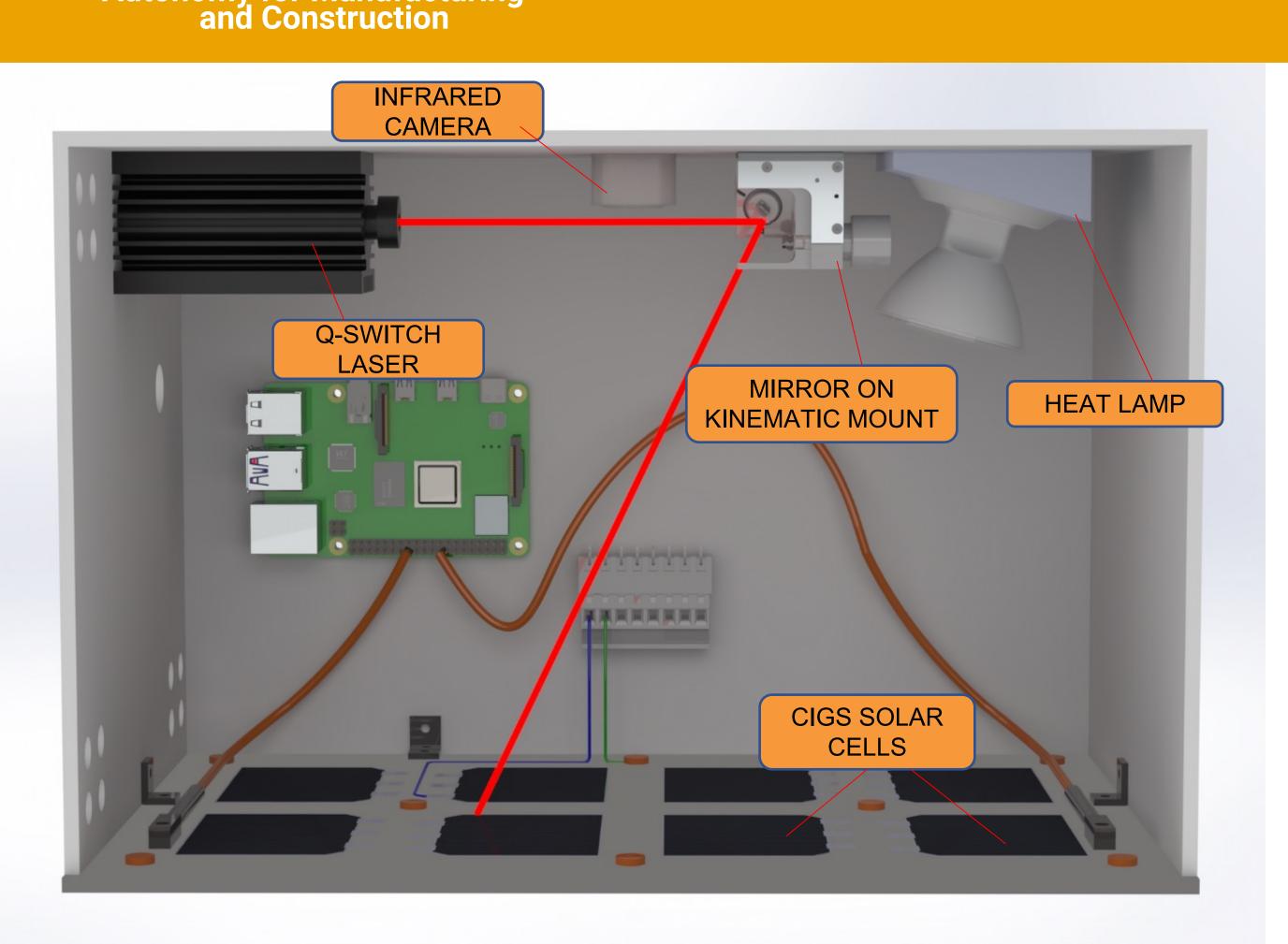
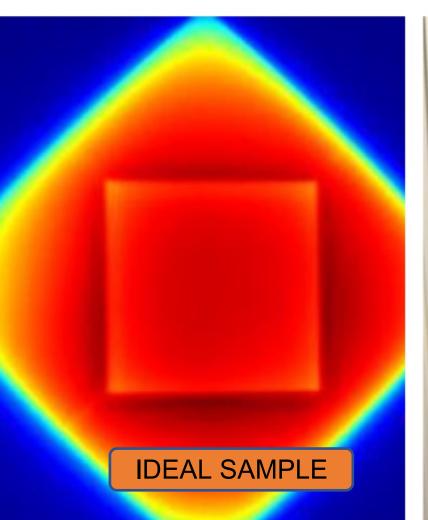
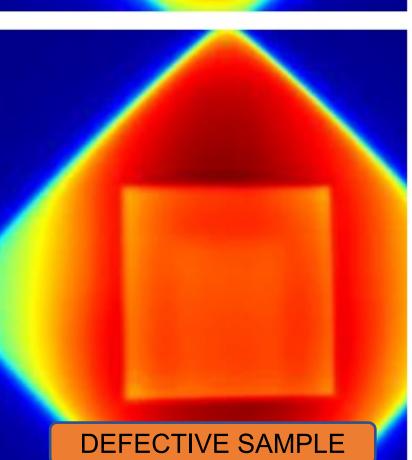


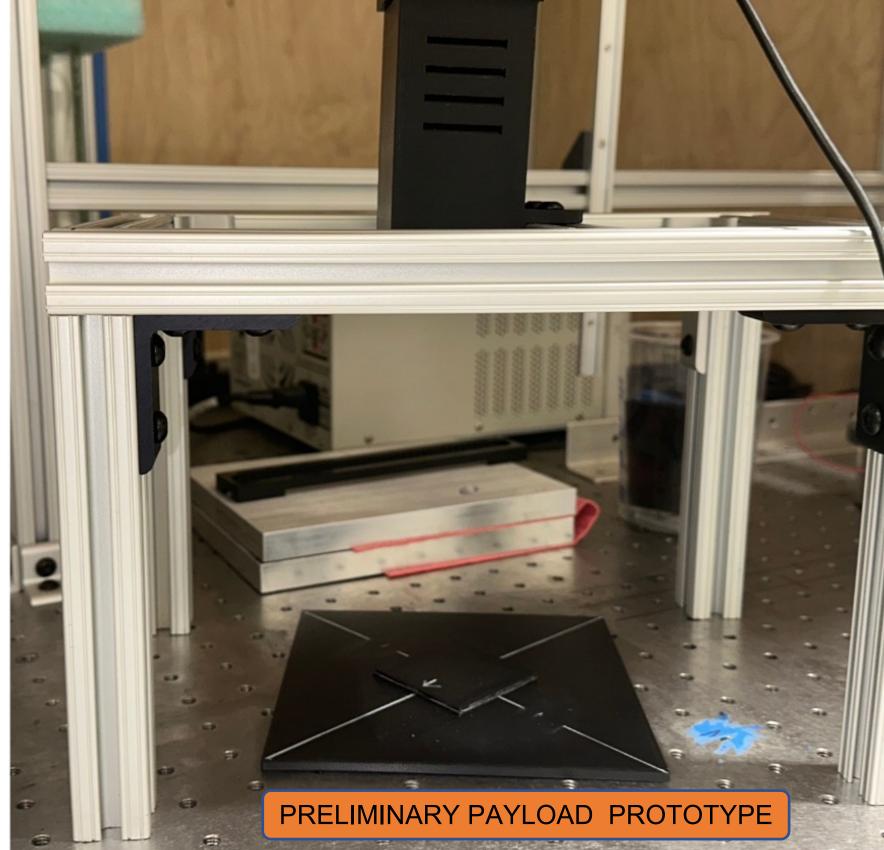
Nondestructive Evaluation of On-Orbit Manufactured Components











Background

- Manufacturing satellites in space would revolutionize the ability to learn and adapt to space exploration and sustainability.
- An essential part of this project would be to develop a system to monitor this production.
- Research explores the feasibility of a payload designed to implement both thermography and ultrasound for in-space Nondestructive Evaluation (NDE) of bonded joints.

Research Objective

- Develop a fully functional payload prototype to perform NDE of bonded joints in-space for quality inspection (look for defects).
- Developed payload will be hosted outside the ISS (International Space Station) to perform the NDE testing.
- NDE methods include ultrasound testing and infrared thermography.

Research Approach

- Ultrasound testing will be done by exciting the bonded joint using a Q-switched laser. The resulting wave propagation will be detected by ultrasonic transducers and analyzed for defects.
- Thermography setup will consist of an infrared (IR) camera and a heat source. This heat source will provide the joints with thorough heat, and once the desired temperature is reached the IR camera will image and look for defects.
- All the required equipment will have to be off-the-shelf in order to expedite the prototyping and ensure that the NDE methods have been thoroughly tested for on-ground manufacturing.

Research Results and Products

- The payload prototype is made of aluminum and includes a thermography setup with an IR camera mounted on the frame.
- Aluminum sheets (50mm x 50mm x 0.5mm) act as placeholders for solar cells, allowing for testing of both ideal and defective adhesion samples.
- The IR camera (SEEK Thermal S304SP) captures the entire base of the prototype from a vertical angle.
- Ultrasound testing uses two bonded transducers to excite and analyze wave propagation in the sample to detect defects.

Commercialization and/or Societal Impact Opportunities

- Application: In-Space Manufacturing of Satellites
- Key Values: Nondestructive Evaluation system that can monitor the quality of bonded joints
- Potential Customers: Space technology manufacturers, specifically interested in in-space manufacturing

Team Names & Collaborators

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