Structural Integrity Associates, Inc.®

Ultrasonic Phased Array Examination of HDPE Piping

Industry Issue

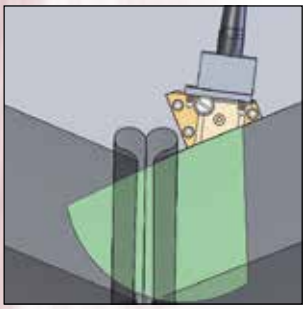
Metal is the ASME accepted and predominantly used material for piping and other pressure retaining components used in the nuclear power industry. However, the metal piping used to transport water is typically prone to corrosion, fouling, rusting and microbiological attack which requires continual maintenance, repair, chemical treatment, and replacement of degraded piping.

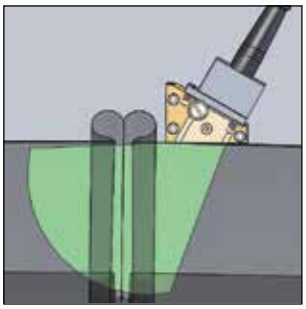
Solution

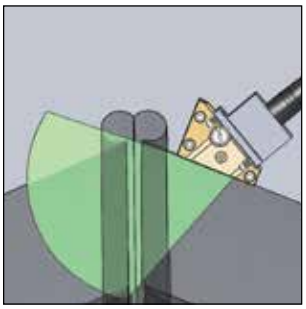
To eliminate the challenges associated with maintaining metal piping, the nuclear power industry is now selectively using High-Density Polyethylene (HDPE) piping for non-safety and safety related applications. HDPE piping is preferred as it does not rust, rot, corrode, or support biological growth. In addition, the use of the HDPE piping in raw water applications ensures long term structural integrity and water flow reliability with minimal maintenance.

Phased Array Ultrasonic Testing (PAUT) advantages over other examination methods:

- Uses a sweep of angles, which greatly increases the probability of detection of defects.
- When optimized, provides coverage of nearly 100% of the fused joint.
- Only requires access from one side of the joint at a time.
- Data represented in side, top, end, and cylindrical-side views, which can be viewed during "live" scanning, or defined during analysis after the data has been recorded.







The technique developed by Structural Integrity Associates, Inc. is optimized to examine up to 7 inch wall-thickness.

For more information, please contact:

Call Toll Free
877-474-7693
877-4SI-POWER

Visit our website at:
www.structint.com

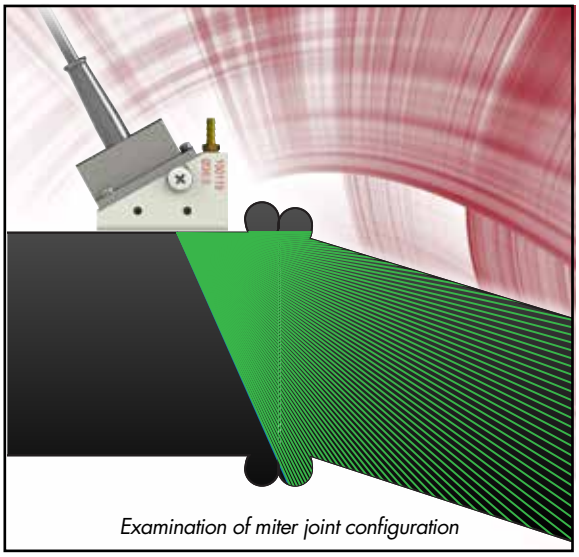
Email: ***info@structint.com***

Structural Integrity Custom HDPE Chain Scanner

- Can straddle a straight butt fusion, or up to 22.5° miter joint
- Holds up to 4 ultrasonic transducers in tandem and side-by-side
- 2 axis encoded with self-centering probe gimbaling
- Automated, semi-automatic, or manual operation
- Up to 2 in/sec scan speed
- Short setup time

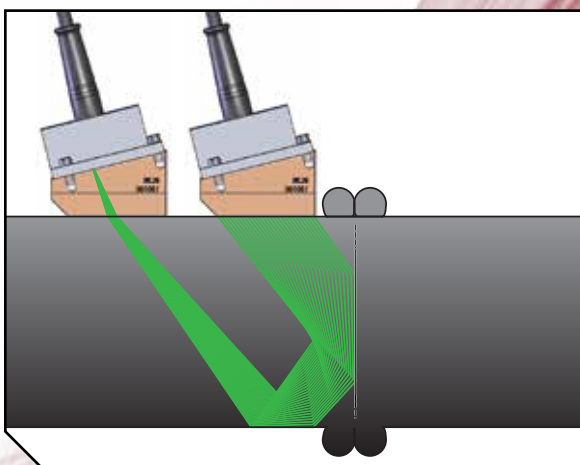
Structural Integrity Advantage

Structural Integrity has been developing and implementing ultrasonic phased array examination techniques for HDPE butt-fusion joints for over 6 years. Material properties and design considerations of HDPE-based components are significantly different from their more commonly encountered steel-based counterparts. Such differences in HDPE relative to steel include lower density, slower sound velocity, and higher sound wave attenuation. Therefore, the techniques and equipment commonly used to nondestructively evaluate steel based components are not adequate for HDPE and more novel approaches must be employed. This has led to Structural Integrity's NDE development of United States Patent Number 8,438,928, "Apparatus and Method for Non-Destructive Testing Using Ultrasonic Phased Array." This patented wedge design and technique allows for full volumetric inspection of HDPE butt-fusion welds in both straight and mitered joint configurations.



Examination of miter joint configuration

We have developed multiple inspection techniques using matrix phased array probes operating in transmit-receive (pitch-catch) configurations. Placing the transmitting and receiving probes adjacent (side-by-side) to each other has been proven to best detect voids and inclusions, while placing the probes in tandem allows for better planar flaw detection, like lack of fusion.



Proprietary tandem PAUT technique for planar defects.

Our advanced ultrasonic phased array acquisition and encoding equipment allow for fully automated, or semi-automated, inspection techniques that provide a 100% digital record of examination for off-line analysis, independent review, and historical comparison. These volumetric inspection techniques are field-proven and have been successfully employed during examination projects for nuclear power utilities, EPRI, and the US Army.

For more information, please contact:

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