

SUCCESS STORY

Fast High Resolution, High Contrast Microfocus X-ray Computed Tomography Reconstruction Algorithms for ICBM Components

RECONSTRUCTION ALGORITHM IMPROVES CT IMAGING FOR AEROSPACE FLIGHT COMPONENTS

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SBIR COMPANY NAME: INOVEX INFORMATION SYSTEMS

TECHNICAL PROJECT OFFICE: AFRL, EDWARDS AFB, CA 93524

SPONSORING ORGANIZATION: AFRL/AFMC

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THE BASICS

- A reconstruction algorithm that creates scans with greater resolution and contrast than commercial computed topography (CT) scans.
- More easily detect potential flaws and defects in equipment.
- Created by using software tools to identify problem areas and speed bottlenecks in the reconstruction software.

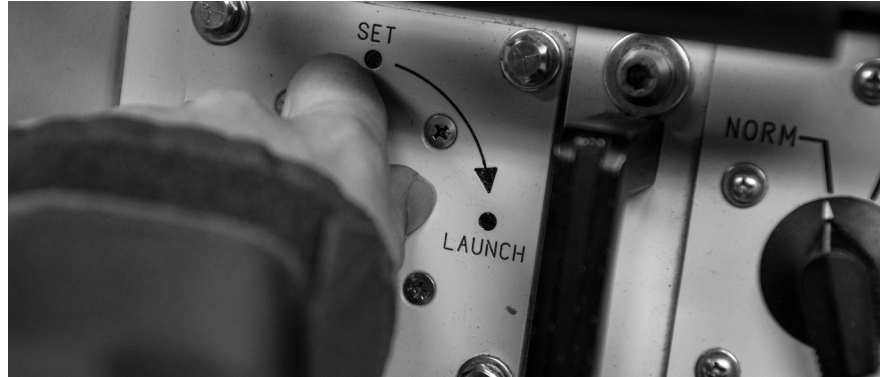


Photo by Staff Sgt. Christopher Ruano

NEW X-RAY IMAGING TECHNOLOGY SIGNIFICANTLY IMPROVES AIR FORCE CAPABILITIES FOR DETECTING POTENTIAL FLAWS IN AEROSPACE AND WEAPON FLIGHT COMPONENTS.

With the support of SBIR/STTR, Missouri-based Lickenbrock Technologies has developed Fast Expectation Maximization Ordered Subsets (FEMOS), a reconstruction algorithm that creates scans with greater resolution and contrast than commercial computed topography (CT) scans.

With this development, the inspection technicians will more easily be able to detect potential flaws and defects in equipment that could lead to failures down the line, and ensures the performance of such equipment in the field.

This project has allowed the company to create a commercial product which forms the foundation for a series of imaging processing tools that are currently in development. A patent application for the FEMOS algorithm has already been submitted.

Lickenbrock Technologies hopes to build more software development contracts from this project, and will be pursuing such ventures moving forward.

BEHIND THE TECHNOLOGY

Previous to the development of the FEMOS algorithm, inspection technicians depended on commercial CT scans to inspect their flight components for flaws.

These scans had inherent complications, and created reconstructions that were difficult to read, often presenting limited and incorrect data because of the data acquisition process that prevented the technicians from identifying the flaws that were present.

Through the use of the FEMOS algorithm, the presentation of incorrect data can be cut down, and the created images provide improved resolution and contrast. This allows technicians to more easily find potential flaws and problems in the flight and weapon components.

continued



continued from page 1


This technology was created by using software tools to identify problem areas and speed bottlenecks in the reconstruction software, and mathematical optimization and regularization strategies to improve the algorithm to be as efficient as possible.

The technology has been transitioned to an operational unit at the Air Force Nuclear Weapons Center CT-Facility at Hill Air Force Base, and has also been transitioned into a commercial product for sale in the private sector.

SBIR FUNDING AND AFRL'S EXPERTISE WERE CRITICAL

Air Force SBIR expertise and funding allowed for a maturation of the system into the fully functioning product that exists today.

With the investment of \$895,000, Lickenbrock Technologies was able to accelerate the speed of their algorithm to seven times its original speed, which allows it to complete in less time than it takes to finish the scan. The investment also allowed the company to improve the quality of the reconstructions and diversify the variety of specimens the system is capable of scanning.

Lickenbrock Technologies expects a return on the project of \$750,000 in the next three years, and with further development, an additional \$500,000 to \$1 million per year in profits in commercial industrial use. 

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