Northeast GAS ASSOCIATION

NYSEARCH

Technology Brief

GasComm^{R} Plastic Pipe and RTU Control Module

Description: **The purpose of this project is to design and build a device to measure in real time various gas pipe parameters. This data is wirelessly transmitted to a secure GasComm^{R} RTU/Control Module (GCM).**

Status: **Following the completion of specifications, design and development tasks are in progress.**

BENEFITS

The commercialized GasComm^{R} unit for steel pipes is confirming the ability of this technology to monitor live pipelines in real time. Plastic pipe is the most prominent material used for distribution pipe applications, therefore adapting the GasComm^{R} technology for plastic pipe is beneficial to the utilities. With a successful operation of the GasComm^{R} unit for both steel and plastic pipes, the product would expand the live gas pipe monitoring technology. The GasComm^{R} unit for PE would also include the certification of Intrinsically Safe (IS) Class 1/Division 1/Zone 0 and pressure boundary (ASME) requirements.

With the advancement in live pipe monitoring through the GasComm^{R} unit, an updated Remote Terminal Unit (RTU), which interfaces the SCADA system to the pipe monitoring system, would be desirable. A dedicated GasComm^{R} RTU/Control Module (GCM) that can wirelessly transmit data will allow the flexibility to funders for its use and allow independent operation at remote locations. There is no power and no communication infrastructure need for the GCM and it will provide data in real time.

BACKGROUND

In 2018, eight funders installed (14) GasComm^{R} field prototype units into a variety of locations in steel pipe distribution systems for a one-year trial period. The pipe measurements were recorded locally within the GasComm^{R} device and wirelessly transmitted to a secure webserver for monitoring, alert indication, and overall performance analysis.

During this field test program, there were several lessons learned on the physical steps of installation and challenges found with the electronic hardware and software during the installation. The progress and experience gained with the GasComm^{R} unit for steel pipes are being implemented in the expansion of technology to plastic pipe.

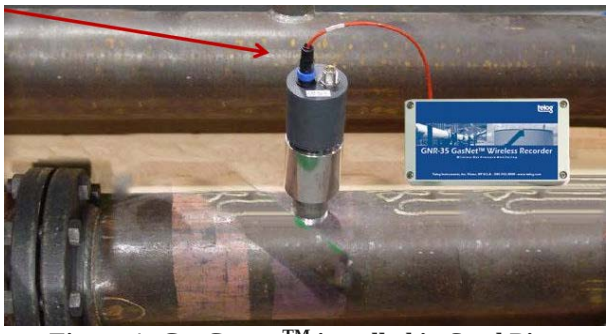

Figure 1: GasComm^{TM} installed in Steel Pipe

Enetics is NYSEARCH's developer and manufacturer of the GasComm^{R} units. Enetics is currently using a standard RTU; however, members showed interest in not only incorporating several improvements by developing a GasComm^{R}-specific RTU/Control Module, but also allowing the GasComm^{R} unit to be utilized with other RTUs. The current RTUs do not provide a direct interconnect with a gas company preferred RTU Platform. Thus, if a gas company chooses to use their own RTU, the GasComm^{R} needs to be optimized to provide the necessary controls, power, and communications for GasComm^{R}. Thus, with this hybrid, each gas

company would be required to provide additional internal RTU expertise, IT and SCADA personnel to extract data in parallel with the RTU.

TECHNICAL APPROACH

NYSEARCH and Enetics worked together to build a commercialized GasComm^{R} unit for steel pipes. The installation of the unit is simple for steel pipes; site preparation includes the drilling, tapping, and welding of a nipple on the pipe, followed by installation of a completion plug to secure the gas line. However, for plastic pipes further research and development was needed to understand hot tapping for plastic pipe.

The primary methods of joining plastic pipes in the field are well developed. Joining plastic pipes together requires either a butt-fused weld joint or an electrofusion weld. Butt-fusion is a common method to join plastic pipes, however the method is preferred on new installations where the network is not yet pressurized.

Electrofusion joints differ from butt-fusion joints mainly in the way the heat is applied internally using an electrically conductive material that is wrapped around the pipe diameter. Passing an electrical current through this conductor produces the heat necessary to reflow the pipe material and create a secure joint.

Figure 2: PE Hot Tapping Tool

Installing a GasComm^{R} instrument into a live, pressurized plastic gas pipe requires the use of a tapping tee. The hot tapping tee is placed onto the plastic pipe and secured using the electrofusion joint process. Hot tapping methods can be employed, like those used for steel pipes, to install the GasComm^{R} unit. This method requires no gas shutoff and is preferred for existing gas network monitoring.

The development of a GCM will control and sequence the GasComm^{R} sensor while providing simple Modbus RTU protocol communication to existing utility RTUs, allowing the utility an option to utilize existing RTU's for data telemetry.

The GCM provides a smaller field footprint for installation. It is Intrinsically Safe for Class 1/Division 1 location placement and it has optimized control features for GasComm^{TM}. These features include adaptation that allow power inputs for energy harvesting options.

PROGRAM STATUS

The hardware design and tooling requirements for the GasComm^{R} unit for plastic pipe has been updated and 3D prototypes have been printed. Lab and pressure testing for the 3D prototype are being conducted. Completion of the Intrinsic Safety certification on the PE pipe design are still in progress.

The GCM is under development. Field RTUs are being lab tested against the GCM to assure compatibility between the two units is seamless when installed in the field.

Highlights

- Live gas pipeline monitoring for PE Pipes
- Wirelessly-transmitted real time data by the GasComm^{TM} Control Module

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