



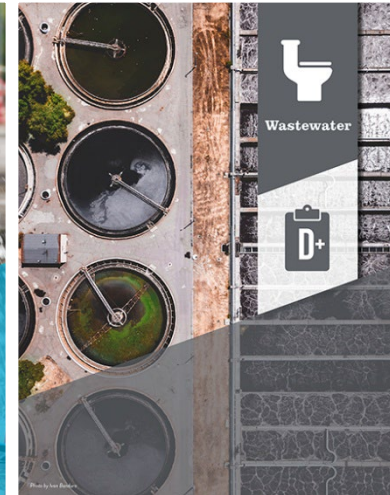
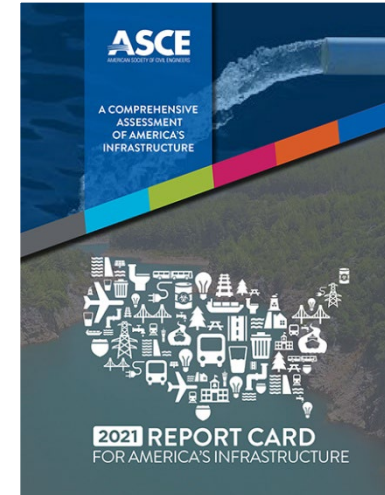
PIPELINES

*Advancing Pipeline Integrity Through Cutting-Edge
Ultrasound Technologies*

Measure Today, Secure Tomorrow:
Ultrasound Scanning's Role in Critical
Pipeline Condition Data

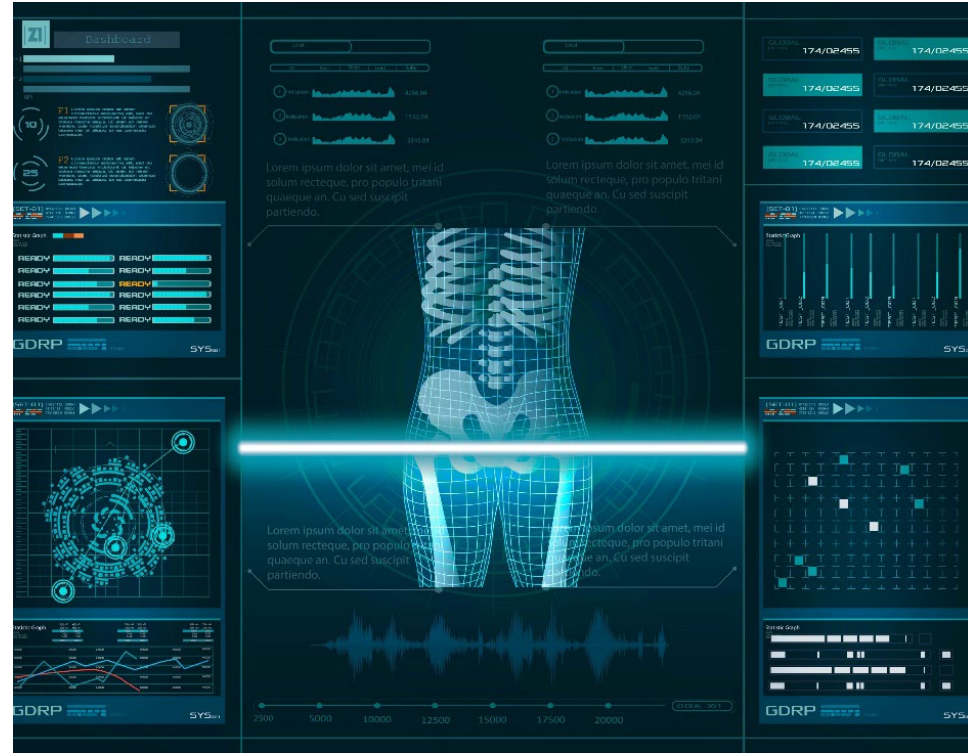
Why Pipeline Condition Assessment Matters

- Owners prioritizing pipeline projects
- Limited budgets
- Employ new technologies and innovations



Visibility

Pipelines: Ability to see critical features and anomalies for proactive asset management and risk mitigation



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Questions to Ask for Pipeline Condition Assessment

1. What is the purpose of the inspection?
2. What level of detail and information is really needed?
3. What is the size, condition, and location of the access



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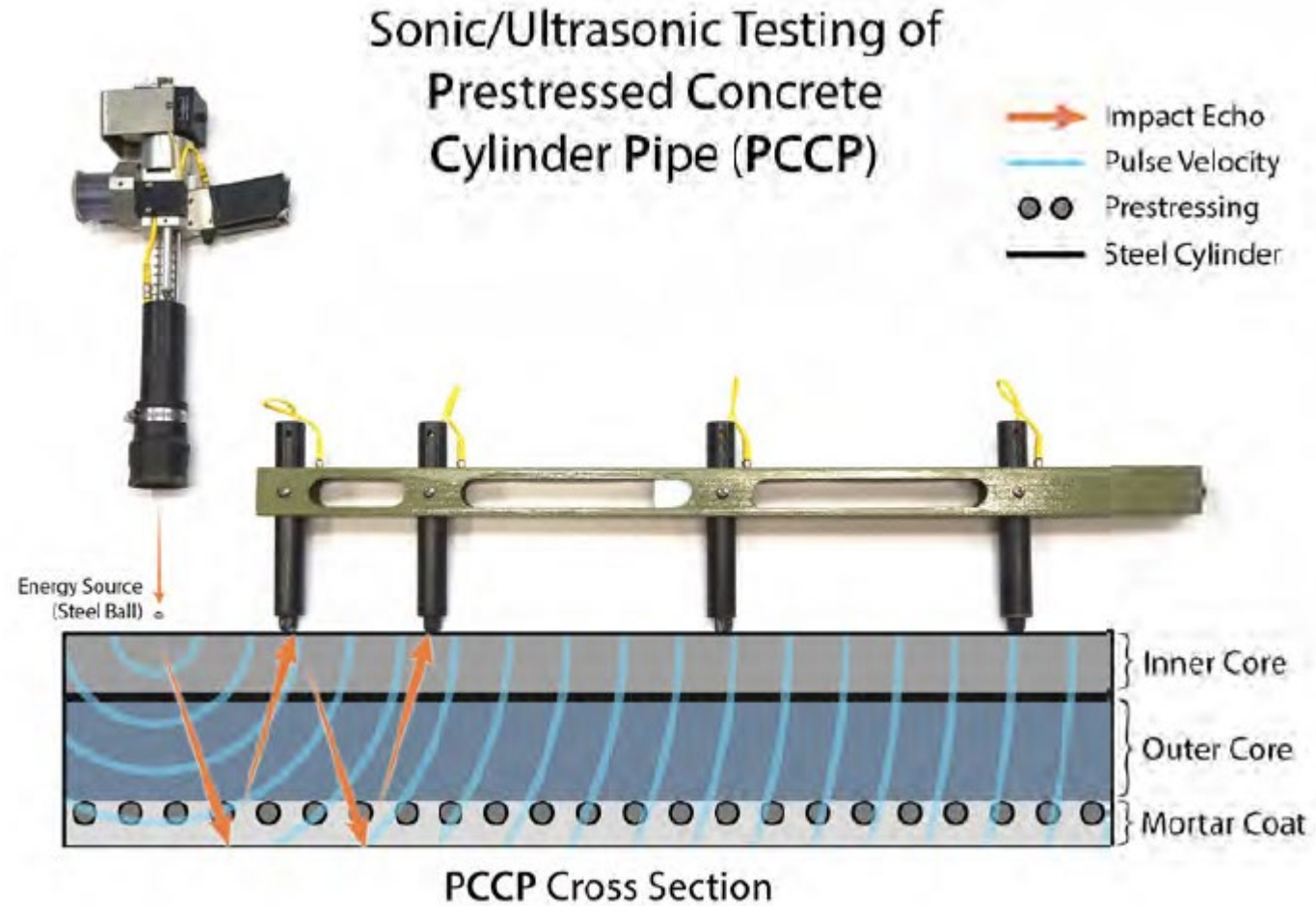
More Advanced Technologies Needed When

1. Shut-down is not desirable
2. Detailed quantitative data is needed



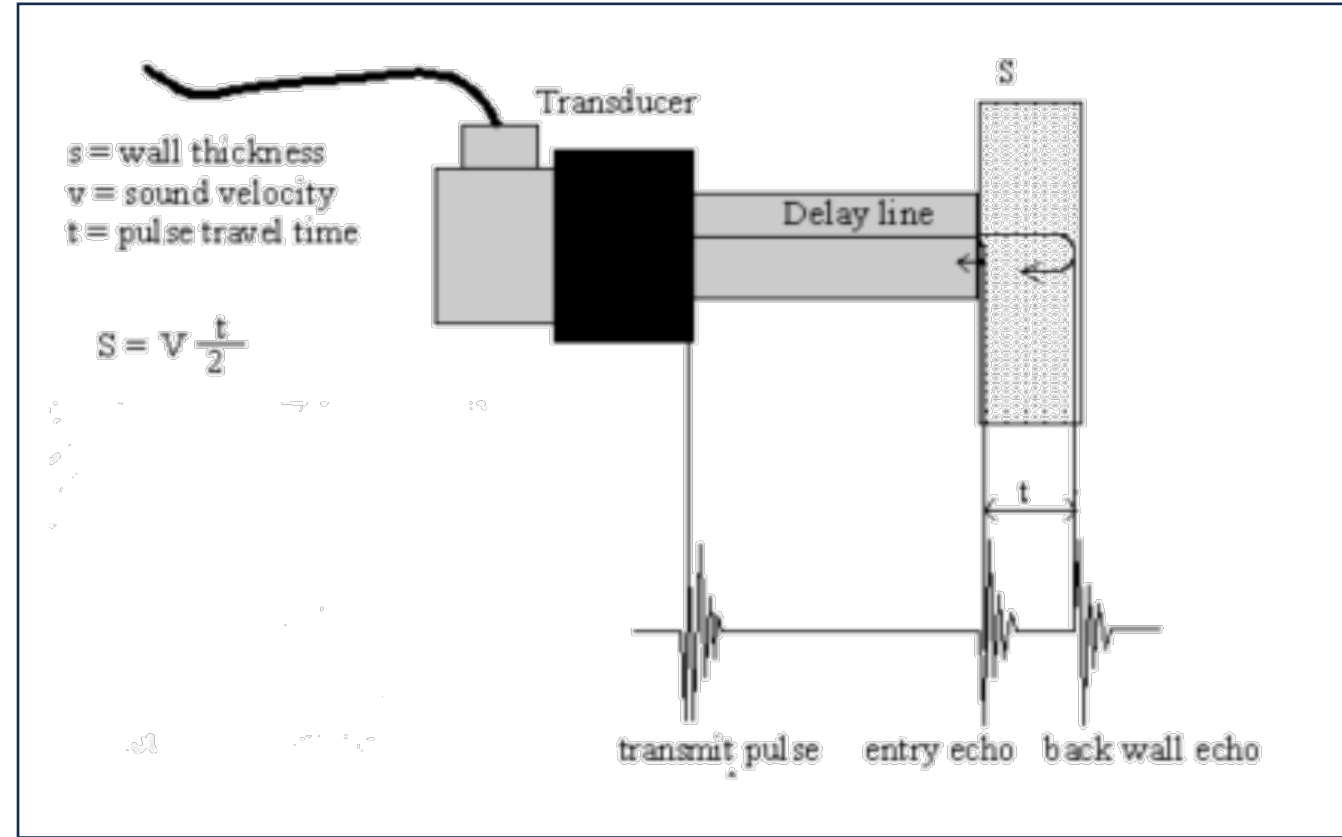
Ultrasound Technology

- Used for 25+ years
- Large water mains for condition assessment of PCCP
- Identifies
 - Wire Breaks/Failures
 - Delamination
 - Cracks
 - Wall thinning



Ultrasound Scanning/Inspection

- Electrical energy converted into high-frequency ultrasonic sound waves
- Travels through pipe wall
- Entry and back wall echo time determines wall thickness



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Ultrasound Evolution

- Point pulse echo
- Phased array type sensor
- PipeScanner
- High-resolution in-line PIG



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Olympus Point Pulse Echo 36D Sensor

The Starting Point

- **Technology Overview**

- Manual single-point
- Limited coverage

- **Capabilities & Use Cases**

- Spot-checking

- **Limitations**

- Labor-intensive, slow
- Lacks full pipe coverage
- No high-resolution mapping



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Phased Array Type Sensor Technology

Advancing Coverage and Resolution

- **Technology Overview**

- Multi-element
- Improved scanning speed and resolution

- **Capabilities & Use Cases**

- Greater surface coverage
- Detect more complex defects

- **Limitations**

- Still limited
- Requires trained operators



Acquaint Pipescanner

Bridging the Gap

- **Technology Overview**
 - Next-generation
 - Full circumferential scanning
- **Capabilities & Use Cases**
 - High-resolution mapping
 - Real-time data collection with advanced reporting



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Bridging the Gap

- **Advantages Over Previous Technologies**
 - Greater efficiency, better data accuracy, enhanced visualization
- **Limitations**
 - External-only scanning



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Acquarius PIG

High-Resolution In-Line Inspection

- **Technology Overview**
 - Autonomous ILI tool
 - Full internal pipeline scanning
- **Capabilities & Use Cases**
 - 360° imaging
 - Detects corrosion, cracks, and wall thickness variations



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Acquarius PIG

High-Resolution In-Line Inspection

- **Key Advancements Over External Scanning**
 - Internal pipeline access enables full coverage
 - Can operate in live pipelines with minimal disruption



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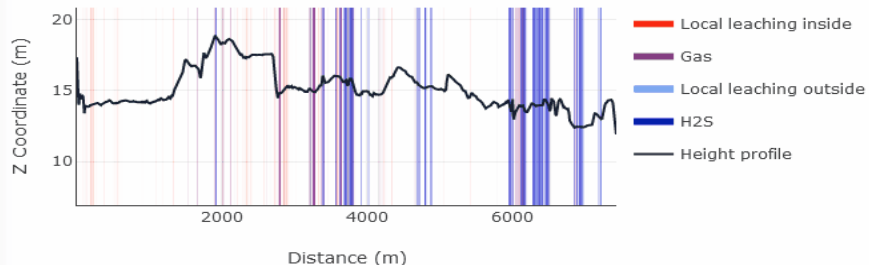
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ANOMALY TYPE

- Local leaching inside
- Gas
- Local leaching outside
- H2S

Height profile



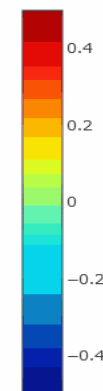
Anomaly book

Filter

Buisdeel ID	Anomaly type	Distance(m)	Length(m)
5	Local leaching inside	4.29	0.11
5	Local leaching inside	4.47	0.22
5	Local leaching inside	5.17	0.04
5	Local leaching inside	5.17	0.07
5	Local leaching inside	5.24	0.05
5	Local leaching inside	5.43	0.06

Cylinder

Wall thickness remaining

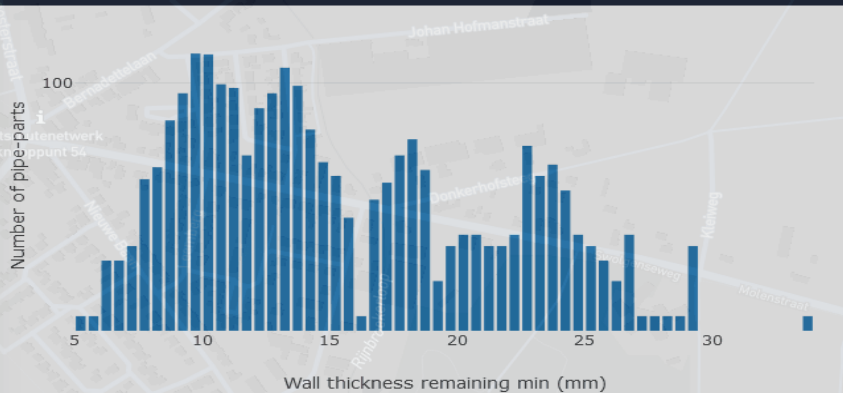
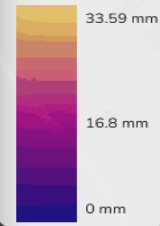


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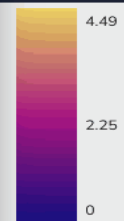
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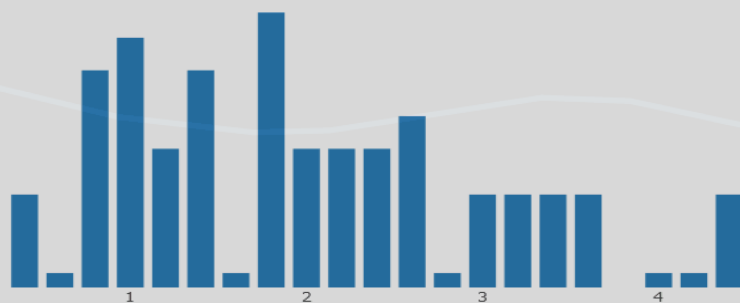


Id	Distance(m)	Pipe part type	Materials	Length(m)	Wall thickness remaining min (mm)
52	223.38	Straight	AC	4.71	9.09
53	228.36	Straight	AC	4.72	10.8
54	233.36	Straight	AC	4.73	10.12
55	238.35	Straight	AC	4.69	9.85
56	243.35	Straight	AC	4.71	11.22



Id	Distance(m)	Pipe part type	Materials	Length(m)	Ovality mean
1426	7269.84	Straight	PVC	7.25	2.18
1427	7277.09	Straight	PVC	10	1.2
1428	7287.1	Straight	PVC	14.83	2.67
1429	7301.93	Straight	PVC	14.65	1.77
1430	7316.59	Straight	PVC	15.5	1.75
1431	7332.1	Straight	PVC	14.68	1.46

Number of pipe-parts



Ovality mean

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Summary

- Ultrasound technology has evolved.
- Each technology serves a unique role.
- Pipeline owners must consider the best tool for their specific needs based on access, resolution, and data requirements



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Questions



Advancing the Nation's infrastructure providing innovative inspection technologies and rehabilitation solutions that protect the environment and deliver efficient, sustainable results and value to our trusted network.

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