

NASA SBIR/STTR Technologies

X5.03-9596 - Structural Integrity Inspection and Visualization System

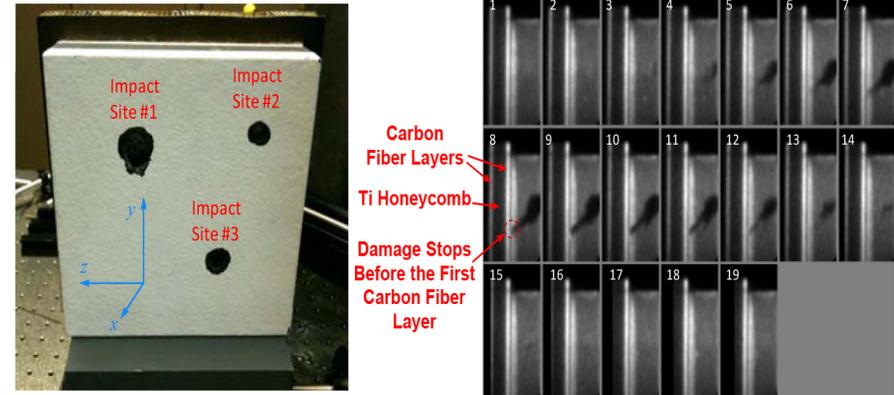


PI: Victor Grubsky

Physical Optics Corporation - Torrance, CA

Identification and Significance of Innovation

To address the NASA need for a compact NDE system for evaluating the structural integrity of spacecraft components during spaceflight, POC proposes to develop a new Structural Integrity Inspection and Visualization System (SIRIUS), based on acquiring 2D images of Compton-scattered x-rays produced by multiple exposures of the object, with subsequent 3D reconstruction of the inspected structure for high-resolution detection and localization of defects. The SIRIUS system will provide detection and 3D localization of defects and damage in composites, ceramics, lightweight alloys, and other typical spacecraft materials with a spatial resolution of ~0.5 mm and penetration depth up to 25 cm.



Example of 3D mapping of a simulated micrometeoroid-induced damage in a spacecraft thermal insulation tile, using Compton Imaging Tomography

Estimated TRL at beginning and end of contract: (Begin: 3 End: 4)

Technical Objectives and Work Plan

Technical Objectives:

1. Development of a preliminary design of SIRIUS system and its optimization
 2. Development of key technologies for implementation of the SIRIUS prototype
 3. Integration, testing, and evaluation of the SIRIUS prototype
- Preliminary establishment of the commercial potential of SIRIUS

Work Plan:

1. Define Target SIRIUS Operating Parameters
2. Design and Optimize Phase I SIRIUS Prototype
3. Design and Fabricate ACAA for SIRIUS Prototype
4. Develop SIRIUS Mechanical Hardware
5. Develop SIRIUS Image Processing Software
6. Develop Preliminary Design of SIRIUS x-ray Source
7. Fabricate and Test Phase I SIRIUS Prototype
8. Explore the Commercial Potential and Product Viability
9. Prepare and Submit Reports

NASA Applications

Noncontact, single-sided NDE of spacecraft components during spaceflight, with the capability to provide reliable, high-resolution assessment of the location and extent of damage within thermal protection, MMOD shields, inflatable habitats, EVA suits and vehicles, electronic systems, conductive structures, pressure vessels, and other lightweight materials, with the ability to function in hard-to-access areas within both pressurized habitable compartments and external space environments.

Non-NASA Applications

NDE of multilayer metal/composite structures in aging and modern commercial and military aircraft, spacecraft, and light marine vessels.

Firm Contacts

Gordon Drew
Physical Optics Corporation
20600 Gramercy Place, Building 100
Torrance, 905011821
PHONE: (310) 320-3088
FAX: (310) 320-4667

NON-PROPRIETARY DATA