FIU | Applied Research Center
FLORIDA INTERNATIONAL UNIVERSITY

U.S. DEPARTMENT OF ENERGY

HIGH LEVEL WASTE/WASTE PROCESSING

PROJECT: Technology Development and Instrumentation Evaluation: *Development of Inspection Tools for DST Primary Tanks*

CLIENT: U.S. Department of Energy
PRINCIPAL INVESTIGATOR: Dr. Leonel Lagos
LOCATION: Hanford Site, WA

Description:

FIU's Applied Research Center (ARC) is supporting the U.S. Department of Energy's Hanford Site by developing robotic technologies for the evaluation of Tank 241-AY-102 and other similar tanks.

Tank waste has recently been discovered in the annulus of AY-102. Inspection tools are needed to isolate and pinpoint the source of the material entering the annulus. These tools will need to provide video feedback so that an assessment can be made regarding the structural integrity of the tank bottoms.

There are three paths of access to the tank floor: 1) through air channels in the tank refractory pad, 2) through a 4-in annulus air supply pipe which travels to the central plenum, and 3) through a 6-in leak detection pit drain from the central sump. Engineers at Hanford have investigated potential inspection tools from the commercial industry which can traverse through any of the three access paths, but have not found viable tools.

The objective of this task is to develop inspection tools that can provide visual feedback of the DST floors by utilizing lessons learned from previous projects, and to gain an understanding of limitations from other potential tools. FIU engineers will work directly with site engineers to develop alternative designs based on specified performance criteria. Specific subtasks include:

- Design and development of a remotely controlled device than can navigate through the refractory pad channels and provide visual feedback.
- Investigation of the use of a crawler device similar to the peristaltic crawler developed that can navigate through the 3/4-in air supply pipe that leads to the central plenum.

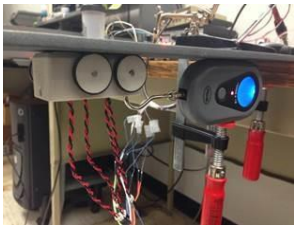
Benefits:

- Provides alternative solutions for monitoring the structural integrity of the bottom of the DSTs.
- Tools developed in this subtask will allow for the detection of potential leaks, allowing site engineers to obtain the necessary information that is needed to generate viable approaches for repair.

Accomplishments:

- Developed and designed a robotic technology that is modular and can navigate through the 3/4-in supply line that leads to the central plenum. The device can navigate through multiple elbows, reducers and vertical runs. It also houses a camera for video feedback.
- Designed and developed a prototype of a remotely controlled device that can navigate through the first 17 ft of air refractory channels by traveling upside down along the tank floor. Minimal modifications will allow for navigation through the turns in the refractory channels.


Inspection tool mock-up testsing (L); gripping mechanism (R).



Testing of the prototype of the slot inspection tool.

ABOUT

Since 1995, the Applied Research Center at Florida International University has provided critical support to the Department of Energy's Office of Environmental Management mission of accelerated risk reduction and cleanup of the environmental legacy of the nation's nuclear weapons program. ARC's research performed under the DOE-FIU Cooperative Agreement (Contract # DE-EM0000598) can be classified as fundamental/basic, proof of principle, prototyping and laboratory experimentation.

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