



Keyhole Technology Program

OCTOBER 2006



# Keyhole Technology Newsletter

Inside this issue:

<i>National Grid Service Installation</i>	1
<i>Camera Inspection</i>	2
<i>Underground Focus</i>	2
<i>Mueller Repair Clamps</i>	3
<i>Kravitch Machine Co.</i>	3
<i>New Member</i>	4
<i>Des Moines Water Works</i>	4

## National Grid Service Installation

This summer, National Grid began using keyhole technologies in New York State with significant success.

In August, five service renewals (low pressure to high pressure) were completed in Oswego, NY, providing an estimated savings of 35 to 40% over traditional methods.

“We chose to use keyhole technology in this application because of the reduced amount of intrusive excavation required,” explains National Grid’s Don Cordone, Principal Gas Operations Specialist. “This equates to considerable pavement restoration savings, limited traffic impediment (both vehicular and pedestrian) and permanent restoration at the completion of the work.”

backfilled and compacted. The core was then permanently reinstated using a bonding agent specifically developed for this type of work.

Cordone notes that keyhole technology can provide considerable savings in paving restoration costs by using a much smaller excavation and completing the permanent paving repair at the conclusion of the task, instead of scheduling permanent paving restoration with a third-party contractor.

“Keyhole technology is relatively new to our operations,” says Cordone. “We are three months into our keyhole program with one set of equipment and tooling in both of our operating divisions. Our goal is to complete a wide range of tasks through keyhole technology. Doing so will not only benefit National Grid, but also our customers.”



The installations were completed in continuously paved areas (asphalt and concrete) to serve several small businesses. The existing gas main was located beneath the sidewalk approximately 36 inches deep. Upon completion of a vacuum-excitation process, long-handled tools were used to retire the existing services. A portion of each existing steel service was cut out and removed. A one-inch-diameter plastic pipe was then inserted in the service, and a new plastic curb valve and steel-to-plastic service tee were installed. The service was then air tested for leaks, energized, and all steel fittings were wrapped to provide proper cathodic protection. A plastic curb valve box was installed to provide access to the curb valve, and the two keyholes were



Two 18-inch-diameter holes were cored to allow to access the steel gas main and service.

### Send Us Your Field Reports

Have you had recent success using keyhole technology?

We'd like to know the details.

Share your success with our readers.

Field report story suggestions should be sent to Angie Wood at Gas Technology Institute at:

[angie.wood@gastechnology.org](mailto:angie.wood@gastechnology.org)

**Field Demo Report:****Keyhole Camera Inspection System**

On August 15, 2006, a field demonstration of a prototype camera inspection system for keyhole operations was conducted in New York City in cooperation with Consolidated Edison Company of New York, Inc.

The camera entered and successfully navigated through a 6-inch-diameter cast-iron main for 100 feet under "live" operating conditions.

To launch the camera, the cast-iron main was first tapped using a modified ALH tapping system. The tapping system was modified by PLCS with the specific intention of making it compatible with keyhole operations. Once the camera inspection was completed, a permanent plug was used to seal the pipe.

The development of the modified camera system was sponsored by Operations Technology Development, NFP.

Building on the existing ULC Robotics camera system for live gas applications, modifications were made to adapt the system for keyhole openings.

"Camera inspection systems are valuable tools for utilities," says GTI engineer Angie Wood. "They've been shown to be effective for evaluating the condition of distribution mains. However, the ability to access pipes for inspection through keyholes has not been available until now."

In order to make the camera keyhole-ready, researchers needed to modify the camera-entry system. In traditional excavations, the camera enters the main through a launch tube positioned at a 20-degree angle from the horizontal. With this design, there is not enough room in a keyhole to use the existing launch tube. The modified launch tube for keyhole applications is vertical. The camera is lowered through the launch tube vertically, and then negotiates a 90-degree angle to proceed horizontally through the pipe. To ensure that the vertical entry could be achieved, the length of the camera was shortened by about an inch.

The keyhole camera is rated for use up to 60 psig. The camera can



Above: Keyhole camera and reel  
Inset: Keyhole camera vs. conventional camera

be used to inspect cast-iron, steel, or polyethylene pipe.

The camera enters the main through a tap hole which is 1½ inches or greater in diameter. The system measures distance of travel, allows for pipe inspection, and allows the operator to map the precise locations of joints and fittings observed on the monitor.

In the field, the camera can capture footage in three different ways – on the hard drive of the unit, on magnetic tape, or on a CD.

**Technology on Display at Underground Focus**

The increasing development of keyhole technology was evident at the 4<sup>th</sup> annual Underground Focus Live Show, held on August 22-24, 2006, at the Chicagoland Speedway in Joliet, IL.

This regional show featured demonstrations, training seminars, exhibits, and networking sessions on a wide range of technologies and infrastructure equipment.

Featured at the show were two keyhole demonstrations, which allowed attendees to witness the entire keyhole process from start to finish.

Some highlights:

- Utilicer Technologies, Inc., provided pavement coring and permanent reinstatement.
- Nicor Gas demonstrated their medium-pressure service abandonment process.
- Cadwelding with keyhole tooling made by Kravitch Machine Company was performed. (Nick Kravitch displayed his company's newest keyhole tools.)
- Trenton Corporation demonstrated corrosion-protection applications.

- Timberline Tools displayed squeeze-off equipment.



Top left: Trenton Corp. corrosion protection; Bottom left: Cadwelding; Above: Nicor's Dennis Bailey on the keyhole stand.



**New Products:**

## Mueller Co. Keyhole Repair Clamps for Steel Pipe

Mueller Company is now marketing its Mini-Band Full-Seal™ 360 keyhole repair clamps for keyhole use. These clamps are currently offered for 2-inch-diameter steel pipe, with clamps for 4-inch and 6-inch pipes currently under field evaluation.

The clamps feature a uniform 360-degree seal that is ideally suited for keyhole applications where the exact leak point cannot be pinpointed.

Features of the new clamp include:

- A gasket that fully encircles the pipe to provide a uniform circumferential seal.
- Integral stainless-steel gap bridges are recessed and bonded to the gasket

- Drop-in style ductile-iron lugs that assist in enduring uniform clamping force
- Zinc-plated bolt with rolled spin-fit threads to speed installation
- Optional stainless-steel nuts and bolts optional.

The compact design allows for easy installation in keyhole or tight conditions.

The clamps can be installed using commercially available tools manufactured by Omega Tools Inc.

For more information regarding Mueller Keyhole Repair Clamps, contact: Bryan Kortte (217/425-7516).



Above: Keyhole Installation of Mueller 2" Full Seal Repair Clamp

Below: Mueller Keyhole 2" Seal Full Seal Repair Clamp



**Mueller Co.**  
GAS PRODUCTS DIVISION

**Focus On:**

## Kravitch Machine Company



Nick Kravitch of Kravitch Machine Company

Kravitch Machine Company, which has been manufacturing industrial-quality tools for more than 40 years, is focusing on developing new technologies for keyhole applications.

Located in the greater Pittsburgh area (Aliquippa, PA), Kravitch Machine has developed a line of long-handled keyhole tools for keyhole use.

In addition, Kravitch markets a new cathodic protection tooling system for keyhole use that uses the ERICO Cadweld Plus System to install exothermically welded connections. This tooling system consists of a pike, remote igniter, and mold. The igniter and mold are attached to the pike with a quick-disconnect coupler. The Cadweld accessories consist of the weld metal package (charge), the mold brush and the mold scraper. The correct charge and mold is determined by the pipe material and geometry.

For more information, contact: Nick Kravitch at: 1-800-437-5801 (nick@gaswatertools.com).



The Cadweld Plus System

## Keyhole Technology

### Permabond Joins GTI Keyhole Program

GTI welcomes Permabond Engineering Adhesives as the newest addition to the keyhole program.

Established in the United Kingdom, Permabond's specialty adhesives and anaerobic sealants were developed as an alternative to locking nuts, bolts, and other mechanical fasteners.

New Permabond developments include new structural acrylics, high-temperature anaerobic and cyanoacrylate adhesives, and new epoxy adhesive hybrids.

The keyhole representative from Permabond is:

*Joe Cairoli*  
Permabond  
20 World's Fair Drive #C  
Somerset, NJ 09973  
Office: 908-534-8054  
E-mail: [joe.cairoli@permabond.com](mailto:joe.cairoli@permabond.com)  
Web: [www.permabond.com](http://www.permabond.com)

### Keyhole Use in the Water Industry

Researchers report that keyhole technology is branching out from the natural gas industry and is being increasingly used for maintenance and operations activities in the water industry.

For example, Des Moines Water Works Distribution recently used keyhole techniques in a job to install 300 anodes on existing spin-cast-iron (post 1945) water mains. The mains varied from 6 to 12 inches in diameter and were accessed through 14-inch-diameter keyholes at 30- to 70-foot intervals in concrete streets.

"This project would not have



Vacuum excavating and sandblasting.

been attempted with ordinary 4-foot-by-4-foot excavations due to the cost," explains John Lins, Distribution Water Quality Coordinator for the Des Moines Water Works.

Following coring activities, the keyholes were vacuum excavated and the pipe was cleaned with a sandblaster. The anodes were then attached to the pipe using pin-brazing equipment powered by a 36-volt portable battery. (Pin-brazing equipments was supplied by Tom Gobin of GAS Product Sales.)

Work was conducted beneath residential streets inside the city of Des Moines on mains that had the highest number of breaks in the last 10 years.

"This is our third year of keyholing," says Lins. "In the first and second years, we chose mains that were in parking areas. This year, all but about 20 of the 300 anode installations were in concrete residential streets."

Lins notes that his company intends on continuing to use keyhole technology, and will likely focus on protecting some key feeder mains.

*Note to Manufacturers:* Des Moines Water Works is looking for a clamp for attaching anodes on older pipe that cannot be pin brazed. Contact John Lins at [lins@dmww.com](mailto:lins@dmww.com).



The pin-brazing process.



Wires run to a test station via a groove sawed in the concrete and a hole drilled through the curb.

*Gas Technology Institute*  
1700 S. Mt. Prospect Road  
Des Plaines, IL 60018-1804  
847-768-0500

Visit us on the web at:

[www.gtiservices.org](http://www.gtiservices.org)

Click on Keyhole Technology or

[www.gastechnology.org](http://www.gastechnology.org)

Click on Products and Services  
then Technical Services  
then Keyhole Technology

*Dennis Jarnecke*

Phone: 847-768-0943

Email: [dennis.jarnecke@gastechnology.org](mailto:dennis.jarnecke@gastechnology.org)

*Angie Wood*

Phone: 847-768-0636

Email: [angie.wood@gastechnology.org](mailto:angie.wood@gastechnology.org)