Phased Array Ultrasonic Examination of Socket Welds

Detect degradation of small bore piping welds — prior to degradation becoming an operational issue — and make only relevant repairs.

Every Innovation Has a Mission

One of utilities' top priorities in the 21st century is securing their operational excellence. Tangible results that ensure safety, quality, performance, and delivery are paramount. Your teams can count on AREVA to deliver innovative solutions that:

- Reduce cost, critical path time, and dose
- Increase task safety and efficiency
- Resolve emergent issues quickly
- Improve plant performance

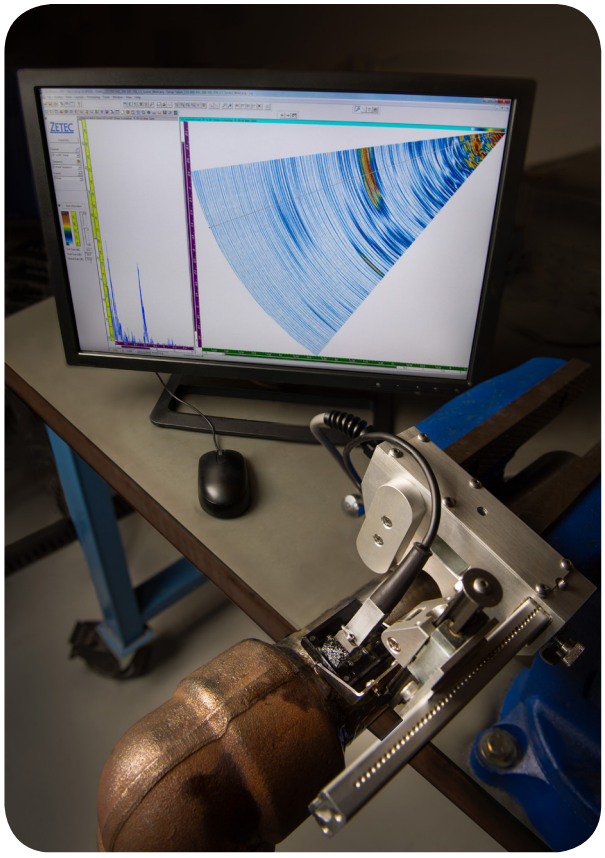
That's why AREVA has invested to develop its phased array ultrasonic (UT) examination technique to locate and characterize indications for small bore piping welds, such as socket welds.

Getting to Life Beyond 60

Failure of small bore piping welds is a recurring problem at nuclear plants — one that causes unscheduled plant shutdowns and thus an economic impact on utilities. As utilities look to renew operating licenses for plant life extension, examination of these components is becoming mandatory.

The industry has long recognized the need to reduce the risk of defects like vibration fatigue, stress corrosion cracking (SCC), and weld lack of fusion, but operators experience challenges when trying to determine the condition of their components. Using existing techniques, plants are unable to discriminate between service-induced and fabrication defects. As a result, plant operators face the dilemma of having to repair all components with reported indications.

Operators need a solution that will not only detect but also characterize potential flaws, allowing the plant to determine which indications are relevant — and make a repair accordingly.



A New Procedure for Weld Flaw Characterization

For examination of socket welds, many utilities only perform a visual or surface examination. These examination techniques are not capable of finding flaws initiating from the inside surfaces. To address the gap of early identification of inside-surface-initiated flaws, EPRI began evaluating ultrasonic and radiographic techniques in 2008. As recently as February 2015, AREVA demonstrated its application of the phased array UT examination technique for an industry group — a technique that can not only quickly identify inside-surface flaws but can differentiate between welding anomalies and service-induced flaws.

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An Innovative New Solution for Detecting and Characterizing Degradation of Small Bore Piping Welds

Prior to degradation becoming an operational issue, AREVA's phased array UT examination technique can detect degradation of socket welds and other small bore piping welds in areas not detectable with other technologies. Existing technologies have the capability to scan the affected areas, but require plants to stop work and evacuate the area, impacting critical path time. AREVA's process is quick, easy to execute, and non-intrusive.

This technique is applicable to all 2" or less small bore plant piping, including PWR primary reactor coolant lines as well as all small main line connections on the primary or secondary side of PWR and BWR plants. Typical areas of focus include socket welds and small bore butt welds, but the technique is adaptable for other applications based on the specific needs of your plant. Examination can also be completed during pre-fabrication of welds before components and piping are installed in your plant, eliminating concerns for dose and critical path impacts.

Utilizing 16-array phased array technology, AREVA's lightweight, semi-encoded biaxial scanner allows an ultrasound to sweep forward, backward and at multiple angles, providing optimum detection capabilities. Using only two personnel, examination can take place on-line or during your refueling outage, requiring less than one hour per weld depending on the spatial location of the weld. Data comes to analysts located in AREVA's NDE labs in Lynchburg, VA, or on your site for analysis with encoded phased array software. Our experts pinpoint and characterize potential indications, then allow your personnel to determine which indications are relevant or non-relevant — and make a repair only when you need to.

AREVA can provide examination as a stand-alone service or as part of a turn-key package including examination, fracture analysis, and repair or replacement, based on your plant's need.

A Proven Process Developed with You in Mind

The AREVA Phased Array Ultrasonic technique is proven — developed with utility input and demonstrated to the NRC. AREVA has qualified its procedure for work at a U.S. utility in the fall of 2015. And the basic procedure can be qualified for various diameters and thicknesses based on your plant's license renewal or leak detection needs.

Features & Benefits

- Non-intrusive inspections
- Experience on PWR and BWR
- Demonstrated technology that is proven to detect flaws in areas other technologies cannot detect
- Proven off-the-shelf phased array technology and attachments
- Only requires 2 personnel to operate, reducing overall dose and man-hour cost
- Encoded data allows for analysis by third-party individuals
- Permanent, historical plant data for comparison and monitoring of flaws
- Allows utility to discriminate between service-induced and fabrication defects

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