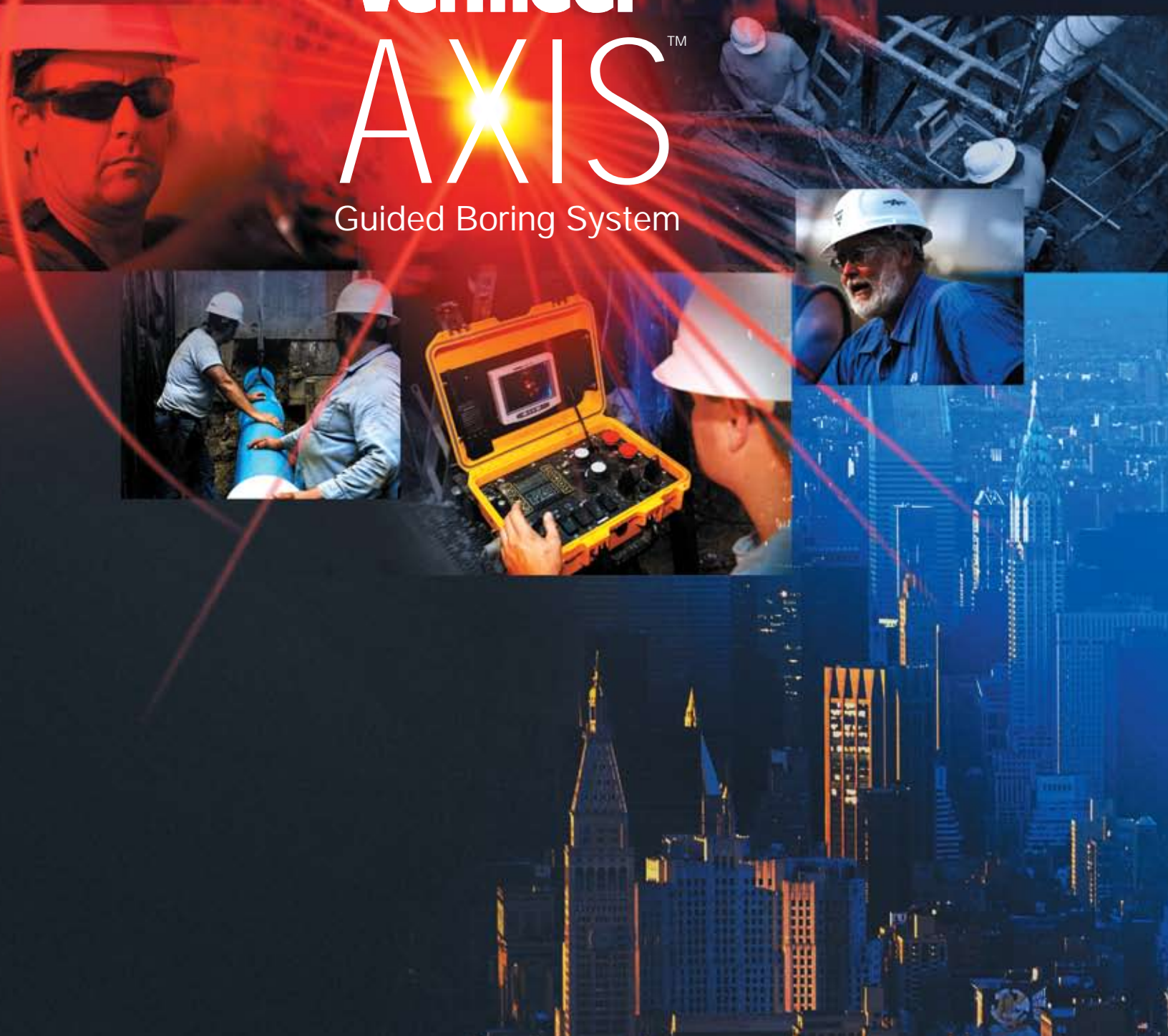


An innovative solution for water and sewer installation

# Vermeer<sup>®</sup> AXIS<sup>™</sup> Guided Boring System



# Our deteriorating infrastructure

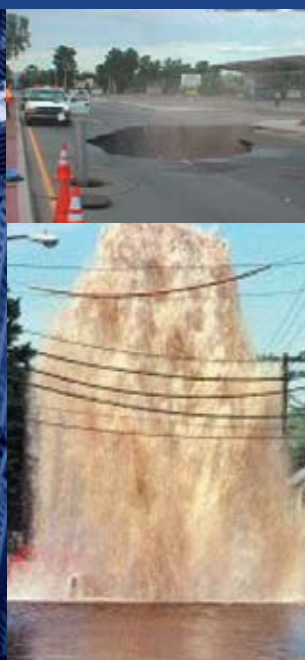
Globally the need to replace and expand sewer and clean water systems presents a vast challenge and opportunity. Much of the sewer and water pipelines installed over the past 100 years have reached the end of their useful life. This existing network of pipelines has been stressed by population growth and urban sprawl in developed countries, while many developing nations completely lack a sanitary sewer and clean water infrastructure.

These challenges are real and becoming more pronounced each passing year. According to an article in the September / October 2007 issue of *Water Utility Infrastructure Management*, up to 40 percent of clean water passing through these pipelines never reaches a single home or business due to excessive leaks while UNICEF estimates 2.6 billion people worldwide live without proper sanitary sewer access.

Yet, the current state of the global sewer and water infrastructure is only part of the challenge.



**Vermeer**<sup>®</sup>  
**AXIS**<sup>™</sup>  
Guided Boring System





# A need for new installation options

A growing number of water and sewer projects are required to be placed precisely on-grade. This work is often viewed to be tedious, labor-intensive, and expensive using traditional installation methods. Some of the current trenchless methods are designed to achieve the extreme accuracy necessary for this kind of work; however, they lack the productivity needed to compete with the open-cut method.

## **Now underground contractors have a new tool in the effort to replace and expand the crumbling sewer and water infrastructure.**

The Vermeer AXIS™ guided boring system is a pit-launched trenchless installation method designed to achieve pinpoint, on-grade accuracy while eliminating some of the difficult steps associated with other installation techniques. A wide range of product pipe, sizing specifications, and other jobsite requirements can be met with the versatile capabilities of the AXIS system.

## **Contractor Stuart Harrison**

*had been involved in the installation of sewer and water pipelines for more than 25 years using various open cut and trenchless methods. However, he discovered none of these methods combined pinpoint accuracy with productivity. Harrison began developing his own trenchless solution, and in 2002 his patented guided boring system was born.*



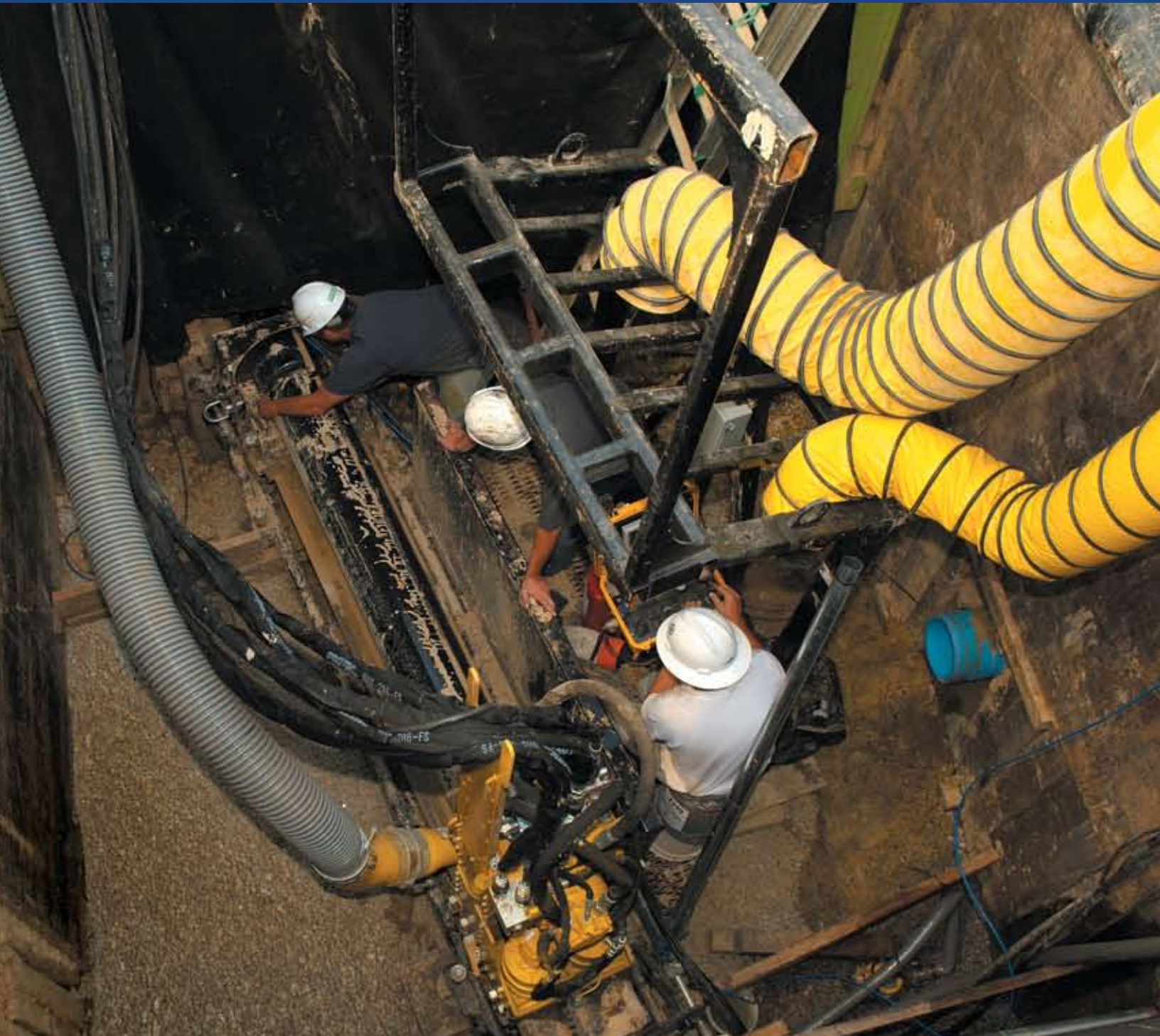
*Over the next three years, his company built five units and successfully installed several hundred thousand feet of sewer and water lines using the technology. In 2006, Vermeer Corporation met with Harrison about the technology and reached an agreement for Vermeer to acquire his patented technology. Over the past three years, Vermeer worked to refine the technology and bring the AXIS guided boring system to market.*



# AXIS

## Guided Boring System

The AXIS guided boring system is designed to install 10- to 14-inch (25.4 to 35.6 cm) pipe at lengths up to 350 feet (106.7 m), ideal for manhole-to-manhole installations. The system is capable of maintaining the strict tolerance and accuracy required for sewer and water projects.



# How the system works: the basics

To understand the unique features of the AXIS guided boring system, take a step-by-step look at how the system works.



First, two pits are dug; one at each end of the bore. The first will serve as the launch pit; the other will be the exit pit.



Then the pipe laser is set in the launch pit at the grade and depth the project requires.



Next, the leveling frame and rack assembly are lowered into the launch pit.



The drill head is lowered next, and contained within the drill head is a camera connected to a monitor on the operator console.



With the camera viewing the laser beam on the target, the operator can accurately monitor the target grade and make adjustments if the drill head moves off course.



At the front of the drill head, the cutter bit rotates to cut through the soil. The displaced soil is vacuumed out through a hollow section in the drill head and subsequent drill casing to a vacuum storage tank.



After the drill head is bored in, it is uncoupled from the carriage assembly. The carriage assembly retracts to its most rear position and is now ready for the first section of drill casing.



Rotation and thrust from the carriage assembly resumes as the first drill casing is pushed through the hole. This process is repeated with numerous sections of drill casing until the drill head reaches the exit pit.



The product pipe can then be installed using the pipe jacking method.

OR



With the AXIS system, the drill head can be removed. Then, the product pipe attached to the remaining drill casing can be pulled back through the bore.



The finished project.

# Component overview of the



Located outside of the launch pit, the **AXIS** system consists of the vacuum power unit, vacuum tank, and the rack power unit.



## **VACUUM POWER UNIT**

A high-performance liquid ring vacuum power unit provides 3400 cfm (96 m<sup>3</sup>/min) at 26 in. Hg (660.4 torr) (wet) to remove excavated material from the bore.



## **VACUUM TANK**

Upon reaching the launch pit, the excavated material transitions from the drill casing to a 6-inch (15 cm) diameter hose running up the launch pit to a 2000 gal (7571 L) or 800 gal (3028 L) vacuum tank.



## **RACK POWER UNIT**

A self-contained rack power unit features a 140-hp (104 kW) diesel engine and hydraulic pumps that connect to the rack, located in the launch pit, and powers rotation, thrust, and pullback functions of the drill head and casing.



## **OPERATOR CONSOLE**

The operator console is designed to centralize control of multiple components into a simple, easy-to-use interface. Console includes the target display monitor, parameter display, drill head steering control, thrust / pullback control, and rotation control.

# AXIS guided boring system



Located in the launch pit is the core of the AXIS system, which is made up of the rack, drill casings, drill head, and pipe laser.



## **RACK**

The rack includes the thrust / pullback carriage assembly and gearbox. As the thrust / pullback carriage assembly moves up the rack, the gearbox simultaneously provides rotation to the cutter bit at the front of the drill head.

## **DRILL CASINGS**

Drill casing segments, measuring 6.5 feet (2 m) long, are placed in the rack carriage. Each segment features a laser sight channel and a vacuum channel for removing excavated material from the bore. In the center of the drill casing is the drive shaft, which delivers rotation to the cutting bit on the drill head.

## **DRILL HEAD**

The drill head uses a flat-face cutter and when combined with the laser guidance system is capable of completing bores with on-grade accuracy. It can also be retracted in mid-installation allowing the contractor to change the cutter bit to adapt to changing ground conditions.

## **PIPE LASER**

The guidance system features a laser that determines the line and grade of the bore, enabling on-grade accuracy throughout the bore process.



# A solution for your sewer and water installation needs

The AXIS guided boring system offers numerous advantages to other installation methods that help enhance accuracy, efficiency, and safety.

**PRECISE ON-GRADE DRILLING** — A closed-circuit camera integrated into the drill head allows the operator to constantly monitor the process on a screen integrated into the controls console. The operator can make corrective steering adjustments to the drill head if needed to maintain line and grade. This combination of user-friendly technology allows the AXIS system to achieve the precision tolerances demanded by on-grade installation.

**CLEAN PITS** — The vacuum excavation method utilized by the AXIS guided boring system eliminates the need to suspend drilling operations to manually handle spoil within the launch pit. Eliminating manual interface with excavated material can also provide a cleaner pit environment.

**INSTALLED PRODUCT PIPE COMPATIBILITY** — The AXIS system has the ability to install both rigidly constructed, as well as fusible and restrained joint product pipe. The system is compatible with a range of pipe options, including PVC, clay, steel, ductile iron, and HDPE. This versatility gives project owners more product pipe options based on factors such as costs, traditional preference, and matching with existing infrastructure.

**NON-STRUCTURAL PITS** — The AXIS guided boring system requires a relatively low amount of thrust / pullback force to efficiently bore as compared to other pit-launched trenchless methods. It doesn't require the construction of a structural backstop or shaft within the launch pit helping to reduce project costs.

**MODULAR DESIGN** — With a flexible, modular design the AXIS system can be configured in a number of ways for jobsite footprint and transport considerations. It can accommodate customer preference with a number of truck and trailer setup options. This allows the system's footprint to be limited to one lane of a street, thus minimizing traffic disturbance.

**PRODUCTION TIME** — A variety of cutter face options are available to help boost drilling performance in varying ground conditions, including rock, shale / reef, clay, and sand / mud / silt. If ground conditions require a cutter face tooling change during the bore, the drill casing and head can easily be backed out to select a more efficient cutter style.



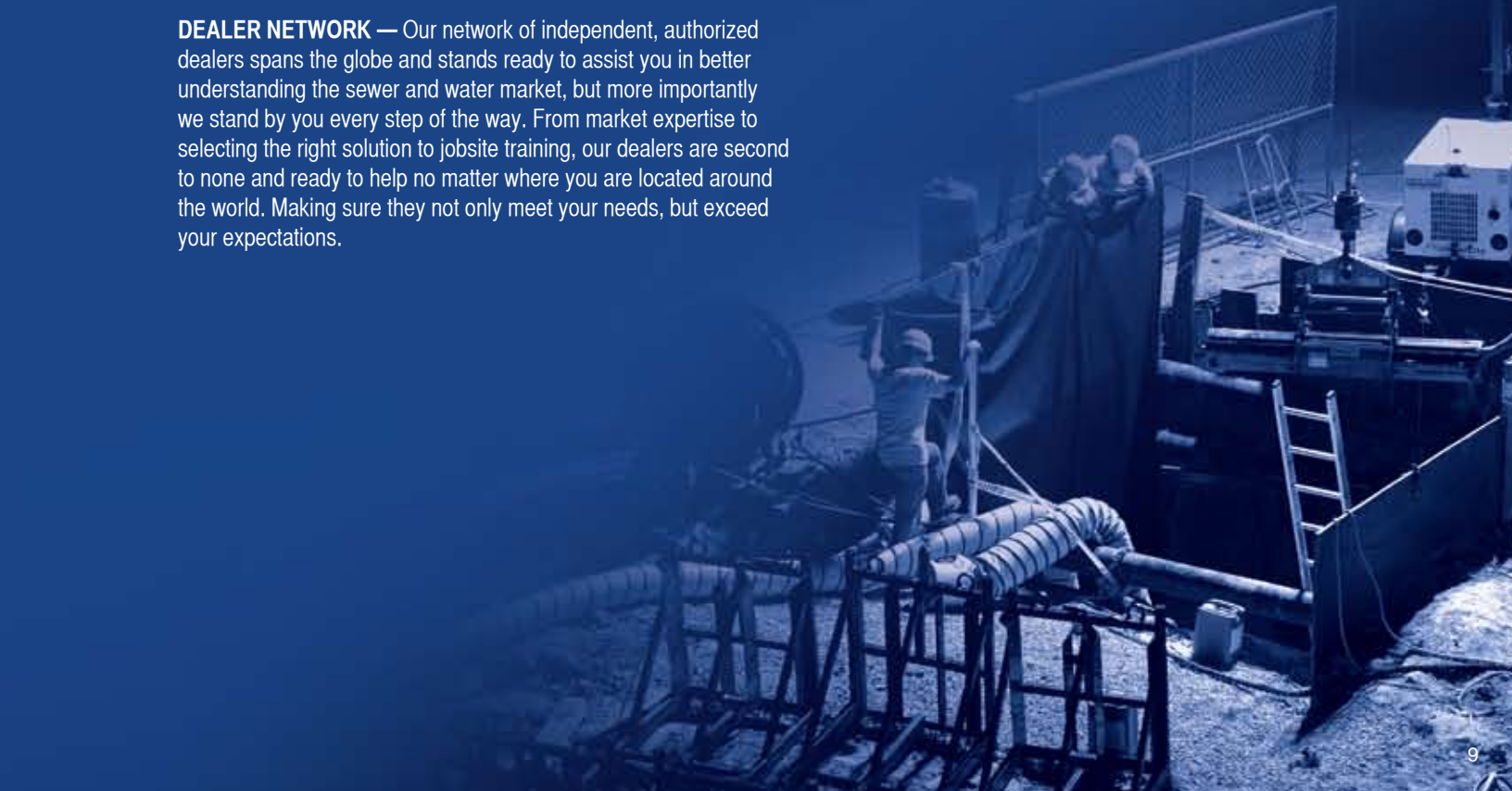


**RESTORATION COSTS** — The AXIS guided boring system is designed to help minimize restoration costs compared to other methods. It requires surface excavation for two pits that can serve as the manhole locations, saving additional excavation time and resources. When compared with open cut, the AXIS system significantly decreases surface restoration costs.

**EXCAVATED MATERIAL REMOVAL** — The vacuum excavation method helps to maintain a clean and compact site. Gone are the piles of spoil and the multiple trucks and loaders often required with other methods. Once the spoil is contained in the vacuum tank it can be transported to a separate site for disposal.

**SAFETY** — Compared to other sewer and water installation methods, the AXIS system requires only two pits and worker movement in and out of those pits is minimal. The AXIS system also features a patented remote lockout, strike alert, and falling object protective structure (FOPS) for jobsite safety.

**DEALER NETWORK** — Our network of independent, authorized dealers spans the globe and stands ready to assist you in better understanding the sewer and water market, but more importantly we stand by you every step of the way. From market expertise to selecting the right solution to jobsite training, our dealers are second to none and ready to help no matter where you are located around the world. Making sure they not only meet your needs, but exceed your expectations.





# Sewer and water installation solutions

Vermeer understands the sewer and water business and works to offer not only products, but solutions and expertise to help you succeed. For more than 60 years Vermeer has worked with customers to help find the right solutions for their company and projects. Our products and services are backed by thousands of employees dedicated to designing, building, and supporting your equipment.

## VERMEER SEWER AND WATER PRODUCTS

### Horizontal directional drilling

Vermeer Navigator<sup>®</sup> horizontal directional drills (HDD) help make sewer and water installations productive and efficient. Our drill rigs, from small to maxi, are ideally suited for sewer and water applications and range from 5500 to 1,000,000 pounds (2494.8 to 453,592.4 kg) of pullback force and 550 to 92,500 ft-lb (745.7 to 125,413.3 Nm) of rotational torque.

### Pipe bursting

HammerHead<sup>®</sup> pneumatic and static bursting tools, available through the Vermeer dealer network, are designed for pipe bursting when rehabilitating or upsizing sewer and water lines. These tools are ideally suited for 4 to 36 inch (10 to 91 cm) sewer and water rehab projects and offer minimal above-ground disturbance.

### Trenchers

The Vermeer line of Commander<sup>®</sup> track and utility tractors are suited for sewer and water work in new or expanding developments. These units range from 125 to 600 hp (93 to 447 kW), with the ability to reach up to 18 feet (5.5 m) in depth and 48 inches (122 cm) in width.

### Vacuum excavators

Through alliances with McLaughlin and Vac-Tron, Vermeer offers a full line of vacuum excavation equipment ranging from 100 to 800 gallons (378.5 to 3028.3 L) in capacity. Each model offers unique features to assist contractors with routine potholing and drill fluid removal projects, as well as attachments to accommodate keyholing, sewer-jetting and exercising valves.





# Vermeer



[www.vermeer.com](http://www.vermeer.com)

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