

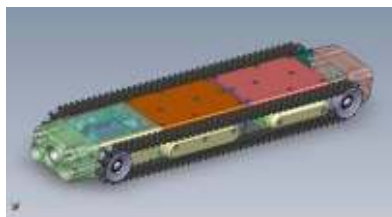
Mini Camera for Inspection of Cased Pipe

Description: A compact robotic inspection device for visual inspection of carrier pipe from the position of inside of the casing.

Status: Development and lab testing are near complete. Field testing is in progress.

BENEFITS

The mini camera addresses the requirement to inspect cased crossings despite limited available options. ULC Robotics has been contracted by NYSEARCH to develop a robotic device for inspecting carrier pipes inside casings. Locomotion will enable travel distances of up to 150' along the inside wall of the casing. The camera will be small enough to fit within most of the annular space between carrier pipes and their casings and will be capable of travel and navigation beyond insulator hubs. The mini-camera will be controlled via wire and have high-resolution lighting for focused inspection.



3D CAD Drawing of the Mini Camera

BACKGROUND

The 2002 DOT/OPS Pipeline Integrity ruling requires integrity assessment of pipes in high consequence areas and does not provide an exception for special areas such as cased crossings. For a few years now, NYSEARCH and NGA have been evaluating an assortment of methods with initial focus on guided wave ultrasonic inspection technologies. While this approach is making some significant advances, there is still more progress to be made and a need to continue pursuing additional alternatives. Therefore, NYSEARCH has been evaluating and/or developing a suite of tools to address the issue and possibly fill technology gaps.

Recent efforts to inspect casings via pushrod-mounted cameras have yielded limited success. Sagging of longer rods prohibited adequate control of the camera and sufficient inspection distances. A solution has been developed to allow

greater distances and a more thorough inspection of the circumference of cased pipes.



Pushrod Mounted Camera In Use

TECHNICAL APPROACH

At the start of the project, design specifications were developed through an industry survey of casing configurations. From this and technical ingenuity, ULC Robotics developed a detailed design of a working prototype and control system. The central component of this new inspection robot will be a miniature tracked crawler. The crawler will be magnetically attached to the

pipeline casing and capable of traveling the length of a typical cased pipe at any radial position. Navigating around pipeline insulators and obstacles will be possible through its skid-type steering tracks. The remote controlled tethered robot is light weight yet powerful. It will use the force of magnetic attraction to crawl axially along the casing at any radial location.



High Resolution Video Imaging

Based on extensive commercial experience with visual inspection inside pipes, ULC Robotics has also designed a low light, high resolution camera and LED lighting system for focused and detailed inspection of the pipeline and annular space via color video.



Mini Camera Attached to a Casing

PROJECT STATUS

A survey of members' cased pipe configurations was conducted to identify design specifications. ULC Robotics designed the tethered robot

based on these specifications. Specialized engineering and a combination of off-the-shelf and custom parts have allowed ULC Robotics to develop a working prototype for laboratory and field testing. Field testing of the camera in actual cased crossings is underway. Testing is expected to be completed by the fall of 2008.



Field Testing an 80' Section of a 24" Carrier within a 30" Casing



Mini Camera Entering the Casing

FOR ADDITIONAL INFORMATION

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Mini Camera Highlights

- High resolution video inspection
- Inspect distances up to 150'
- Requires excavation at only one end of casing