

Mechanical Fittings: A 'Perfect Fit' with Keyhole Operations

Elster Perfection and Omega Tools, Inc., are partners in a new initiative to market special mechanical fittings and tools for use in keyhole operations.

According to Elster/Omega, utilities could potentially save hundreds of thousands of dollars per year by utilizing mechanical fittings in small-hole processes.

Leading the initiative are Thomas W. Coleman III (Regional Sales Manager for Elster Perfection) and Dr. William Hutton (President and CEO for Omega Tools).

"In the past few years, the number of processes available for keyhole operation has grown rapidly," says Hutton. "To truly realize the full benefit of small-hole technology, operators can infuse the use of mechanical fittings into the process. The benefit of mechanical fittings can stand on its own, but combined with the excavation and restoration savings of a small-hole process, the savings are staggering."

Mechanical fittings for polyethylene (PE) mains have been providing savings on overall installation costs since the mid

1970s, when the first "stab" (or, mechanical fitting) was introduced.

Shortly thereafter, the mechanical tapping tee was introduced.

"A mechanical tapping tee offers a unique combination of speed, economy, and security when connecting PE service lines to a gas main," adds Coleman. "Surface preparation time is significantly reduced and the cool-down time associated with fusion methods is completely eliminated."

A mechanical tapping tee can typically be installed in less than 10 minutes in either a conventional or keyhole excavation. In addition, with the use of mechanical tees no bulky fusion equipment is required, no external power source is needed, and pipes can be easily joined regardless of weather conditions.

Elster Perfection's PermaLock brand of mechanical tapping tees (for use on PE



mains) are available in sizes ranging from 1¼-inch IPS through 8-inch IPS with outlet sizes ranging from ½-inch CTS through 2-inch IPS. The full encirclement tee is designed to ensure an easy-to-install, reliable gas-tight connection. The tee features a ratchet-style cutter assembly that not only creates a large port for gas flow, but also securely locks the tee into the gas main, preventing any movement, rotation, or loosening of the connection. Additionally, the cutter's locking sleeve is designed for minimal protrusion into the main, allowing for efficient pigging of the line.

The use of the PermaLock tees is complemented with specialized Omega tools and procedures developed for small-hole technology. The latest tooling enables the installation of the tees as well as various forms of electrofusion tees.

When installing the Elster Perfection tee, two light-drive extension handles are used with specialized attachments and

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Omega's tools include standard extension handles that engage pneumatic heads; quick-release handles for pickup and placement manipulations; and torque handles to generate torque force. Numerous attachments in the form of specialized sockets and manipulation devices are used to accomplish specific tasks.

Keyhole Technology Gaining International Interest



Keyhole activities are continually expanding and gaining interest outside of North America.

Gas International magazine reports that National Grid (formerly British Gas) is importing keyhole technology from its U.S. operations for use in the United Kingdom.

In field demonstrations in 2006, National Grid investigated the use of coring and vacuum-excavation techniques, with the support of a team of U.S. engineers brought to England to provide training in keyhole technologies. Two trucks equipped for keyhole operations were also sent overseas.

It is reported that National Grid is the first company in the U.K. to use combined coring and vacuum excavation for utility operations.

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sockets to place and hold the top section of the tee to the main while the lower saddle is held in place with a specialized saddle form. Using a socket extension system, the cap screws are torqued into position. Once the tee is secured to the main with the bolts, the punch is driven down using the medium-drive extension handle with a hex key socket. The cap is installed using the universal cap installer. The service pipe is installed using Omega's Pipe Manipulation tooling. Final pressure testing is accomplished with the extension tester assembly.

For more information, contact: Thomas Coleman (732/681-8308; tcoleman@perfectioncorp.com).

Comparison of Typical Electrofusion Tapping Tee with Mechanical Tapping Tee



	Electrofusion Tee (2" x 1")	PermaLock Tee (2" x 1")
Installation Time	80 min. (in a keyhole)	15 min. (in a keyhole)
Labor Rate	\$46.00/hr.	\$46.00/hr.
Total Labor Costs	\$61.32	\$11.50
Material Costs	\$17.25/tee	\$26.95/tee
Total Cost (Labor Plus Materials)	> \$78.57	> \$38.45

Using these estimated figures provided by a major utility in the northeast, the cost savings per two-inch service installation (typically the most common) would be **\$40.12**. Combine the savings of using small-hole technology and mechanical fittings and utilities can realize significant savings.

KeySpan Energy Delivery Expands Keyhole Program with Use of New Truck

KeySpan Energy Delivery New England recently announced the expansion of its keyhole coring and reinstatement program and the acquisition of five new MD-100 SB coring units from Utilicor Technologies.

Designed for high maneuverability, the coring unit is mounted on a medium-

duty Ford F-550 cab and chassis with a 141-inch wheelbase, a cab-to-axle distance of 60 inches, and dual rear wheels.

The system's core-drill assembly is based on the field-proven Minicor™ model and is fitted to the unique *Traversacor*™ core-zone extension system. This unique design feature provides the flexibility to core anywhere within an 11-square-foot area behind the truck without repositioning the vehicle. Three hydraulic stabilizers can be adjusted to facilitate coring operations on angled surfaces and ensure accurate coring results.

The service body on this vehicle is built by Omaha Standard, which has more than 80 years of truck-body building experience. According to Utilicor, this know-how, combined with superior materials, advanced design and manufacturing processes, and factory-applied paint over an epoxy electrocoat primer results in the best service body on the road today.

Overall, the service body is 108 inches long, 95¾ inches wide, and 40 inches high. The truck includes three 20-inch-deep, lockable storage compartments of different dimensions on each side and a transverse 12-inch-high, 20-inch-wide, and 95-inch-long storage box (with easy access doors at each end) mounted across the unit behind the cab for the storage of long-handled tools. All doors are weather-

proofed and equipped with heavy-duty stainless steel, automotive-type, rotary paddle latches combined with an adjust-



The unique *Traversacor*™ system allows for coring up to 28 inches out from the back of the truck and from the curb to more than halfway across the width of the truck, without repositioning the vehicle.

able striker pin to provide positive door closure. These paddle latches are key-lockable and are "blind" bolted to the door for security and ease of replacement.

In addition to the service body, with more than 67 cubic feet of storage capacity (which is greater and more organized than the open-cargo capacity of a standard pick-up) the MD-100 SB comes equipped with an easy-access, deck-mounted, heavy-duty, roll-out storage tray that can be used to accommodate up to six pails of Utilibond or to store an extra coring drum, spare cores, road plates or other heavy items. It also comes with an on-board high-pressure wash system, and a 100-gallon water tank.

For more information, contact: Marshall Pollock (416/391-3901; mpollock@utilicor.com).

FIELD REPORT

Southwest Gas Finds Big Savings with Keyhole Technology

In a little more than a year, Southwest Gas Corporation's Northern Nevada Division has gone from simply investigating the use of keyhole techniques to incorporating keyhole technology as a significant part of its maintenance activities.

In 2006, the division was tasked with a project to dig and inspect numerous valves and isolated steel pipe sections to determine material types and install test points and galvanic protection as warranted. With the majority of the digs located in paved areas, operations management noted that the project presented a good opportunity for implementing keyhole technology, and subsequently worked with its corporate staff groups and master pipeline contractor (Northern Pipeline) to secure the required keyhole apparatus and tooling.

"As expected," notes Byron Elkins, Manager of Operations Planning & Analysis for Southwest Gas, "utilizing the keyhole process for this project resulted in significant savings over conventional excavation methods. Conservatively speaking, the savings exceeded 38%."

Given the success of the keyhole dig-and-inspect project, the division initiated a feasibility study over the winter of 2006/2007 to determine if keyhole technology could be used to complete service-to-main (STM) tie-over activity in conjunction with PVC main-replacement



Left: STM(s) being completed with keyhole tools and apparatus. Right: Completed STM connection.

projects. (In 2001 and 2002, the division replaced all of its PVC services. Since then, it has been targeting PVC mains for replacement based on franchise projects and risk assessments.)

PVC main replacement is completed via a "split-and-pull" installation process where the main being replaced is isolated, a cable is inserted, and a splitting head attachment is pulled back through along with the new polyethylene (PE) main. The new PE main is essentially in the exact location of the old PVC main, which eliminates much of the logistical challenges associated with conventional open- and trenchless-installation methods. Since the services have already been replaced – and the STM connection would take place in the same location – it was desirable to complete the activity (in its entirety) within a single keyhole excavation. This was accomplished through use of a Lyall bolt-on service tee and associated keyhole tools; a Central Plastics' electrofusion coupling and fusion unit; and various Omega keyhole tools to facilitate pipe scraping, tracer wire connections, and electrofusion coupling alignment.

Two pilot projects were successfully completed in April 2007. Based on the demonstrated benefits of keyhole technology, the division is expanding its keyhole STM methodology for PVC-replacement projects throughout its service areas in 2007.

With the exception of the main tie-in locations, keyhole methodology will allow crews to replace a daily average of 500 feet of PVC main (per crew) and complete multiple STM connections in a "one-stop-shop" setting.

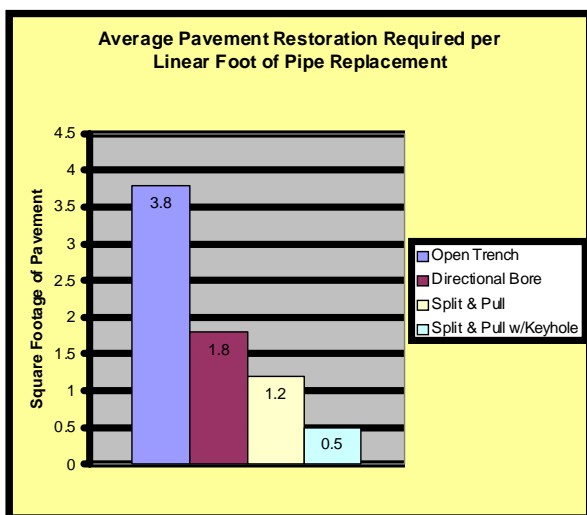
The company estimates that using keyhole technology and the "split-and-pull" method can provide an average reduction in pavement-restoration costs of almost 87% for main-replacement projects completed in blacktop. Given the continually increasing cost of oil-based products such as asphalt, using keyhole technology and innovative trenchless-installation methods whenever feasible is now a key consideration at Southwest Gas.

"The keyhole process greatly enhances the division's efforts to minimize the cost, inconvenience, and aesthetic impacts associated with conventional excavation and pavement restoration practices," says Elkins. "We are very excited about the advances in this technology and we appreciate the support and dedication of the entities that have helped us see this innovation to fruition."

For more information, contact: Byron Elkins (702/876-7316; byron.elkins@swgas.com).



Completed STM/Keyhole location.



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. Send field report story suggestions to: Paul Salamondra at Gas Technology Institute at:

paul.salamondra@gastechnology.org

TECHNOLOGY UPDATE**New Products for Keyhole Operations**

The following products are now available for use in keyhole operations.

Trenton Corporation is now offering an **encapsulation box for Kerotest valves**. The box includes a center section that has retention clips to hold the box in place, and an access hole at the top. Boxes are available to accommodate 2-inch, 4-inch, and 6-inch pipe. *Contact: Frank Rampton (fcr@trentoncorp.com).*

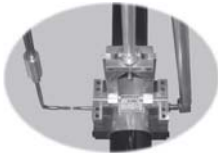


Buzzi Unicem USA is introducing a pavement repair mix for small road repairs. The **Ulti-Pave® mix** is marketed as a one-component, rapid-

hardening patching material formulated to meet ASTM C 928A standards. *Contact: David Weber (David.Weber@buzziunicemusa.com).*

Mueller Company's Mini-Band Full-Seal™ 360 **key-hole repair clamps** are now available for use on 4-inch pipe.

(Clamps for 2-inch pipe are also available; 3- and 6-inch prototype clamps are being built and tested. *Contact: Bryan Korte (bkorte@muellercompany.com).*

**EXCAVATION TECHNOLOGY****MichCon Initiates New Program**

Michigan Consolidated Gas Company (MichCon) has initiated a new program involving the use of hydro-excitation.

The company has adapted four Vac-tor HXX PD hydro-excitation units into single-truck systems, each containing a tri-lobe blower (capable of producing 5,150 cfm), 400,000-Btu water heater, and stainless-steel water tank. A 360-degree telescoping arm with 8-inch digging tubes is also included.



MichCon reports that the system works in all weather conditions (working easily through frost and small roots with no damage to surrounding utilities). Productivity has increased from 3-4 jobs per day to 8-10 jobs per day with the new technology. The hydro-excitation process has been used for service cut-offs and main repairs, and is just starting to be used for meter move outs.

For more information, contact: Mike Arioli (ariolim@gteenergy.com)

**STAFF ADDITION****Salamondra Joins GTI Keyhole Program**

Paul Salamondra recently took on new responsibilities at GTI as an Institute Engineer focusing on keyhole technology development.

Paul has worked as an engineer in GTI's Delivery Sector since joining the group in 2002. He has been involved in such projects as: the study of static electricity build-up and discharge on vacuum trucks; a new system for measuring stresses in pipes using ultrasonics; a tool to remotely shut-off damaged gas mains; and pipe-failure analysis. Previous work also focused on pipeline integrity management, pipeline coatings, and pipeline repairs.

Currently, Paul is the principal investigator for a GTI study on gas interchangeability and for research on repair techniques for low-stress natural gas pipelines.

Need More Information?

For more information or questions on any of the *Keyhole Technology News* articles, please contact:
Dennis Jarnecke
847-768-0943
dennis.jarnecke@gastechnology.org

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Gas Technology Institute
1700 S. Mount Prospect Road
DesPlaines, IL 60018-1804
www.gastechnology.org

GTI Demonstrates Keyhole Technology

A variety of keyhole technologies were on display at GTI's exhibit at this year's American Gas Association Annual Operations Conference held April 23-26, 2007, in Grapevine, TX

The GTI exhibit featured a selection of currently available tools, a recently developed "live" inspection camera, and products still under development.

A highlight of the exhibit was a keyhole demonstration stand that provided visitors with an opportunity to use keyhole tools in a simulated operation to experience the ease and benefits of keyhole technologies.

