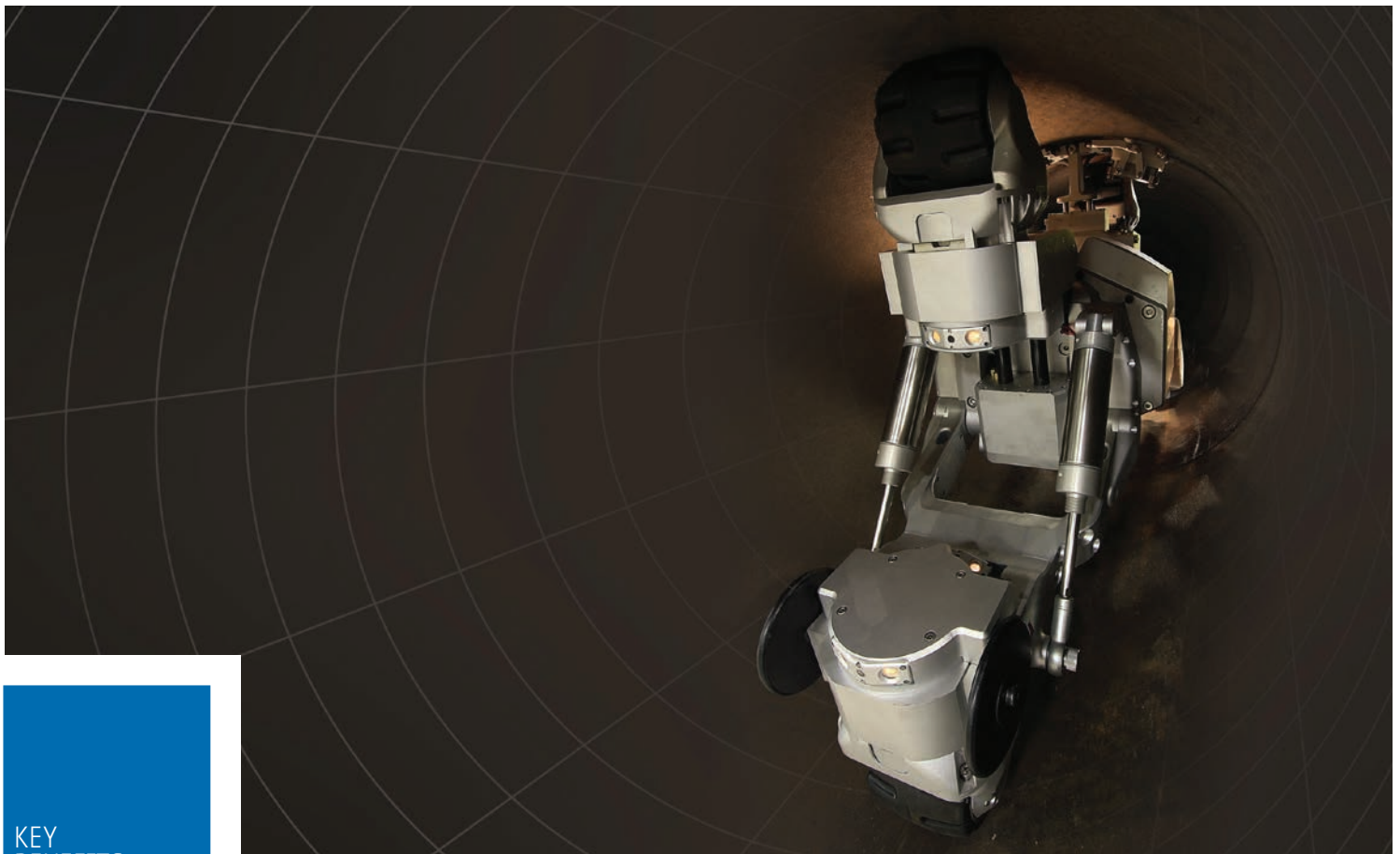




INTRODUCING THE GROUNDBREAKING ROBOTICS PLATFORM THAT WILL TRANSFORM THE WAY GAS UTILITIES MANAGE PIPELINE RISK

DEVELOPED IN PARTNERSHIP WITH SGN

Our CIRRIS XI™ Inspection Robot and CIRRIS XR™ Repair Robot **extend the usable life of large diameter cast iron gas mains** by providing a structural assessment of the pipe wall through measurements of wall thickness and stress; and by renewing the mechanical and jute joints at a **lower cost and with less disruption** than replacement or other rehabilitation techniques.



KEY BENEFITS

Risk Models Based on Actual Pipe Data

Data obtained through deployment of the CIRRIS XI™ robot can be fed directly into risk models so pipe risk can be measured using direct inspection data.

Specialized Sensors Designed for Field Use

Using sensors that are optimized for use in cast iron, the CIRRIS XI™ is able to measure wall thickness and determine if the pipe is under stress.

Real Time Data Collection

Automated inspection functions can perform inspection of the pipe barrel or the CIRRIS XI™ can take more/less spot scans as requested.

Remote Renewal of Multiple Joint Types

The CIRRIS XR™ is able to renew mechanical and lead/yarn style joints. Procedures have also been developed to renew internal mechanical seals.

Stop and Prevent Harmful Leakage

Internal robotic anaerobic injection of the mechanical or lead/yarn joints stops existing leakage and prevents new leaks from forming.

Reduced Disruption to the Public

This technology is able to access over 1,400 feet of main through one small excavation to reduce the impact of utility maintenance typically seen with other methods.



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MODULAR ROBOTICS PLATFORM

The CIRRIS XI™ and CIRRIS XR™ robots share a common transportation system consisting of four arms, four motorized drive wheels and a tether management system. This allows the robot operator to transport the repair module or inspection module into the live main, maneuver it around bends and position the module within the main. This modular platform also serves as a means to efficiently develop additional modules that will be able to further expand the capabilities of this technology.

The initial prototypes are designed for 24" diameter pipe, but the technology will be expanded to inspect and repair mains ranging from 12" up to 48" in diameter.

CIRRIS XR™



Robotic Internal Renewal of Cast Iron Joints and Mechanical Seals

> The CIRRIS XR™ renews both mechanical and lead/yarn joint types by drilling into the joints and injecting/applying an industry proven anaerobic sealant. Once cured, the sealant renews the joint to stop existing leaks and prevent new leaks from forming. In addition, this robotic technology can also repair internal mechanical seals that have failed.

CIRRIS XI™



Robotic Inspection of Cast Iron Mains for Wall Loss and Stress

> The CIRRIS XI™ performs an assessment of the pipe barrel by deploying two highly specialized sensors on the pipe wall. With the ability to measure the wall thickness of the pipe and detect stress in the pipe wall, data obtained using this robotic platform will be used to determine the actual risk of the pipe.

ADVANCED LAUNCH SYSTEM

Both the CIRRIS XI™ and CIRRIS XR™ robots are able to launch into live, pressurized cast iron gas distribution mains using ULC's advanced launch system.

- PED 97/23/EC & ASME BPVC Section VIII certified
- Meets operational requirements for purging prior to powering on the system
- Motored cable feeders
- Access door for efficient maintenance and repair
- Tether protection feature
- Internal cameras and lights assist with launch and retrieval

This groundbreaking robotics platform is designed to benefit gas customers, the environment and the gas network by:

- Reducing leakage and gas emissions
- Reducing excavation and reinstatement requirements
- Reducing gas main replacement activity
- Reducing gas main maintenance
- Accelerate the removal of actual risk from the gas network

US and UK Patents Pending
UK Patent Application No. 1507444.6