Finding better and more efficient and effective ways of utilizing underground construction technology is a hallmark of the gas utility industry. In fact, gas utilities are very much responsible for the development and refinement of many of the trenchless construction methods utilized today.

Like most large gas utilities around the country MichCon, Detroit, Mich. (a subsidiary of DTE Energy), has roots that go back well over 100 years. Many things have changed since the company’s beginnings and in order to remain competitive MichCon has had to meet and exceed the needs of its customers. One way it has been able to achieve a level of high customer service is through the construction techniques that minimize disruption and increase efficiency for service installations and replacement.

According to MichCon Project Supervisor Michael Arioli cost and customer service have driven them from conventional construction techniques to trenchless methods. He said, “We are very focused on customer service, as well as efficiency. By utilizing trenchless technology we can often achieve both goals at the same time. We’re keeping disruption to a minimum. We don’t have to trench through peoples’ yards, driveways and sidewalks. We’re also keeping disruption to the streets and roads down which helps traffic. And finally, we’re saving time and money on each project.”

New service installations and service line upgrades are two areas where trenchless technology has had a big impact at MichCon. Crews are using a “keyhole” technique to limit disruption and save restoration costs. The crews use 1.75-inch and 2-inch diameter Grundomat piercing tools from trenchless equipment manufacturer TT Technologies, Aurora, Ill on a daily basis and the results are impressive.
Utility Stats
MichCon Gas is one of the nation’s largest and oldest providers of natural gas, having served the city of Detroit and surrounding areas for over 150 years. Currently the utility supplies natural gas to approximately 1.3 million families and businesses in over 500 communities throughout Michigan. They maintain over 18,900 miles of natural gas pipeline and have the ability to store 130 billion cubic feet of natural gas.

Service installations keep MichCon Gas crews particularly busy. With over 150 service installations per month (either new service, upgrade or rehab/replacement) how maintenance crews approach them can have a significant effect on time and money. Arioli says the company has looked at many different construction techniques for facilitating these installations.

He said, “The cost of doing work conventionally is increased dramatically by the cost of excavation. We looked at several trenchless options including directional drilling units, but for this work we found them to be cost and time prohibitive. By utilizing keyhole technology with trenchless piercing tools the same work can be accomplished for a fraction of the cost. It reduces the cost of open cut restoration by over 500 percent.”

While new service or rehab/replacement installation is common, Arioli has seen a consumer demand trend in his area that began after the blackout in the summer of 2003. Since that event, customers have been requesting larger services to accommodate gas-powered generators in the event of another electrical power loss. The gas-powered generators require a 1 1/8-inch service to operate, much larger than the area’s 1/2- to 3/4-inch standard services.
Through the Keyhole
As the name implies, keyhole installations utilize small excavations. While each installation is different, 50 feet is the average length. crews begin by excavating a small hole in the road above the main. Arioli explained, “To excavate the road we use what we call a cookie cutter. It’s a specially designed coring machine for concrete and asphalt. We core through the pavement, asphalt or sidewalk to a depth of two feet and remove the core. The diameter of the hole is only 18 inches. Once the coring is complete we vacuum excavate down to the main, usually four or five feet deep.”

Meanwhile at the house, another minimal excavation is performed to allow the launch of the piercing tool. According Arioli the launch pit is typically 4 inches wide, 26 inches long and 14 inches deep. From there the piercing tool is launched to the 18-inch diameter core (keyhole) in the street. crews position the piercing tool using a telescopic Grundoscope aiming frame and surveyor stake before launching in order to ensure that the tool starts out on the proper line and grade. Still, working with such small targets, the precision and accuracy of the piercing tool is an absolute must.

Accuracy is Key
The basic design for the piercing tool is rather simple. The tool is basically a piston within a casing. Compressed air moves the piston and the impact of the piston drives the tool forward. More is needed, however, to achieve the high level of accuracy necessary to perform the keyhole work that MichCon gas is performing.

According to TT Technologies Piercing Tool Specialist Brian Mattson, early piercing tool technology with this basic design was often thought of as unreliable and because accuracy was an issue. The development of the Grundomat piercing tool with a reciprocating stepped-cone chisel-head assembly in the 1970s helped change the way contractors viewed piercing tools.

Mattson said, “The chisel-head assembly really makes the difference when it comes to accuracy. The assembly is spring-loaded and pushes forward from the main casing at a rate of approximately nine times per second. This creates a pilot bore for the Grundomat to follow, ensuring a high degree of accuracy. The reciprocating spring loaded action and stepped-cone design allow the tool to power through difficult soils and obstructions without being pushed off course. While the body of the tool is tight in the ground the head moves independently like a small jack hammer. Most piercing tools will deflect when hitting an object, because of the cylindrical head design.”

Piercing tools are used in water, gas, sewer, electrical, CATV and other construction
applications and range in size from as small as 1 3/4 inches in diameter up to 7 inches. Accurate bores at lengths of 50 to 150 feet are common. In addition to horizontal boring, the tools can be used for other applications like pipe bursting and pipe ramming.

**Pulling in Pipe**
MichCon crews use 1 3/4-inch and 2-inch piercing tools for keyhole operations. Once the tool arrives at the 18-inch diameter core in the sidewalk, street or roadway, crews attach the new Medium Density Polyethylene (MDPE) service to the front of the piercing tool. Because the diameter of the keyhole is so small, the tool cannot be removed through it. Instead, the new pipe is attached to the front of the tool and the tool is placed in reverse and backed out to the launch pit. As the tool is backing out it pulls the MDPE in place.

MichCon dedicates three crews to fulltime keyhole installations. Crews are typically able to finish two or three installations per day.