANDOFF, LARGE-AREA THERMOGRAPHY (LASLAT) FOR ROTOR BLADE INSPECTIONS

Thermal Wave Imaging (TWI)'s LASLAT technology provides large area inspection from a fixed position, at the maintenance site, greatly reducing labor hours and simplifying the evaluation time.

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THE TECHNOLOGY

Thermographic inspection uses either a component's inherent heat flow (passive thermography) or an induced heat flow (active thermography) to detect component abnormalities. For years, passive thermography has been used to inspect objects from large working distances while flash thermography (a technique of active thermography) has been limited to close proximity distances. By leveraging the past success of close proximity flash thermography and the large distance-to-target principle of passive thermography, LASLAT developed into a system that can provide results of close proximity flash thermography in a maintenance or hangar environment while at a large standoff distance.

“OUR INSPECTION TIME FOR THE ROTOR BLADE USING CLOSE PROXIMITY FLASH THERMOGRAPHY USED TO TAKE 10-14 HOURS TO DO ONE BLADE, NOW WITH THE INCREASED FIELD OF VIEW OF LASLAT, AS WELL AS THE IMPROVED DATA ANALYSIS SOFTWARE, WE HAVE CUT THE TURNAROUND TIME DOWN TO 2-3 HOURS A BLADE.”

Clint Salter, NDI Engineer AIR-4.3.4.3 FRC-E In-Service Support Center

THE CHALLENGE

As naval rotor blades change from metallic substrates to complex composite structures, conventional metallic inspection methods become complex, time-consuming, and rely on a point or small area inspection envelope. Although thermal nondestructive testing (TNDT) techniques such as flash thermography, have improved inspection fidelity and speed, it is limited to close proximity to the inspection surface, has limited resolution and resulted in excessive time spent inspecting large areas or the missing of a critical defect completely. Rapid inspection of large areas of the aircraft using current procedures had not been feasible.

THE TRANSITION

The LASLAT project started as a SBIR Phase I sponsored by PMA-261 to determine the feasibility of large standoff distance active thermography. Since then, its continuing success has led to Phase II.5 funding in partnership with FRC-E Cherry Point as the sponsor and developed a production unit for the rotor blade inspection. A SBIR Phase III contract was awarded mid FY17 using FRC-E Capital Improvement Program (CIP) funding. Equipment install occurred in Dec 2017, and production rotor blades commenced Jan 2018.

THE NAVAL BENEFIT

Large area inspection usually requires gantries, component disassembly and routing, and extensive instrumentation which results in long component down times and high inspection costs. The LASLAT system removes these pre-inspection requirements and thus, reduces component down times and inspection costs. The LASLAT system provides these savings by bringing the inspection method to the hangar environment, acquiring the inspection data automatically beyond ten feet from the inspection surface, and simplifying the evaluation of complex composites with model based thermal analysis.

THE FUTURE

A Phase II.5 expansion contract was awarded to fully develop the technology for general use applications to include general use process controls and calibration, advancing data acquisition for real-time analysis, improving inspection sequencing, investigating complex construction detection capability, and developing a lightweight portable configuration to augment inspectable areas. With the ongoing Phase II.5 expansion work coupled with the successful implementation of the rotor blade inspection system, the feasibility of a full aircraft inspection system is becoming a reality.