FIU Engineering & Computing
FLORIDA INTERNATIONAL UNIVERSITY

SENIOR DESIGN ORGANIZATION SYNOPSIS – SPRING 2014

TEAM 4 – Breaking Under Ground (BUG)
INSPECTION DEVICE FOR UNDERGROUND TANKS LOCATED AT HANFORD SITE

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One of the United States Department of Energy's tasks at the Hanford Site in Washington State is to safely store, retrieve, treat and dispose of approximately 56 million gallons of radioactive waste. The waste has been stored in underground tanks for decades and therefore, concerns have arisen on the integrity of the tank and its ability to safely store the waste.

The primary goal of this project is to develop an inspection tool for the tank bottoms and refractory pads in the double shell tanks at Hanford. Tank waste has recently been found in the annulus of tank AY-102 and it is believed the waste came from the tank bottom and flowed through the cooling channels of the refractory pad (located between the inner shell tank and the outer shell tank). The refractory pad serves as an insulation that surrounds cooling channels. The minimum channel size is 1.5-in by 1.5-in. In order to reach the center of the tank, the device will have to navigate through the channels, encountering four 90° turns. In addition to these challenges, the device will need to be radiation hardened, be able to operate in relatively high temperatures and not subject the channel walls to pressures greater than 200 psi, the compression strength of the refractory material.

Our goal is to design a device that can travel through the cooling channels providing video feedback of the tank surface and to determine potential locations of leaks. The body of the proposed design will consist of a frame encasing a camera and motors that give power to the wheels connected to treads. To avoid potentially destroying the refractory pad and building up debris, the proposed design has a magnetic plate attached to the top frame to allow the tool to travel upside down along the bottom of the carbon steel tank. The device uses a tank tread to propel forward. The tank tread is favored over wheels so as to increase the surface area along the tank and allow for movement over varying surface topologies. The device will be controlled and given power from a fiber optic line. The tether also serves as a full proof method to retrieve the tool in the event that it is unable to function do to unforeseen obstacles.