

Friction Stir Weld Inspection

Application Note

Inspection Challenges

Friction Stir Weld (FSW) inspections can be challenging and time consuming. It typically requires 3 beam angles for flaws parallel to the weld center line (WCL). Standard solutions use multiple probes, and require each probe to be aligned and calibrated, which can be a long process. Some flaw types (transverse, skewed) are not reliably detected with standard probe design. Additionally, the surface condition and flashing can prevent adequate coverage of the weld area with a contact solution.

Recommended Solution

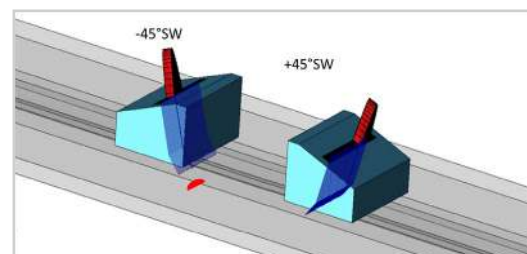
Keeping total inspection time low is critical for process efficiency. A reliable and efficient inspection solution should include rapid setup, quick calibration and fast inspection speed. The following recommended components and approach achieve the desired results:

- ▶ A high-performance phased array ultrasonic testing (UT) instrument, either fully integrated and portable, or scalable depending on inspection requirements
- ▶ Optimized phased array UT probes for improved detection capability and a reduced number of scanning sequences
- ▶ An immersion tank inspection for adequate coupling on the welded surface
- ▶ Industrially proven software platform for seamless system integration and efficient data analysis

The recommended examination technique for flaws parallel to the weld center line involves linear electronic scanning using 3 beam angles (+45°SW, 0°LW, -45°SW). All techniques (groups) can be applied in a single scanning sequence with a volumetric merge of 3 groups for efficient data analysis.



The recommended examination technique for transverse flaws involves linear electronic scanning using 2 beam angles (+45°SW and -45°SW) using probe inclination in the secondary plane. All techniques (groups) can be applied in a single scanning sequence (2 probes required) with a volumetric merge of 2 groups for efficient data analysis.



Products:

Zetec offers the optimal solution for this type of inspection challenge, delivering a highly reliable and efficient inspection. The following complete solution kit from Zetec features the necessary components and tools to confidently perform all the examination techniques in the inspection.

Portable: Zetec TOPAZ®32 fully integrated PAUT instrument

TOPAZ32 is a fully integrated, high-performance phased array UT device. With a 32/128PR configuration, battery operation and UltraVision Touch software onboard for setup, acquisition and analysis, TOPAZ32 is a complete portable solution for your inspections.

Features include:

- **Fully integrated unit:** from preparation to reporting, TOPAZ32 is the complete solution. With easy setup and onboard analysis, you can reduce the amount of equipment needed to perform an inspection.
- **Highly capable:** ability to combine phased array and TOFD techniques simultaneously. Furthermore, 2D matrix array probe support is included without the need of any external software.
- **Industrially proven:** driven by UltraVision Touch on-board software ensuring an efficient inspection workflow
- **Highly responsive:** multi-touch screen that not only offers high resolution, but also one of the largest display size to instrument footprint ratios in its class.



Scalable: QuartZ PAUT instrument

Zetec QuartZ achieves an excellent balance between speed, power and flexibility for some of the most complex applications.

Features include:

- **Parallel firing capability**
- **High power phased array channels:** incorporates real 100 V pulser
- **High data throughput:** can deliver up to 30MB/s of data throughput making the difference for demanding applications
- **UltraVision Classic software:** for seamless system integration using multiple units



Optimized PA UT Probe

Features include:

- Optimized 1D linear array probe, 7.5 MHz, 128 elem., with small pitch and adequate elevation
- Capable of generating 0°LW and 45°SW for flaws parallel to the WCL without probe inclination
- Capable of generating 45°SW for detection of transverse flaws (when inclined in secondary plane)

Benefits:

▶ Optimized approach

- Optimized PA UT probe design for improved detection and sizing capability, including transverse and skewed reflectors
- Adequate coupling on an 'as welded' surface condition

▶ Performance that is ready to go

- High-performance phased array UT units controlled by UltraVision software platform, for setup, acquisition and data analysis
- Simplified calibration and improved repeatability

▶ Scalable solution to meet your specific needs

- From one probe and acquisition unit up to 3 probes and units for 3 x reduction of inspection time

The Zetec Advantage

Zetec is a global leader in nondestructive testing (NDT) solutions for the critical inspection needs of industries the world counts on every day— including power generation, oil and gas, aerospace, transportation, military, heavy industry and manufacturing. By integrating design and engineering with our own manufacturing, Zetec delivers solutions that optimize productivity, safety and total cost of ownership.

For more information about the Zetec friction stir weld inspection solution, TOPAZ32 PAUT instrument, optimized PAUT probe or other Zetec products contact your local Zetec representative, email us at info@zetec.com or visit www.zetec.com.



Zetec holds ISO 9001
and ISO/IEC 17025
certifications



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