

*the Energy to Lead*

# GTI Corrosion Programs and Research Overview

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**2012 NE Corrosion Conference  
Ted Conway  
Gas Technology Institute  
January 19, 2012**

# Today's Agenda

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- > GTI Background
- > BEM Technology Overview
- > Infrastructure Tracking & Traceability
- > New Standards Development – Guided Wave as equivalent to Hydro-testing
- > Intelligent Utility System: Data Quality/Enhanced System Awareness
- > Field Applied Coatings Project
- > Microbial Influenced Corrosion

# GTI Snapshot

- > Not-for-profit gas research & services organization with a 70 year history
- > Capabilities that span the natural gas value chain
- > Facilities
  - 18 acre Chicago campus
  - 28 specialized labs totaling 200,000 ft<sup>2</sup>
- > Staff of 250
- > 1,200 patents
- > 750 products taken to market



Offices & Labs



Pilot-Scale Gasification Campus



Energy & Environmental Technology Center

# Addressing Key Energy Industry Issues Across the Value Chain



**Supply**

**Expanding the supply of affordable energy**



**Delivery**

**Ensuring a safe and reliable energy delivery infrastructure**



**End Use**

**Promoting the efficient use of energy resources**

***Reducing carbon emissions to the environment***

# GTI Delivery Sector Activity

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## > R&D Projects

- Approximately 100 active projects
  - > New product development
  - > Research to support standards development and regulatory compliance
  - > Technology/process improvements for a safe, reliable, and secure natural gas infrastructure.

## > Accredited Labs and Industrial Testing

- Technical and Analytical Testing and Services
- Failure Analysis and Technical Consulting

# BEM Technology

**Broadband Electromagnetic (BEM) technology is a direct assessment tool that is capable of detecting metal loss and cracks in ferrous pipes.**

## **Principle of Operation:**

- > An eddy current is induced in close proximity to the transmitter/receiver. As these eddy currents migrate with time they allow a complete profile of a ferrous object to be obtained.
- > Sensors detect the energy from magnetic fields induced in the wall of the pipe. In a signal-to-distance measurement, high amplitude signals represent enhanced ferrous material, a decrease corresponds to reduction in ferrous material quality.

# BEM Technology

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- > BEM technology has been used in the oil and gas exploration industry for many years.
- > BEM remains a unique technique for scanning a broad range of ferrous and non-ferrous pipes without the need for direct sensor contact with the pipe surface.
- > Can identify:
  - Metal Loss
  - Cracks, fractures
  - Graphitization
  - Anomalies

# BEM Capabilities and Benefits

## > BEM Capabilities

- Cast Iron
- Mild Steel
- Wrought Iron
- Ductile Iron

## > BEM Benefits

- Internal/external corrosion id
- Non-destructive
- Live pipe OK
- No diameter limit
- No sandblasting
- No coating removal



# BEM - Recent Developments & Field Trials

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## **Project Objectives (PHMSA & OTD Funded):**

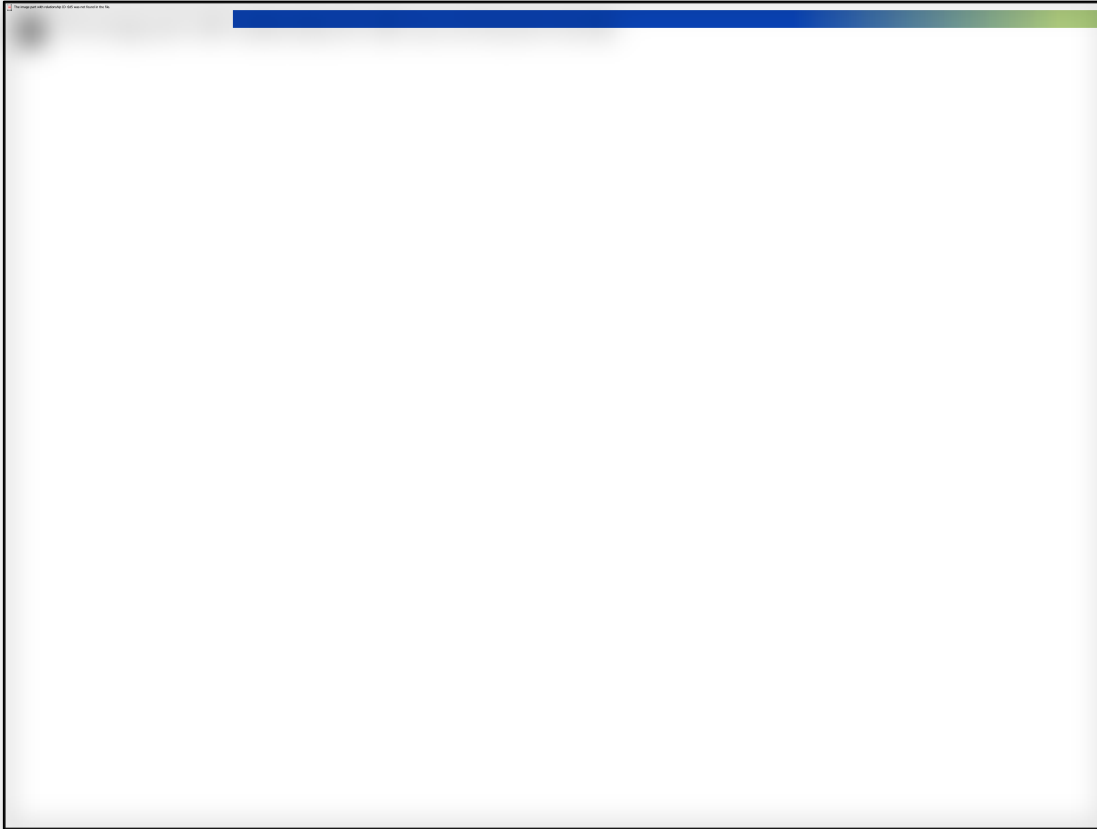
- > The goal of this project is to develop a pipeline inspection tool to support integrity assessments of the nation's pipeline delivery system.
- > Rock Solid Group and GTI have enhanced the BEM technology to allow for a more user friendly Windows based system and the ability to be used on pipes with minimal crew interactions.
- > Further enhancements of the system has been the development of smaller sensors allowing the technology to provide greater pipe condition detail.

# BEM Technology

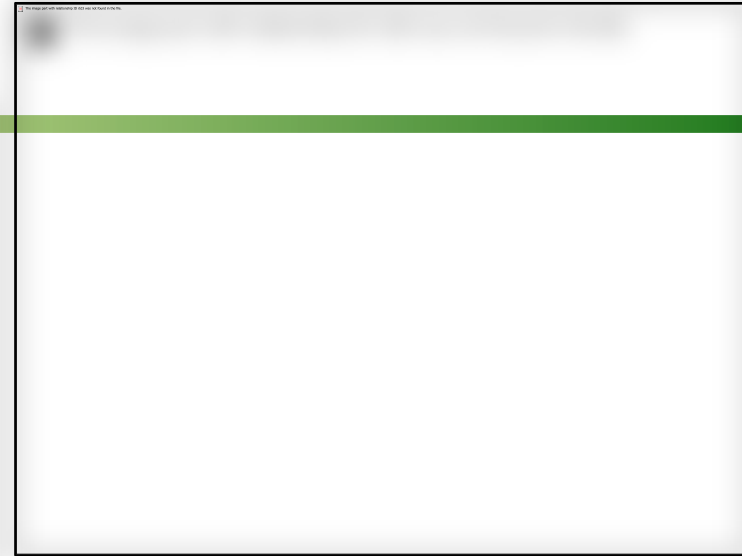
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# BEM Technology



Hand scanning large diameter pipes



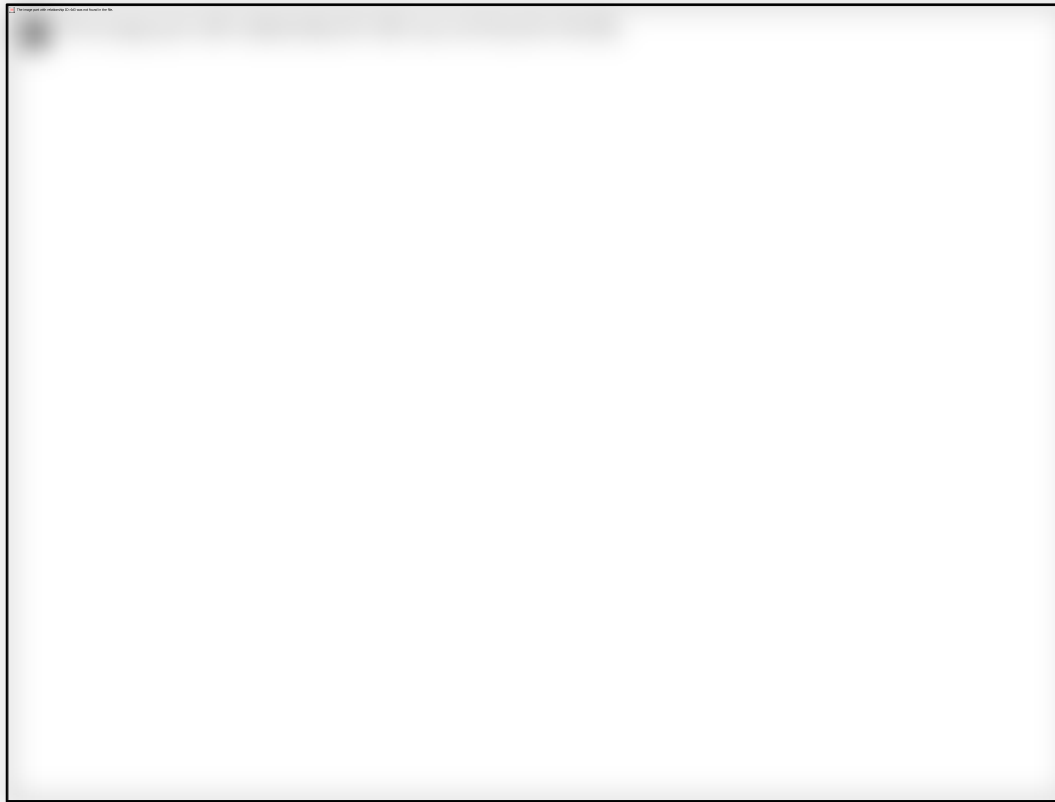
12" insulated pipe scanned w/ HSK



# BEM Technology

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## Full Encirclement Tool



GTI's Prototype

# BEM Real-time and Processed Data

## Pipe Data:

Computer screen  
(instant) data on  
left and processed  
data on right of the  
same pipe.

# BEM Field Trials – Pipe Scan 1

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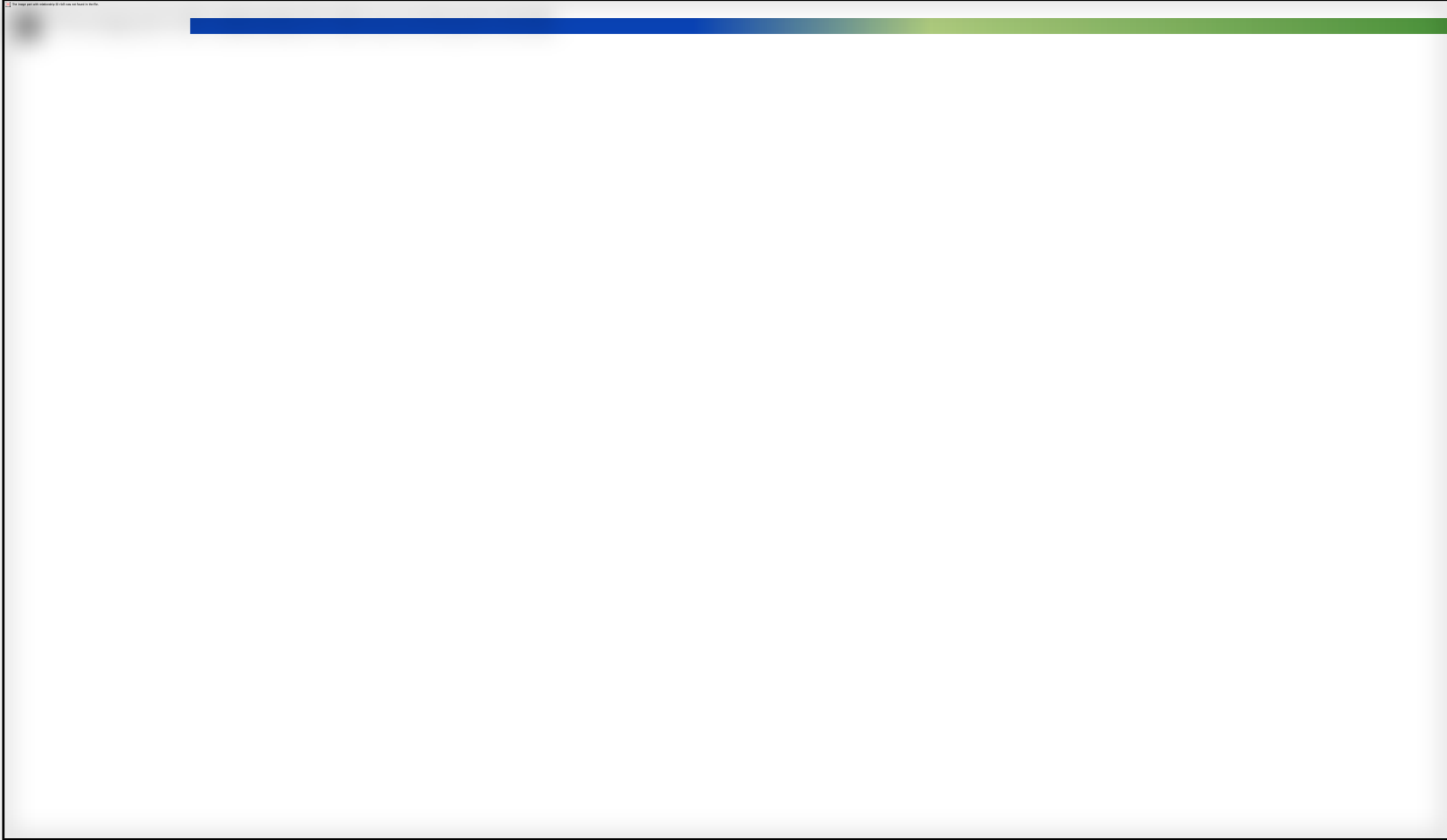


Cast Iron Pipe – FEU  
Scan



Cast Iron Pipe –  
Hand Scan

# BEM Field Trials – Pipe Scan 1



One of the real-time displays from the field trial Pipe Scan

# BEM Field Trials – Pipe Scan 1


Pipe Scan 1 Processed data –

Process data shows thinning at the crown of the pipe with a localized low pt. in the lower left corner



# BEM Field Trials – Pipe Scan 2

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BEM unit placed on cast iron pipe  
while the pipe was exposed for  
other C&M activities

# BEM Field Trials – Pipe Scan 2



One of the real-time displays from the Nicor Pipe Scan

# BEM Field Trials – Pipe Scan 2

Pipe Scan 2 Processed data –

The processed data confirms the pipe thinning at the bottom of the pipe that was seen during the real-time display.

# BEM Field Trials – Pipe Scan 3

At the field location 3, a 6” steel pipe was exposed and scanned using the BEM system.

This steel pipe was coated and wrapped.

The pipe coating was not removed for inspection with the BEM system.

