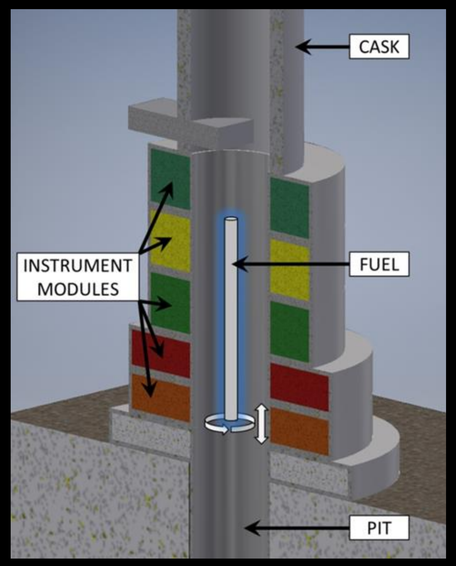
XXIII Twenty Third Annual engineering · design expo 2016

VISUAL AND DIMENSIONAL INSPECTION FOR NUCLEAR FUEL

University of Idaho College of Engineering

Problem

Develop a system for performing Visual and profilometric inspection of post-irradiated fuel within MEITNER environment.



Goal

Design a module capable of collecting information about the dimensions of a subject and provide visual information within an isolated environment. We additionally developed a proof of concept model to demonstrate functionality.

Team

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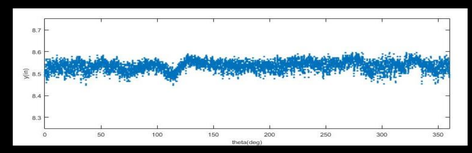
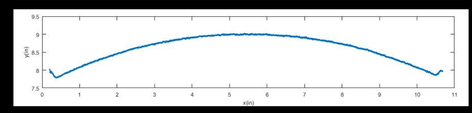
Solution

- Use laser triangulation techniques to determine distance from a fixed sensor to the specimen.
- Implement linear motion stage to provide sensors adaptability to measure diverse geometries.
- A CCTV camera with pan, tilt and zoom functionality provides visual inspection capability.
- Investigated methods for data collection of surface measurements of specimens via rotation of the specimen or panning of laser sensor.

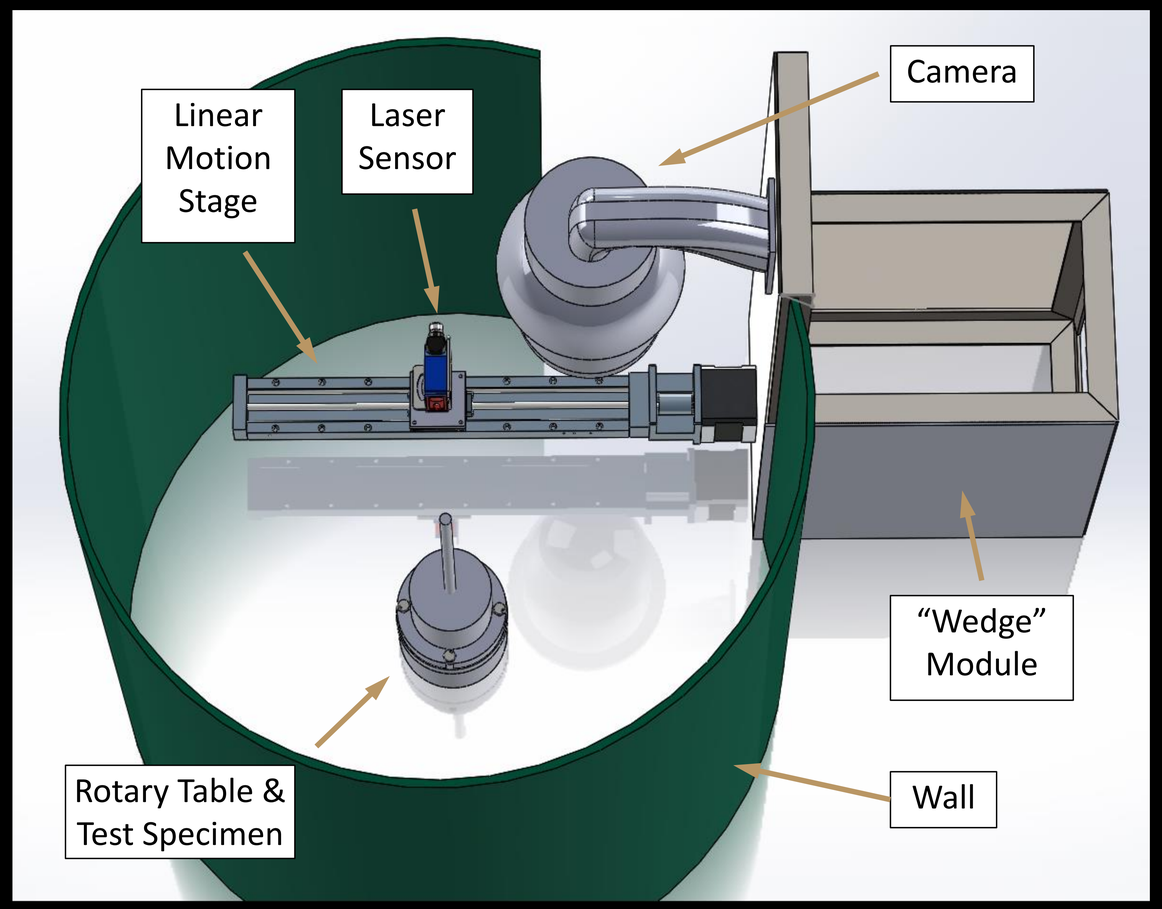
Mock-up cell built by team.



Surface measurement of end mill via rotation of specimen with fixed laser position.



Surface measurement of 10’’ curved plate via sweeping laser across linear stage.



Design

- CCTV security camera mounted to module mirrors specifications of rad tolerant models
- Linear motion stage mounted to cantilevered beam provides axial movement of laser sensor via 2.1 amp stepper motor.
- Laser captures 0-10V signal that represents distance within 50 – 350 mm range.
- Wedge is representative of lead mounting structure which will house cables of internal equipment.

INL Idaho National Laboratory