

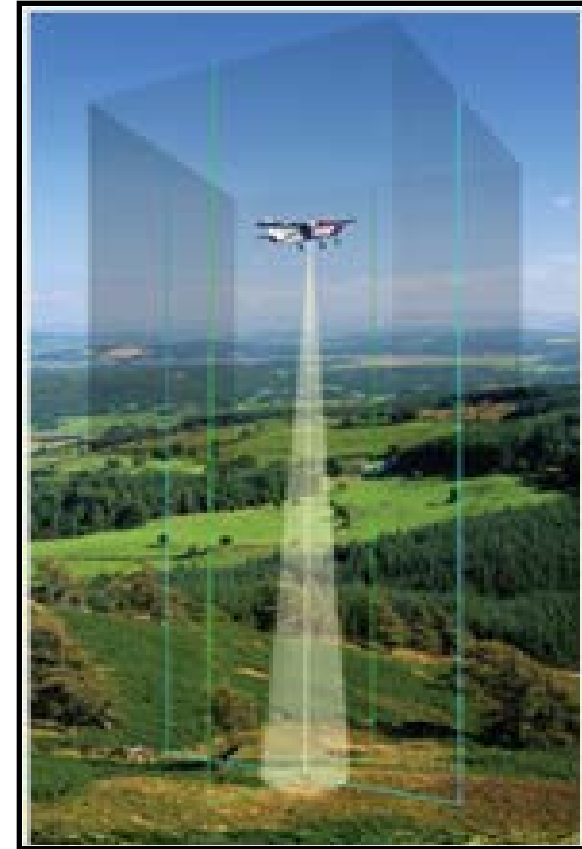
Pipeline Research & Research Partnerships Are Generating Solutions



Improvements to Natural Gas Leak Detection



A research partnership with ITT led to integration and demonstration of GIS imagery, Midwave Infra-red cameras and Differential Absorption Lidar and resulted in near real-time data collection and processing improving from 3-4 weeks to one day. At the conclusion of this research, Route Generation can now be accomplished in the field and requires only 1 hour of effort to generate 100 miles of pipeline routes. This is a 30X improvement in speed.

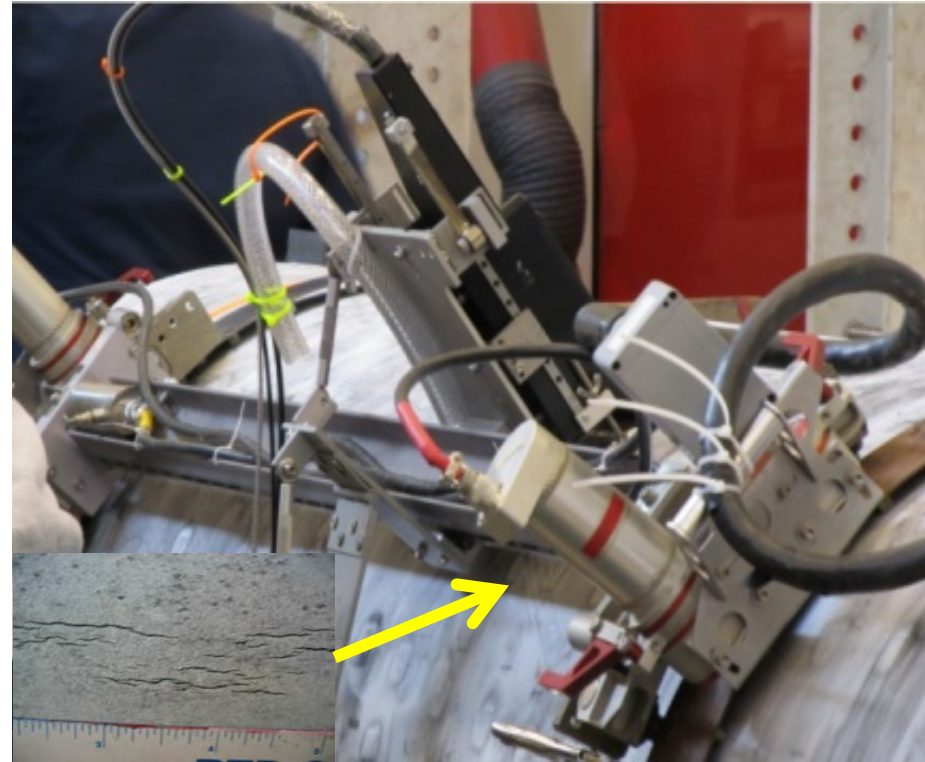


TECHNOLOGY

Integrated Tool Development for SCC In-Field Assessment



This research partnership between PHMSA/DOT, PRCI, and a multi-party collaboration (Applus RTD, IOS, JENTEK, Blade Energy Partners) successfully deployed an integrated Stress Corrosion Cracking (SCC) assessment tool consisting of crack mapping technology, a data analysis tool for identifying the most significant SCC crack fields and laser SCC depth sizing. After the completion of this project, pipeline operators have access to a validated integrated tool approach for SCC assessment in the ditch.



TECHNOLOGY

Software/Hardware Improvements to Guided Wave Ultrasonics (GWUT)



Four separate research projects addressing GWUT with NYSEARCH and Southwest Research Institute led to commercial improvements with multiple service providers. As a result software and hardware support longer inspection distances and better characterization of defects. This technology is widely applied to inspect cased crossings nationwide. Use of magnetostrictive sensor guided-wave technology was also benchmarked.



TECHNOLOGY

Advanced Development of PipeGuard Proactive Damage Prevention System

A research partnership between PHMSA/DOT, NGA/NYSEARCH and Magal/Senstar to develop and test an acoustic warning system to proactively report third party activity near pipelines. NYSEARCH completed several successful tests with alpha prototypes and is now completing with PHMSA further advances to the product through development and testing the of beta prototypes.



TECHNOLOGY

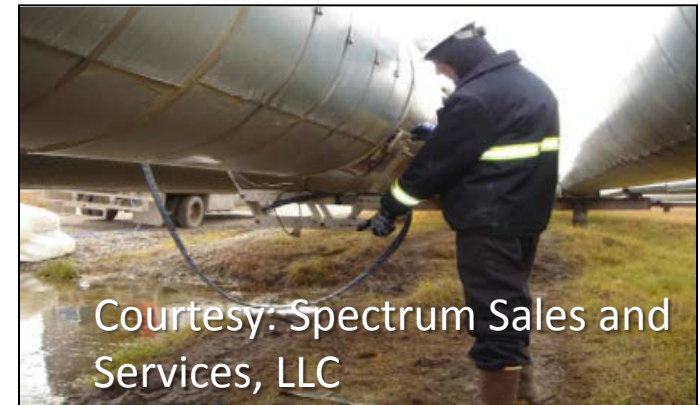
Improvements to Through Coating Inspection of Pipelines



This research led to commercial improvements with three different service provider tools for detection of corrosion & mechanical damage through coatings and insulation. This NDT technology can inspect above ground & in-ditch piping with eliminating the need to strip the thin corrosion barrier for anomaly inspection through most coatings less than 3mm thick.



Courtesy: SI Associates, Inc.



Courtesy: Spectrum Sales and Services, LLC

TECHNOLOGY

Advancement in Welding, Repairs and Remediation of In-Service Pipelines



A research partnership with EWI led to commercial improvements with automated welding for in service pipelines. The new automated system is approximately 2.3 times faster and 62% cheaper than manual welding. The system allows in-service repair welding on future high strength/pressure pipelines where manual repair welding is not suitable.



TECHNOLOGY

Pipeline Research & Research Partnerships Are Generating Solutions



Collaborative Testing/ Demonstration of Guided Wave Ultrasonics



DOT/PHMSA and NGA/NYSEARCH worked in partnership to test and evaluate various enhancements to Guided Wave Inspection. In 2006, at NYSEARCH's test bed where cased piping systems are installed with known defects, several technologies were subjected to validation tests for industry and government officials to: 1) evaluate the capabilities of state-of-the-art in guided wave and, 2) to help set a framework for application of Guided Wave inspection for gas pipelines.



KNOWLEDGE

Most Downloaded PHMSA Research Final Reporting



	Researcher Name	Project Title
1.	Stress Engineering Services	Deepwater GOM Pipeline Damage Characteristics & Repair Options
2.	Edison Welding Institute, Inc.	Advanced Welding Repair and Remediation Methods for In-Service Pipelines
3.	Battelle Memorial Institute	A New Approach to Control Running Fracture in Pipelines
4.	Pipeline Research Council International	Pipeline Integrity Management for Ground Movement Hazards
5.	Battelle Memorial Institute	Integrity Management for Wrinklebends and Buckles
6.	Battelle Memorial Institute	Model Modules to Assist Assessing and Controlling Stress Corrosion Cracking

Wow! Final reports for these projects were collectively downloaded over 15,000 times from the PHMSA website. We've been tracking this information since January 2008 with over 949,000 downloads via all facets of our program website - <https://primis.phmsa.dot.gov/rd/>

KNOWLEDGE

Improvements to External Corrosion Direct Assessment Methodology



Several research projects contributed new knowledge to the early development of the Pipeline External Corrosion Direct Assessment Methodology and its application by pipeline operators.



ANSI NACE Standard RP0502-2002
Item No. 2.1037

Standard Recommended Practice

Pipeline External Corrosion Direct Assessment Methodology

This NACE International (NACE) standard represents a consensus of those individual members who have reviewed this document, its scope, and provisions. Its acceptance does not in any respect preclude anyone, whether he has adopted the standard or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not in conformance with this standard. Nothing contained in this NACE standard is to be construed as granting any right, by implication or otherwise, to manufacture, sell, or use in connection with any method, apparatus, or product covered by Letters Patent, or as indemnifying or protecting anyone against liability for infringement of Letters Patent. This standard represents minimum requirements and should in no way be interpreted as a restriction on the use of better procedures or materials. Neither is this standard intended to apply in all cases relating to the subject. Unpredictable circumstances may negate the usefulness of this standard in specific instances. NACE assumes no responsibility for the interpretation or use of this standard by other parties and accepts responsibility for only those official NACE interpretations issued by NACE in accordance with its governing procedures and policies which preclude the issuance of interpretations by individual volunteers.

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CONSENSUS STANDARD

Robotic Platform for Inspection of Unpiggable Natural Gas Lines

 Northeast
GAS ASSOCIATION

NYSEARCH

A research partnership between DOT/PHMSA and NGA/NYSEARCH with cofunding from OTD, PRCI, DOE/NETL, SDTC and Invodane Engineering to design, develop and test a range of platforms to negotiate the challenges of un-piggable transmission mains. Commercial product is now available from this program. Several additional larger size robotic platforms are also being released.



TECHNOLOGY

Improvements to the Battelle Two-Curve Method



A PHMSA partnership with EMCC and PRCI led to the first major improvements to the Battelle Two-Curve Method. Modifications to the backfill coefficient developed in this project along with field burst data addressing soil behavior and its affect on the fracture speed of running axial flaws in buried line pipe materials were incorporated into the BTCM.



MODEL

Improvements to Corrosion Mitigation



A partnership with Shell Global Solutions led to the commercialization of an In-line Cathodic Protection Inspection tool which was the first method to assess the effectiveness of a pipeline's cathodic protection system from INSIDE the pipe. The data provides information used to diagnose problems with the cathodic protection system and coatings.



Courtesy: Baker Hughes

TECHNOLOGY

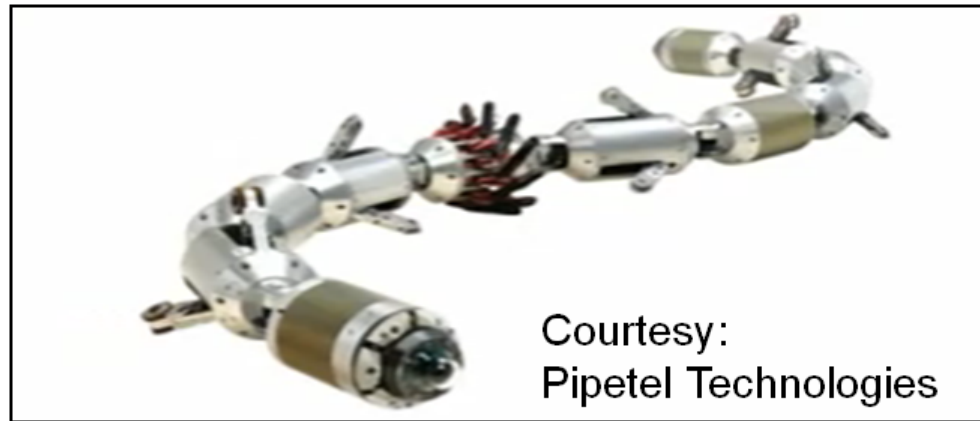
Pipeline Research & Research Partnerships Are Generating Solutions



Improvements to Corrosion Detection/Mitigation



A partnership with NYSEARCH led to the commercialization of the first ever inspection platform (Explorer II) and integrated sensor capable of internal unpiggable gas pipeline inspection. Explorer II is an untethered, modular, remotely controllable, self-powered inspection robot for the visual and nondestructive inspection of 6- and 8-inch natural gas transmission and distribution system pipelines.

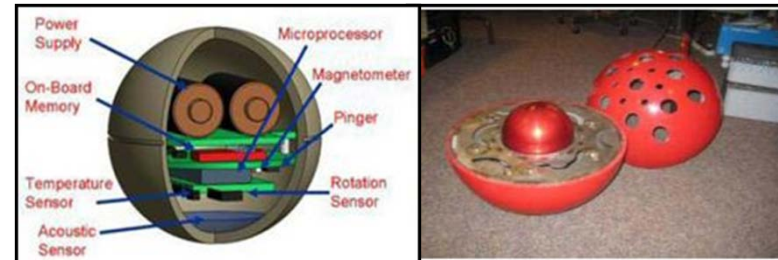


TECHNOLOGY

Improvements to Pipeline Leak Detection



This joint academic/industry/PHMSA research project made commercial improvements to a free-swimming acoustic leak detection tool from technology used in the water pipeline industry and further developed the device for application in oil product pipelines and evaluated its potential for natural gas pipelines.

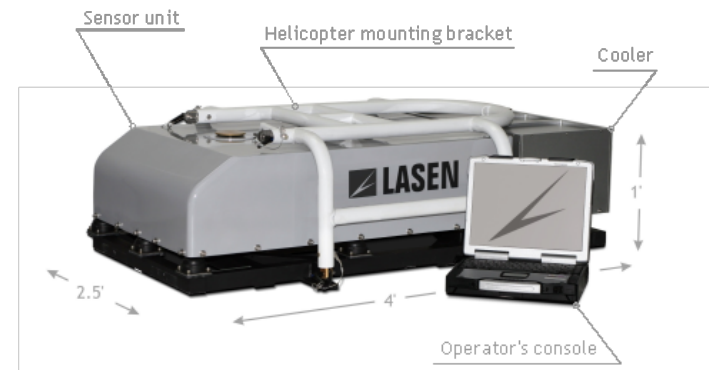


TECHNOLOGY

Improvements to Pipeline Leak Detection



A partnership with Lasen, Inc. supported deployment of a helicopter based fast, efficient, and accurate tool for detecting and mapping natural gas and hazardous liquid pipeline leaks. This work enabled an engineering research prototype to become a commercialized leak detection and mapping system that the pipeline industry can now use.



TECHNOLOGY

Innovative Sensors for Inspection of Unpiggable Lines

A research partnership between PHMSA/DOT and NGA/NYSEARCH with cofunding from OTD to develop sensors that could, with integration into the robotic platform, negotiate plug valves, back-to-back bends, 90s, vertical segments and other challenges that are characteristic of un-piggable transmission mains. SwRI and Invodane developed the two types of sensors (RFEC and MFL) for the range of platforms.

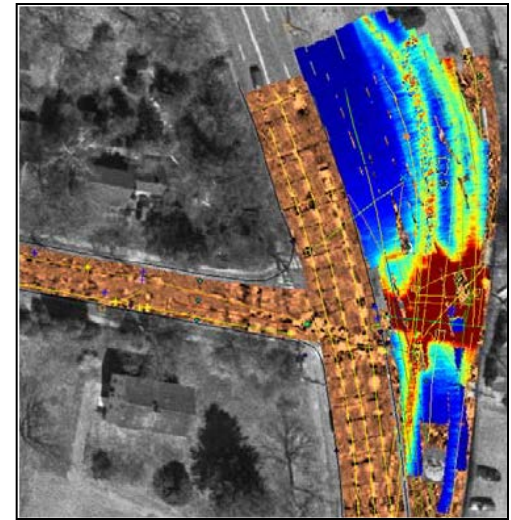


TECHNOLOGY

Improvements to Sub-Surface Mapping



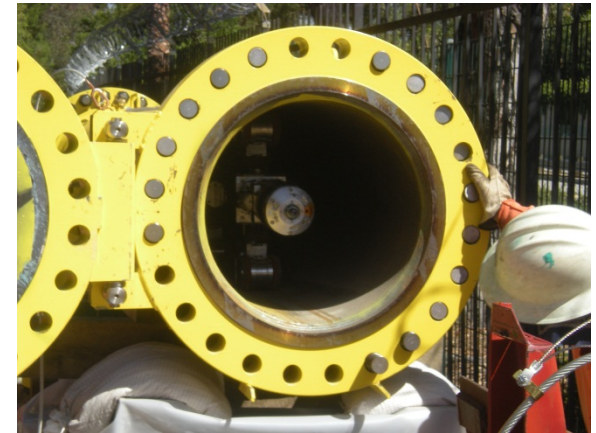
Research led to the first commercial system capable of producing highly accurate, three-dimensional maps and images efficiently and noninvasively (without digging) in conditions as much as ten feet underground and based on rapid computer analysis of radar images. The system is vehicle mounted or smaller hand walked system by operator for rural or urban deployment.



TECHNOLOGY

Final Development and Testing of Robotics Systems

Extensive field testing of platforms and sensors at NYSEARCH Test Bed and in live pipelines prior to commercialization. Explorer 20/26 undergoing live testing at funding companies. Operational and safety procedures are validated. Data collection and analysis culminate with release of inspection report to host companies, tailored to their needs. Reliability and robustness of robotic system and sensor are established as well as accuracy of data collected.



PRODUCT

Improvements to Flaw Acceptance Criteria in Girth Welds



Research partnerships with EMCC and CRES have contributed new knowledge to the industry standard on the welding of pipelines and related facilities. Specifically with updating the flaw acceptance criteria in API Standard 1104 Appendix A on girth welds when welding high strength steels.

Welding of Pipelines and Related Facilities

API STANDARD 1104
TWENTIETH EDITION, OCTOBER 2005
ERRATA/ADDENDUM, JULY 2007
ERRATA 2, DECEMBER 2008



CONSENSUS STANDARD