

Universal Locator for RFID Technology

Description: The purpose of this project is to develop an antenna and signal processing system to detect and acquire read/write capability to interact with the Radio Frequency Identification Technology (RFID) tagging. The product is intended for use as a general PE pipe locator.

Status: Feasibility study and design activities are in progress.

BENEFITS

The universal locator will be an interactive tool for plastic pipe embedded with RFID tags. The universal locator will detect and locate the buried plastic pipe and will be able to read/write the information located on the RFID tag. Additionally, the tool will include the capability to locate existing tracer wires for plastic pipes.

These advantages are not possible without an accurate locator capability. Detection of existing tracer wire with the same tool would maximize the tool's use and minimize the need for extra work when deploying RFID tags locating for plastic pipe.

BACKGROUND

Improvements in detecting plastic pipe in complex areas has been sought by the gas distribution industry for many years. There are electromagnetic locators on the market with modern features such as geo-referencing (GPS location identification) and time stamp downloadable systems which aid in the documentation of the pipe location process. However, there remains a need for accurate PE pipe locator particularly in areas where tracer wire has been compromised.

A current NYSEARCH project with GRTGaz is to produce an RFID locating device for coiled plastic pipe which will provide identification through encoded tags embedded on the surface of plastic pipes. The RFID tag can operate without a power source. It draws its energy

from the reader antenna to transmit and receive the data. Eliot Solutions, a subsidiary of European pipe manufacturer RYB, has a commercially available solution for straight pipe and fittings installed in open trenches.

The pipes installed via trenchless application present a unique challenge. Therefore, GRTGaz, Eliot Solutions and NYSEARCH created a RFID tag that would be suitable for trenchless applications and horizontal directional drilling of coiled PE pipe. These RFID tags are very thin and will work well with the trenchless application.



Figure 1: RFID Tag

Coiled pipes prove to be more difficult as they can twist during the uncoiling process. This project enables operators to accurately identify the location of pipes due to the application consisting of three RFID tags to fit 360 degrees around the pipe's outer diameter. Thus, this design for a tag is always facing the surface and is readable.

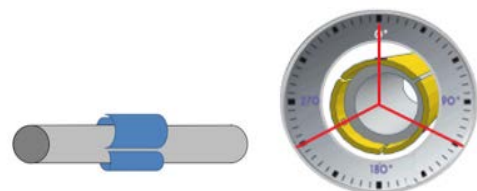


Figure 2: Three RFID Tags for 360° Coverage

TECHNICAL APPROACH

NYSEARCH and GRTGaz worked together to develop a set of standards and specifications detailing the performance of the universal locator with various types of markers.

There are various RFID markers delivering different levels of accuracy and different distances of reading and writing information on the chip. Currently, there are no universal RFID marker locators; the operator must be equipped with different detectors to detect every kind of marker they come across in the field.

The universal locator project initially aims to update a product known as -VLOC Pro3- which will combine different functionalities such as electromagnetic detection, EMS marker detection, and RFID marker detection for a large range of frequencies. The EMS marker for the VLOC Pro 3 already exists and the development of the RFID marker is under development. The universal locator will have a single body resembling the VLOC Pro3 with a plug-and-play accessory for each type of marker.

In addition, electromagnetic detection is widely used for metallic pipeline and tracer wire detection. PE pipe detection is challenging, thus developing a new detection solution with a high level of accuracy and using RFID technology will address both challenges by offering a way to accurately locating passive antenna and contain traceability information.



Figure 3: VLOC Pro3 Unit

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PROGRAM STATUS

The antenna design of the universal locator for RFID tags is currently under development. The project is in the feasibility stage and will conclude once the proof of concept solution is finalized and tested.

The lab prototype antenna is being developed and tested to meet the targeted detection depth of 1.5 meters (5 feet). To measure the prototype's performance, it is being tested in different soil types (sand, clay, gravel, limestone and topsoil).



Figure 4: Early stage prototype testing

Highlights

- Detect and locate all types of buried plastic pipe
- RFID marker detection for a large range of frequencies

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