

# Pipe Splitting Hits Its Mark For Brooklyn Union Customers

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On a daily basis, New Yorkers endure a lot, including the ear-splitting sound of jackhammers ripping up the streets. While utilities explain that excavation of trenches is sometimes a necessity, customers are often less than appreciative of the inconvenience of gaping holes in front of their houses—or under their cars.

For Brooklyn Union, which distributes natural gas through a 3,900-mile distribution network in the New York City boroughs of Brooklyn, Queens and Staten Island, keeping 1.1 million customers satisfied is a major challenge. Founded in 1895, the company serves 3.8 million people in one of the most densely populated areas in the country and maintains some underground mains that are as much as 90 years old.

Consideration for customers as well as cost savings have given great impetus to Brooklyn Union to use trenchless technologies for installing and replacing gas piping whenever it can. Doing so has dramatically reduced the amount of conventional excavation required to accomplish these tasks.

## Pipe Splitting

Thanks in particular to a tool known as the Bullet, customers in New York City have found their lives much less frequently disrupted by street construction. A highly innovative technology which Brooklyn Union developed and that has now been commercialized, the Bullet cuts and expands underground pipes, forming a conduit into which replacement pipe of the same size or larger can be inserted. By eliminating the need to dig long trenches and remove old steel and cast iron pipe before installing new pipe, the Bullet saves labor and restoration costs, and minimizes much inconvenience to customers.

Patented by Brooklyn Union, the Bullet is available worldwide from McElroy Manufacturing, Inc., in sizes ranging from 1.5-inch through 6-inch diameter. The Bullet is inserted at one end of a pipe being replaced. As it is hydraulically pulled through the host pipe, its cutting wheels

and spreader cut the pipe longitudinally and spread it radially, enabling it to receive the replacement pipe. From the front to the back of the Bullet, the four hardened-steel cutting wheels are successively larger in

main must be removed. Therefore, prior to splitting and expanding, the old main is cut along its circumference on both sides of each service connection. These segments can then be easily pried away to provide



After the Bullet has split the original main, Brooklyn Union employees prepare to insert spreader that clears a path for plastic pipe to follow.

diameter. The continuous replacement pipe is attached at the tail end of the Bullet prior to its run through the host. During a typical run, approximately 200 to 300 feet of pipe will be split and replaced.

As the tool is pushed through a length of pipe, the first wheel penetrates about halfway into the pipe wall. The following wheels cut completely through the lower part of the pipe wall, then through whatever type of coupling joins the pipe. Splitting pipes and couplings, however, is just the first job of the Bullet. It also expands pipe, making way for the same size or larger pipe to be inserted. A conical expander is pushed back through the severed pipe, which is further expanded to eliminate all sharp edges and obstacles. Replacement plastic pipe is then pulled through the expanded pipe.

The newly installed length of plastic main must, of course, be attached to service lines along its route. This means that all of the service connections on the old

access for new service connections.

Customarily, the Bullet is used to replace lengths of main that have few services needing to be taken off line. Test holes are bored to ensure that the soil is not too compact. Brooklyn Union also makes certain that the work will not disrupt adjacent utility conduits.

The risk of penetrating other facilities directly beneath the pipe being split is eliminated by positioning the cutting wheels at a 5 o'clock or 7 o'clock angle in the pipe. To prevent the tool from rotating within the pipe, additional wheels have been placed atop the tool to fasten it in a fixed groove.

Since deploying the Bullet in 1990, Brooklyn Union has used pipe splitting to replace some 18,000 feet of cast iron pipe and 44,000 feet of steel pipe, each year, saving about \$2.5 million. The company has found that depending on conditions, pipe can be split at the approximate rate

of five feet per minute—and the cost of replacing each foot of two-inch steel has dropped from \$103 to \$44.

Dependable, adaptable and almost indestructible, the Bullet has permanently changed utilities' approach to underground pipe installations.

### Pneumatic Piercing Tools

Just a few years ago, installing a one-



Typical compression couplings and steel pipe split by Bullet.

inch service from a main in the street to the front wall of a home entailed digging a trench at least several feet deep and 10 to 20 feet long. Today, workers merely have to excavate small openings over the main and at the front wall of the building and insert a pneumatic reciprocating tool. The tool tows the service itself behind it and eliminates the need for the trenching in between the holes.

### Insertion & Lining

When possible, Brooklyn Union utilizes the method known as insertion, which entails inserting a plastic pipe into a larger main or service. In this upgrade, the smaller pipe can carry more gas at higher pressure than did the original section of pipe. The company has also rehabilitated mains using both modified slipliners and soft liners. The former process involves the installation of a tight-fitting plastic liner, which is reduced in diameter prior to its being inserted into the "host" main. The latter involves inverting a resin-impregnated liner to closely fit the inside diameter of the host pipe. Immediately following the inversion, steam cures the resin and ensures the integrity of the main.

### Directional Drilling

Today, Brooklyn Union routinely installs hundreds of feet of plastic pipe in city streets. The machine that accomplishes this is essentially a directional boring tool with a steering head that is projected through the ground using a series of interconnected rods. The drill string disappears into the ground at one end of the installation, and emerges several hundred feet away at a predetermined target where a reaming tool and the carrier pipe itself is attached. The rig is then used to cut back or backream the hole and pull the pipe into position at the same time.

Several years ago, the company directionally drilled 3,000 feet under New York Harbor to install an 8-inch gas main between Red Hook, Brooklyn and Governors Island, using technology originally developed for the oil industry.

### Technology & Development

The nature of Brooklyn Union's service territory demands that it continually seek

new and innovative ways of building underground installations. The company's Technology Development, Testing and Deployment program works to reduce the cost of doing business, improve cost-effectiveness, and enhance service to customers. One intriguing development is the emergence of "keyhole" technology to design tools that work in extremely small spaces and require minimal excavations. *P&GJ*

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