



Commercialization of a True Mechanical Internal Services Reinstatement Process

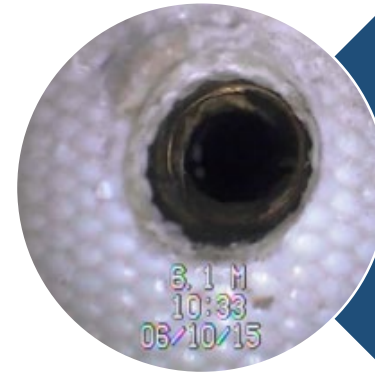
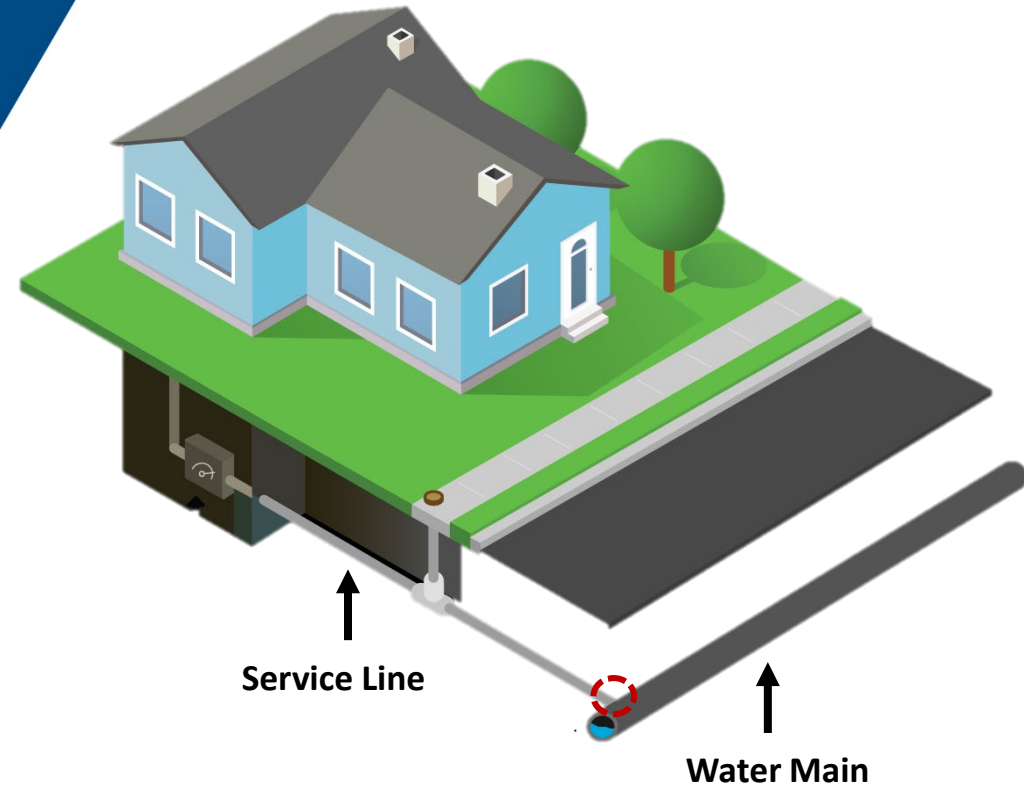


AEGION®

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Potable Water Service Connections



Adhesive



Mechanical

Historical Service Reinstatement Options

Adhesive reconnections (Relies on host pipe for watertightness)



Plug and drill method whereby liner adheres to host pipe and service corporation

Excavated mechanical reconnections

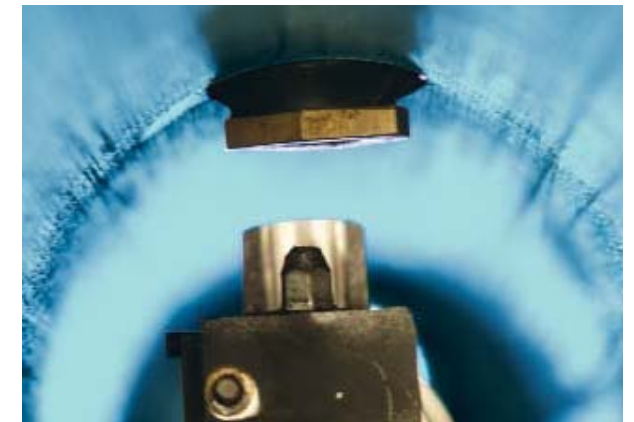
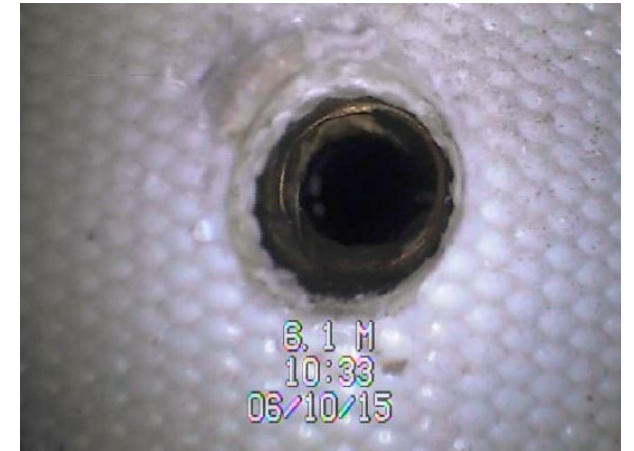


Involves open-cut excavation and installation of new mechanical connections at each service.

Robotic mechanical reconnection

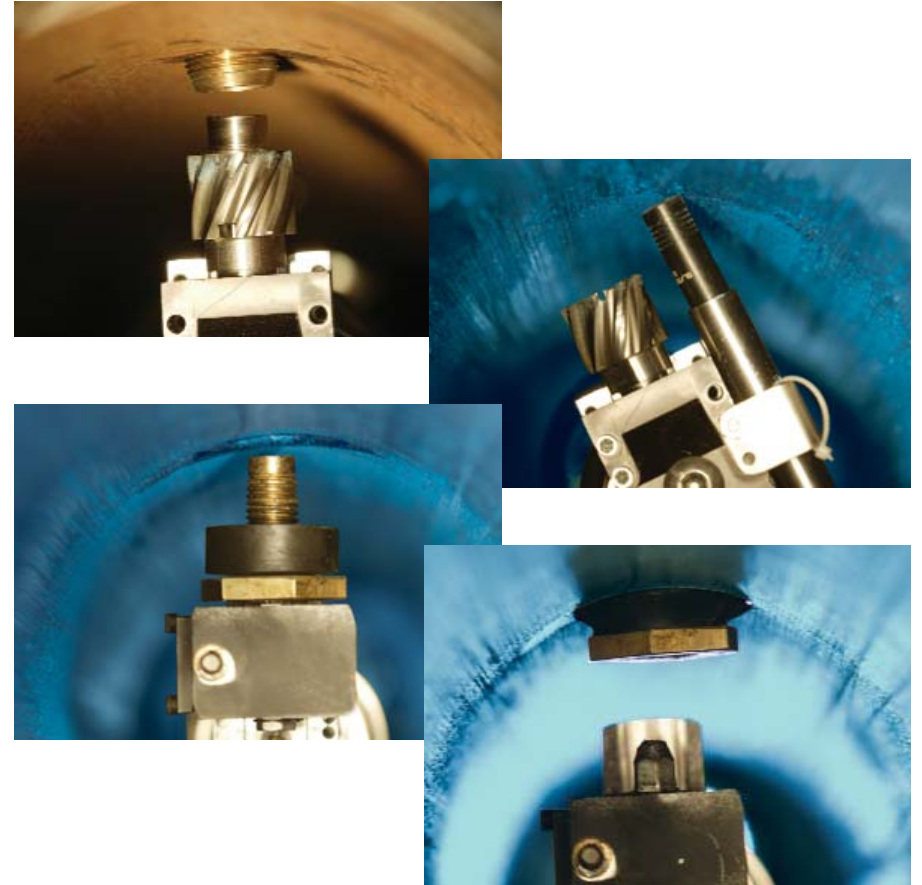


Robotic installation of a mechanical fitting to provide a watertight internal connection



Old Robotics

- Reverse thread of protruding services
 - Plug existing services
 - Locate & Drill at connection (post lining)
 - Install mechanical fitting
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- Highly inefficient:
 - One at a time
 - Miles traveled for each segment
 - Success rate – just ok
 - Limited to direct taps 1" and smaller
 - Expensive



Need for updated and improved methods...

Next Generation Internal Mechanical Reinstatements



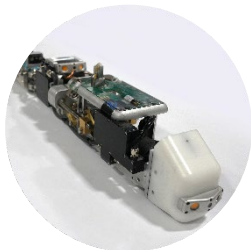
Measurement probe

Consists of laser sensors and inspection camera



Self-locating plug

Installed prior to lining to prevent resin migration



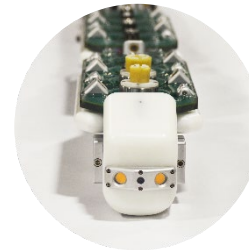
Drilling tool

Detects exact location of plug prior to drilling



Mechanical fittings

Utilizes a patented push-in-place “Corpbite” system that maximizes pull-out force



Cartridge loading system

Holds up to 8 plugs/mechanical fittings to maximize production



Interface software

Provides operator with easy-to-use interface for reinstating connections



Robotic Equipment – Measurement Probe



Consists of laser sensors and inspection camera



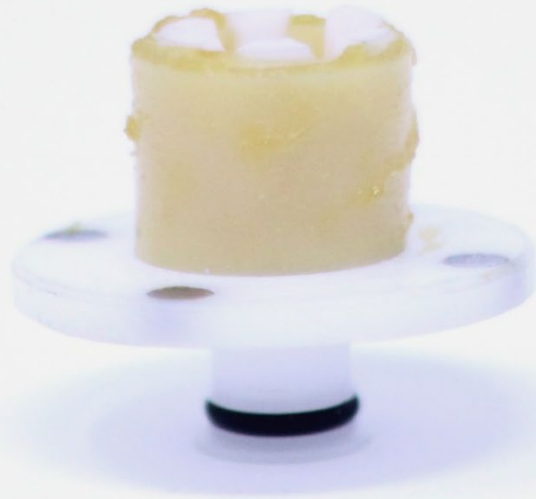
Laser identifies corporation diameter and alignment to the host pipe



Camera mounted on the probe validates the current position of the corporation valve



Service Relocation Device – Plug



Installed prior to lining

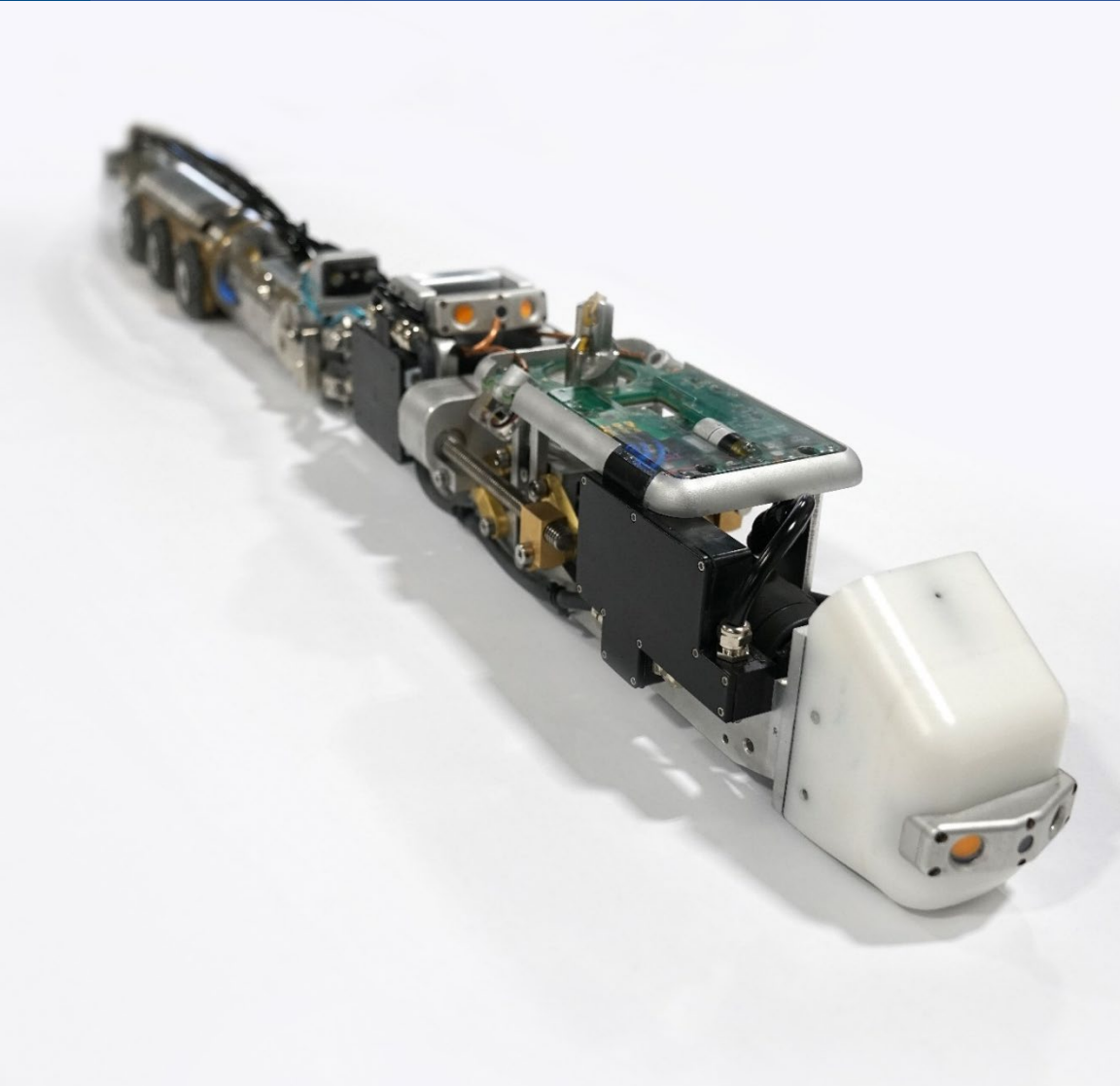


Prevents resin migration during cure



Magnetic array embedded into the rim of the device enables precise relocating after lining

Robotic Equipment – Drilling Tool



Contains cameras, lights and lasers to assist operator with alignment as well as sensors to detect exact location of plug prior to drilling

Drills plug out post-lining

Robotic Equipment – Measurement Probe

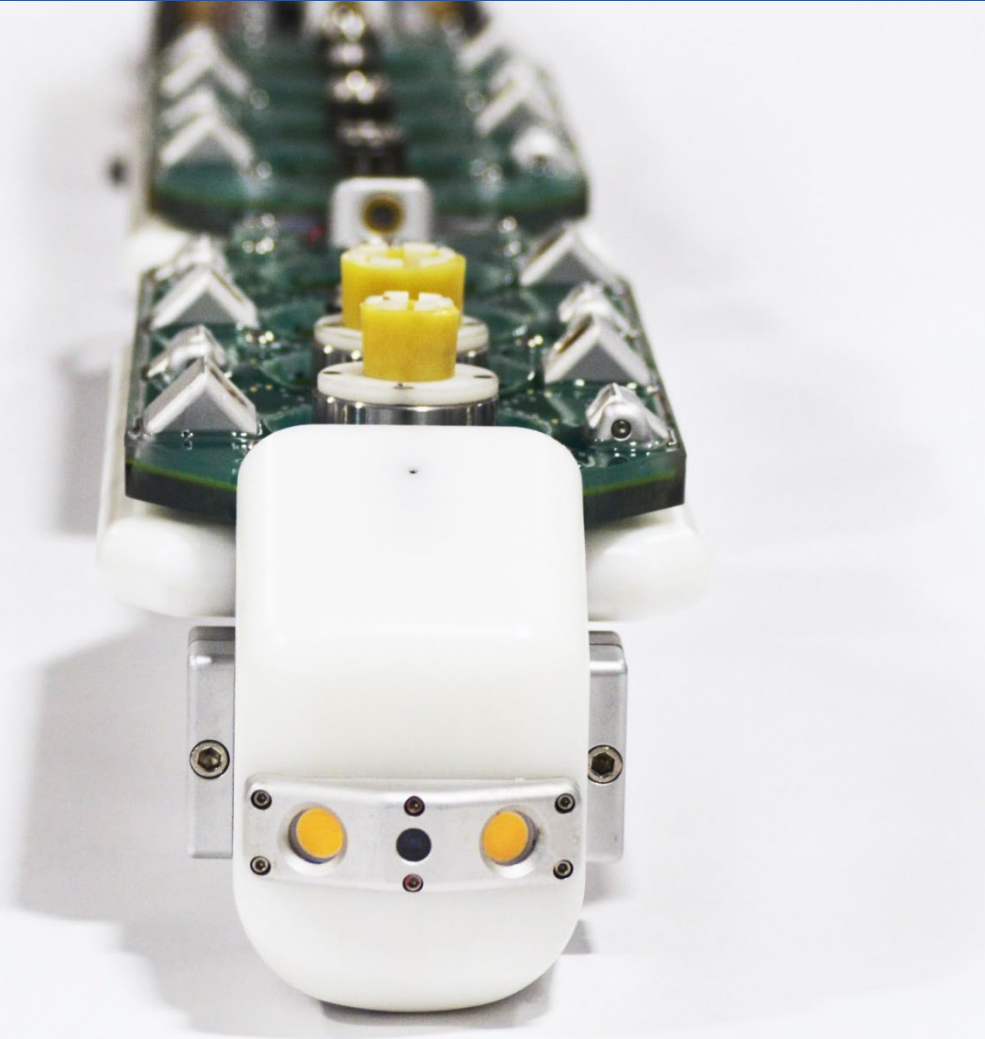


Manufactured utilizing specialized stainless steel materials and gaskets that are capable of withstanding long-term exposure



Utilizes a patented push-in-place “Corpbite” system that maximizes the pull-out force of the device while maintaining the low force required for installation

Robotic Equipment – Fitting and Plug Installation Tool

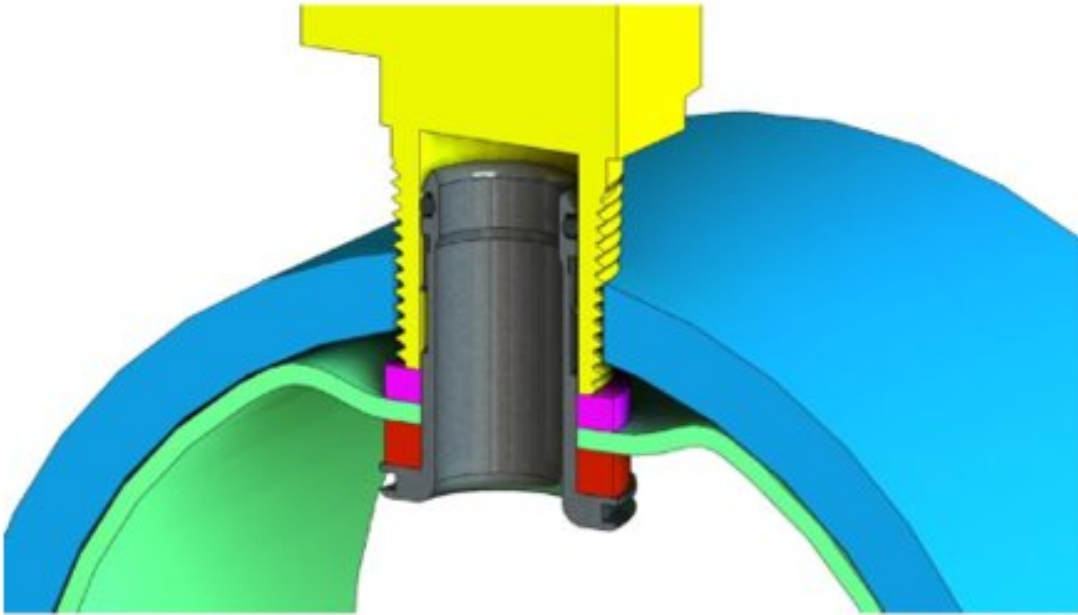


Cartridge system holds up to 8 plugs/mechanical fittings in order to maximize production

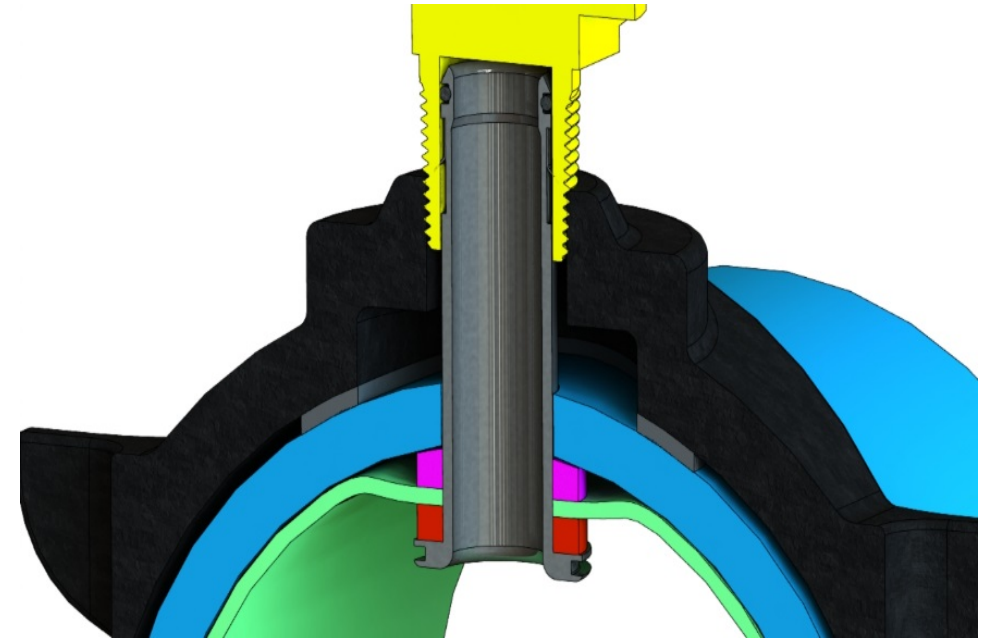


Each cartridge silo includes laser alignment tools and cameras for precise installation

Completed Watertight System

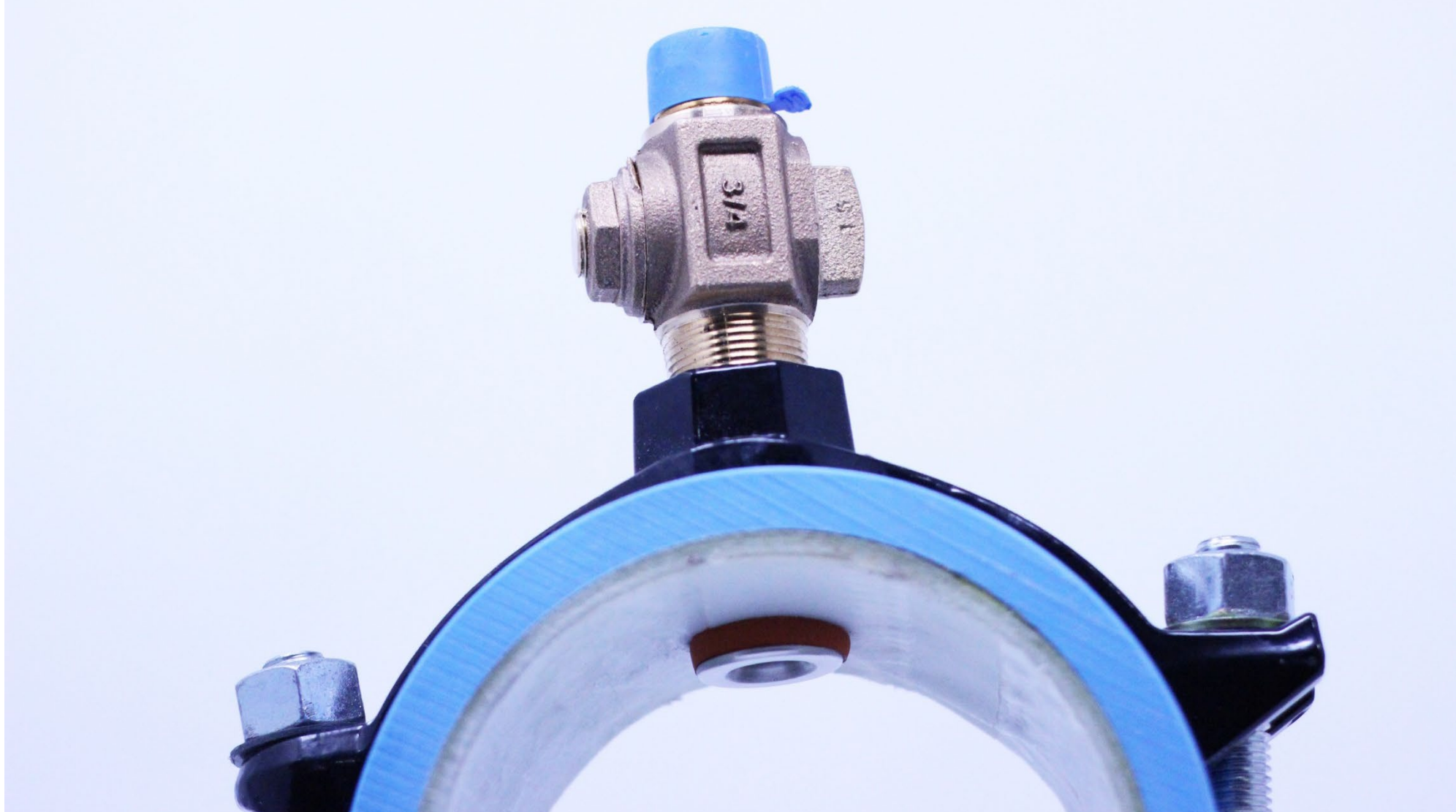


Direct tapped service



Saddle tapped service

Completed Watertight System



The iTap® System

Measurement probe

Consists of laser sensors and inspection camera



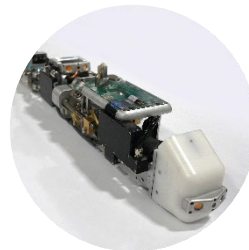
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Drilling tool

Detects exact location of plug prior to drilling



The only long-term solution for service reconnections

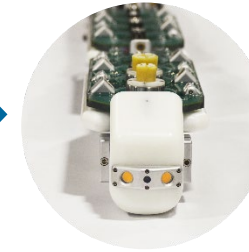
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THANK YOU!

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