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GAS OPERATIONS
news

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Taking a New Look At Infrastructure and Rehabilitation

When it comes to installing new or replacement mains and services, today's natural gas operators continue to face the challenge of escalating costs and the need to reduce the construction footprint of these initiatives.

In recent years, many operators have shifted their focus to the replacement or rehabilitation of aging cast iron, bare steel—even early-generation polyethylene—piping systems. These large-scale replacement and rehabilitation initiatives can present even more challenges, including customer interruption, excavation and pavement restoration, and construction methods and techniques.

At GTI, we're looking for ways to reduce the costs of installation and improve the lifecycle of distrubtion assets. Dennis Jarnecke is the program manager for these efforts, and we've added some key new staff, which you'll read about in this issue. We'll also tell you about the many ways that GTI is working with operators to develop and deploy new technologies, information, and new piping materials to help meet industry collaborative and individual company needs.

Edward B. Johnston
Managing Director,
GTI Delivery Sector

Advancing the Adoption of PA12 for High-Pressure Applications

Polyamide 12 (PA12), a thermoplastic pipe, is an excellent alternative to steel pipe in high-pressure applications up to 250 psig. PA12 is easier to install than steel and eliminates the need for costly long-term corrosion control measures.

Two new pipeline installations of PA12 performed under special permits may soon help change federal code governing the safe use of plastic piping systems.

GTI recently coordinated PA12 installations at two U.S. utilities looking to use this new material to meet the challenges of high-pressure gas lines. The hope is that these installations will validate the use of PA12 at higher operating pressures and help change federal code to allow the permanent use of PA12 piping systems.

A New Option

PA12 is not only corrosion-resistant and easier to handle and install than steel, it offers all the benefits of polyethylene (PE) pipe while extending the range of operating pressures and temperatures. **By employing PA12 as a lower-cost substitute for steel in their pipelines, gas distribution operators can now realize significant installation and labor savings, while eliminating long-term corrosion control headaches and the need to reduce the rate of flow.**

According to Dennis Jarnecke, program manager at GTI, "PA12 is an excellent alternative to steel pipe in high-pressure applications up to 250 psig for gas distribution lines. It has been used in fuel lines in cars and for air brake tubing in trucks. Now, we see great potential for its use in gas delivery systems."

Feasibility and Federal Code

In January 2009, the Department of Transportation (PHMSA) amended federal code to allow PE up to 125 psi (49 CFR Part 192). Now, efforts are underway to further amend the federal code to permit the use of PA12 at operating pressures up to 250 psig, enabling LDCs to use these new materials to help them maximize their assets.

In recent years, GTI has conducted feasibility studies, sponsored by Operations Technology Development (OTD), designed to evaluate the performance of PA12

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Adoption of PA12

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in various environments across a wide range of utility practices and procedures. In this way, GTI hopes to provide a basis for revising 49CFR Part 192.123 to permit the use of PA12 at higher operating pressures.

Two recent field trials—at Energy West in Montana and Atmos Energy in Mississippi—demonstrated the benefits of PA12 piping for two very different applications. At Energy West, PA12 piping was installed to run new high-pressure gas lines in order to provide gas service to a new area. The Atmos Energy installation was designed to demonstrate the benefits of using PA12 piping for the rehabilitation of older high-pressure steel lines.

PA12 Extends Energy West Distribution System

As part of its plan to extend its gas distribution system outside Great Falls to provide gas service to Cascade, Montana, Energy West—a gas utility and energy supplier based in Montana—obtained special permits to operate a PA12 piping system at higher operating pressures. Working with PA12 resin supplier (VESTAMID PA12) Evonik-Degussa AG, GTI coordinated a system of PA12 straight and coiled pipe and fittings for the installation of three miles of PA12 piping in an established right-of-way outside Great Falls.

Completed in August 2009, the installation, the first-ever installation of PA12 pipeline, was witnessed by federal and state pipeline safety officials, including representatives from the U.S. Department of Transportation.

According to Ed Kacer, general manager at Energy West, "PA12 is lightweight and allows for faster construction than steel, while maintaining higher volumes associated with higher pressures. Installation can be accomplished using a smaller construction crew, saving time and money."

The same equipment and processes that are used with other plastic pipe can be used for installing PA12 pipe, so there is no need to modify equipment. And the heat fusion process is easier and faster than connecting steel pipes.

Because PA12 is corrosion resistant, compliance with pipeline integrity regulations is also more cost-effective.

PA12 Rehabs Aging Steel Pipe at Atmos Energy

In order to evaluate the use of PA12 as a suitable replacement for aging steel pipe operating at up to 250 psig, Atmos Energy—a distributor of natural gas service in Mississippi—completed the first-ever 6-inch-diameter PA12 installation in September 2009.

GTI worked with PA12 resin suppliers Evonik-Degussa AG and UBE Industries to provide the resins to produce the pipe and fittings. The PA12 pipe was installed in the street right-of-way parallel to a railroad spur track, with the 6-inch PA12 line tied into an existing 6-inch steel line and extended along the line for 1,491 feet. The installation again demonstrated that conventional PE operating practices can be readily extended to PA12.

Staff from the Mississippi Commission and PHMSA were present to witness the Atmos Energy PA12 training and installation. The system has since been successfully placed on gas pressure of 165 psig.

"Because we can use the same installation practices and butt fusion pipe joining for PA12 that we employ for PE, training of crews is quick and easy," says Jamie McKenzie, Engineering Manager at Atmos Energy. "And because it's so easy to handle and install, it makes sense to use PA12 pipe for replacement of older high-pressure steel lines that are needed as our infrastructure ages." ▼▲

Adding to the Industry's Composite Materials Knowledge Base

Many pipeline companies are making composite materials part of their rehabilitation programs and are using them to repair corrosion, dents, and other defects in their steel piping systems.

There is still a need for a better understanding of technology options. Under sponshorship of OTD, GTI is currently working on two fronts—to help operators understand these options and benefits of composite pipe products and to help them select a composite pipeline repair system based on its predicted service life.

Composite Pipe Product Review

Composite pipe products may offer cost-effective, safe, and reliable alternatives for rehabilitating and replacing high-pressure steel natural gas pipelines. Yet, pipeline operators face the challenge of determining the best options for specific applications. One GTI research team is providing operators with a product selection guide based on thorough research of currently available reinforced thermoplastic pipe (RTP) products. Data include comparisons of composite/RTP piping products with each other as well as with other steel replacement options.

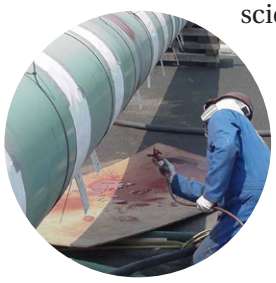
Composite Repair System Data

One critical decision pipeline operators must make is how to select the right composite pipeline repair system based on its ability to restore serviceability of damaged pipe. Another GTI research team is working to provide information about the performance of composite repair systems. Their research includes testing full-scale sections of pipes with composites and evaluating the long-term performance of their associated adhesives. The results of the engineering tests and analysis provide justification for their use as allowed by CFR 29 Part 192 codes. ▼▲

Providing Comprehensive Coverage of Field-Applied Coatings

Today's pipeline operator has more options for controlling steel pipe corrosion than ever before. New coatings help control costs, improve safety, and meet regulatory requirements. Yet, when choosing the right coating material and technique for the field conditions in which they are applied, there is a lack of unbiased, third-party information about each system's performance.

"Every company wants to be sure that they are using the most effective materials and the most efficient methods possible when applying pipeline coatings," says Daniel Ersoy, R&D Director, GTI Delivery Sector. "However, with all the options available and limited in-house testing abilities, it is difficult for operators to make their choices based on sound scientific evidence."



GTI's 10-Year Study

Beginning in 2000, GTI and a consortium of pipeline and energy companies, coating manufacturers, and utilities launched a multi-year study of the application characteristics and performance qualities of the most advanced corrosion protection coatings available today.

In 2001, the GTI Pipeline Coatings Facility was built so that studies could be conducted in real-world conditions.

In the years that followed, research was conducted on a wide range of types and sizes of coated pipes. Testing conditions included three extreme soil types, small and large pipe, ambient and elevated temperatures, and short- and long-term burial. More than 50 types of applied pipeline coating systems were applied to 504 pipeline joints of different diameters in the field.

"Through this research, we pooled resources to provide the industry with a knowledge base no one pipeline or coating company could develop on its own," Ersoy says.

Data for Decision Making

Now that the study is complete, field performance data has been gathered and categorized, which include specific surface preparation and application requirements for each joint, as well as quantitative test data in areas that include adhesion and peel strength, hardness, impact resistance, penetration resistance, abrasion resistance, cathodic disbondment resistance, blistering, wrinkles, dents, rust formation, holiday detection, and film thickness.

From this data a comprehensive knowledge base will be developed to help operators make coating selection decisions and to reduce operating costs and improve corrosion protection.

"With data from this evaluation," Ersoy says, "operators will be able to make informed decisions in selecting the most cost-effective systems to adequately protect the pipeline." ▼▲

Coring: The Key To Saving With Keyhole Technology

With some estimates putting the cost of excavation and restoration at U.S. natural gas companies at more than $1 billion a year, keyhole technology is reemerging as an effective way to reduce maintenance costs.

Currently in use at more than 30 leading gas and other utilities in the U.S. and the U.K., the keyhole coring and reinstatement process offers savings in time and money, as well as new economies in the use of energy and raw materials, fewer harmful emissions, and greater convenience for surrounding communities.

Keyhole Alone Is Not Enough

National Grid—a combined natural gas/electric utility operating in the U.K. and the United States, with a natural gas business unit serving more than 3.4 million customers in the Northeast U.S.— has been a proponent of keyhole technology for years. "Everybody understands the benefits of keyhole," says Dennis Ruppert, Manager, Operations Performance at National Grid, "but we found that doing the work without replacing the core had little value without saving pavement restoration costs."

In 2004, following a GTI workshop introducing rotary coring as a recent addition to the keyhole process, National Grid expanded its use of keyhole equipment to most of its U.S. operating areas. "We redeveloped the tooling and started to look for municipality buy-in on the process," Ruppert says.

In one field trial with New York City's Department of Buildings and Department of Transportation, crews were able to core 18" of macadam and restore the core in about half the time of traditional excavation and restoration methods. "We were able to demonstrate that there was no need for saw cutting, jackhammering of the hole, backhoe, dump trucks to take away the material, temporary paving, and cut backs," says Ruppert.

As a result, the utility received the city's buy-in on the end result—a real coup. "When you get a big city like New York City on board, others follow," says Ruppert.

Overcoming Internal Barriers

While the New York City effort helped National Grid expand use of the process and leverage other municipalities in their service territory, getting internal acceptance across the enterprise was another major challenge.

National Grid's successful keyhole initiative is due, in large part, to advocacy at the executive level. A vice-president serves as an executive sponsor for all low-dig activities, presiding over a low-dig team. He is responsible for getting buy-in at the regional, state, and yard level as well as for setting goals for the entire process throughout the U.S.

"While we understood the benefits of keyhole, we couldn't put our finger on it," Ruppert says. In order to quantify the keyhole coring process and its benefits and savings, a database was developed to track all keyhole jobs and to determine performance of each keyhole crew. "We knew that doing the work and not replacing the core was a money loser," says Ruppert.

The database made it possible to analyze major job types—including test holes, retirement of services, cathodic, and cast iron joints—and demonstrate that, although some jobs may take longer to complete with the keyhole coring process, savings in restoration alone is so

significant that it still pays to use it. The information, as well as a savings calculation, is provided to the executive sponsor and the operational areas on a weekly basis.

The utility's planning and scheduling groups prioritize those jobs that should be performed using the keyhole process. Because the keyhole process requires additional training and has a steep learning curve, another consideration was to get buy-in from the crews themselves to be willing to get that training.

"Because the equipment is expensive—and much more likely to need daily maintenance—we needed to make sure that our fleet organizations were willing to make maintaining that equipment a priority," says Ruppert. "It took a buy-in from our support organizations to keep the keyhole equipment functional day to day," says Ruppert.

In the past year, National Grid has had 16 crews dedicated to keyhole work and, according to Ruppert, the utility has enjoyed a savings of approximately $3 million in the 2009 fiscal year from use of keyhole technology. "Based on analysis of the past few years of our keyhole work, we are now able to expand the number of keyhole crews by 25%," says Ruppert.

Doing the Math at Southwest Gas

Southwest Gas, a natural gas company serving 1.8 million customers in Arizona, Nevada, and California, has found that using the keyhole

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The NIMCO Meter Change-Out Solution: Early Successes in the Field

Every year, utilities across the country complete an estimated 3 million meter change-outs, with the number for each utility ranging from as few as 3,000 to as many as 118,000 per year. When you consider that every meter change-out requires an average of 38 minutes—including about 20 minutes of customer interaction, as well as time for equipment turnoff, meter exchange, and relight—it's clear how costly the procedure is.

Tools of the "Trade"

The suite of tools known as Non-Interrupting Meter Change-Out (NIMCO), is designed to provide utility crews with a cost-effective solution for performing routine commercial and residential meter exchanges.

The NIMCO system, which has been in development at GTI on behalf of OTD for five years, is designed to enable utility crews to conduct change-outs without interrupting gas service. "Our goal was to make the replacement or repair process seamless for the customer," says Andy Hammerschmidt, R&D Manager, GTI Delivery Sector. The NIMCO suite comprises three tools that use different but complementary approaches to keep gas flowing:

- Swivel Tool, now marketed by Mueller Co. as the Meter Xchanger™
- Tee Tool
- Directional Bag Stopper (DBS), also licensed by Mueller Co.

Whether used for a meter, a regulator, or a riser, the DBS tool, which uses a small bottle of compressed natural gas (CNG) as an alternative gas supply so that there is no service interruption, has demonstrated considerable success in the field. In fact, according to Hammerschmidt, it has been used successfully nearly 30,000 times.

Directional Bag Stopper (DBS) Tool

Atmos Energy in Texas

In 2008, the Texas Railroad Commission (RRC) issued a rule requiring natural gas distribution utilities operating in the state to replace compression couplings at service risers by December 2009. In response, Atmos Energy—the largest natural gas distributor in Texas—implemented a two-year project to replace the risers identified in the directive. Seeking a way to complete the project with minimal delays and customer disruption, Atmos called on GTI to help them leverage the benefits of NIMCO technology.

The DBS tool, which was modified for compatibility with the Atmos system, was placed in service in September 2008. According to Marc Rothbauer, Director of Operations Support at the Atmos Energy Mid-Tex Division, "Our division has successfully used the NIMCO tool at over 29,000 locations. At each of these locations, the inlet meter riser was replaced without interrupting the customer's service. This tool continues to be utilized today on meter, riser, and service line replacements. While the tool can't be used at all locations, it does offer seamless service to many customers in our service territory."

Atmos Energy realized an estimated savings of $1.4 million in pilot relight costs alone. Additional savings were realized because of the reduced need for travel time to customer locations.

More DBS Field Trials

Nicor Gas and Consolidated Edison are currently conducting field trials of the DBS tool prior to implementation and system deployment. ▼▲

The Economics of NIMCO

It is estimated that the NIMCO kits will provide a savings of about $25 per meter change-out, which could generate annual savings of approximately $250,000 (based on changing 10,000 outside gas meter/year).

NIMCO eliminates:	So utilities save:
Service interruptions	Time dealing with customer complaints
Service relights	Cost of relights
Scheduling appointments with customers	Cost of missed appointments
Need to enter a customer's residence or business	An average of 20 minutes for customer interaction (or about 54% of the average total meter change-out time of 38 minutes)

Coring

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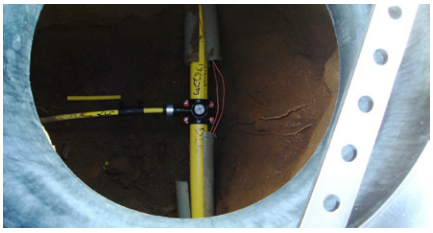
coring and reinstatement process in conjunction with other innovative trenchless technologies is an effective way to realize considerable savings over conventional open trenching methods.

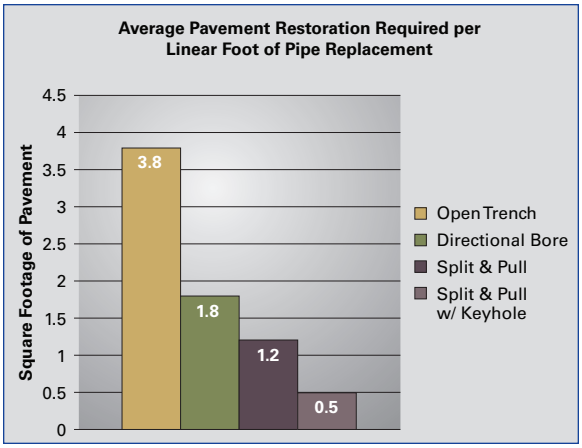
Southwest Gas combines keyhole technology and the split-and-pull installation for PE main and service replacements. In split-and-pull, the main being replaced is isolated, a cable inserted, and a splitting head attachment is pulled back through along with the new polyethylene (PE) main.



"We use keyhole processes to tie over the existing services to the new main," says Kenny Pollock, Manager of Gas Operations Support Staff at Southwest Gas. "If services need to be replaced, we replace them in the keyhole as well. Or, if they've been replaced ahead of time, we tie them over, reinstate the core, and we're good to go. It's just a better restoration method."

Southwest Gas estimates savings of nearly 87% in pavement restoration costs with keyhole combined with split-and-pull for main replacements completed under pavement compared with open trench methods.

"Given the continually increasing cost of oil-based products like asphalt, using keyhole technology with trenchless methods whenever feasible greatly enhances our efforts to minimize cost, inconvenience, and aesthetic impact associated with conventional excavation practices," says Byron Elkins, Manager of Operations Planning at Southwest Gas. ▼▲



This graph summarizes the average reduction in pavement restoration costs at Southwest Gas for keyhole with split-and-pull versus open trench methods.

New Staff Added to Infrastructure and Rehabilitation Team

Ernest Lever, a leader in the field of plastic piping systems, will serve as a Senior Institute Engineer and lead GTI's research, testing, development, and deployment of plastic pipe, fittings, and other products. He comes to GTI from Georg Fischer Central Plastics LLC, a design and manufacturing company in Oklahoma, where he served as Vice President of Engineering and Quality.

"We are very excited to have Ernest join our team," says Eddie Johnston, Managing Director, Delivery Sector. "He has a history of driving improvements in engineering and quality, and we will leverage his talents to bring value to our customers and to benefit the natural gas industry."

Oren Lever joins GTI as an Engineer and will function as Lead Investigator for projects related to polymer pipe, joining, and appurtenances. He has expertise in the areas of finite element analysis including stress, thermal, computational fluid dynamics, and injection mold analysis. Oren comes to GTI from Georg Fischer Central Plastics, where he served as a Product Engineer. ▼▲

Need More Information?

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