



Frequently Asked Questions Regarding: ULTRASONIC FLAW DETECTION AND SIZING USING FAST™ TECHNIQUES

WHAT DOES FAST™ STAND FOR?

FAST™ is an acronym for Flaw Analysis and Sizing Technique.

WHAT IS FAST™?

FAST™ is a single operation, multi-tasking ultrasonic examination technique. With one technique, and in the same operation, planar flaws are:

- Detected
- Sized for through wall extent
- Sized for length.

WHAT MAKES FAST™ “*BETTER, FASTER, AND CHEAPER*”

- Better
 - ⇒ Increased reliability
 - ⇒ Increased examination consistency
 - ⇒ More accurate through-wall sizing
 - ⇒ Minimizes geometric reflections
- Faster
 - ⇒ Reduced calibration time and preparation time
 - ⇒ Reduced scanning time
 - ⇒ Reduced data recorded
- Cheaper
 - ⇒ Reduced number of calibration blocks
 - ⇒ Reduced number of transducers
 - ⇒ Faster is more cost effective
 - ⇒ Increased reliability and accuracy is cost effective

WHAT IS DIFFERENT ABOUT FAST™?

- FAST™ uses refracted longitudinal waves exclusively for detection and sizing.
- Geometric reflectors and the interpretation problems associated with them are virtually eliminated.
- Through wall sizing is performed concurrent with detection.

WHY WAS FAST™ DEVELOPED?

- To provide a better, faster, and cheaper method of ultrasonic examination for the Nuclear Industry.
- ASME Section XI, Appendix VIII allows for the use of any technique which can be proven effective by demonstration.

FAST was developed to take positive advantage of this change.

WHERE HAS FAST BEEN USED?

- SCC through wall sizing in gas transmission pipelines.
- Qualification of inspectors for Appendix VIII and for IGSCC examinations at EPRI.
- Nuclear piping welds to the requirements of ASME XI
- Nuclear piping welds for detection and sizing of IGSCC per generic letter 88-01.
- Composite materials, aluminum forging and inconel welds
- Thin wall gas piping welds.
- Thin wall (0.05”T) circumferential butt welds in inconel tubing.
- Boiler tube welds
- Dissimilar metal welds in boiler tubes
- OD crack sizing of Stress Corrosion Cracking (SCC)
- Fillet weld toe crack confirmation and depth sizing

FOR WHAT TYPE OF FLAWS IS FAST™ APPLICABLE?

- Planar flaws, either internal or connected to the ID or the OD surface.
 - ⇒ In-service flaws such as fatigue and stress corrosion cracking.
 - ⇒ Welding flaws such as cracks, lack of fusion, lack of penetration, and slag.

WITH A TYPICAL CALIBRATION BLOCK, WHAT CONFIGURATIONS, THICKNESSES AND MATERIALS CAN BE EXAMINED?

- 0.5" diameter through unlimited (flat)
- 0.05" through 5.0" thick
- Materials as follows:
 - ✓ Carbon steel
 - ✓ Inconel
 - ✓ Stainless steel
 - ✓ Other with similar acoustic properties.
 - ✓ Clad carbon steel

WHAT EQUIPMENT IS REQUIRED TO EXAMINE THE ENTIRE RANGE OF CONFIGURATIONS, THICKNESSES, AND MATERIALS

- ✓ 3 transducers
- ✓ 1 calibration block

HOW DOES FAST™ SAVE TIME?

- Reduced scanning time due to area covered by 70° L-wave beam.
- Reduced number of indications to record and analyze.
 - ⇒ Geometric reflectors are virtually eliminated.
 - ⇒ Only flaws provide indications to be recorded.
- Reduced number of set-ups and calibrations.
 - ⇒ Detection and sizing are done in the same operation.
- Reduced paperwork.

HOW MUCH TIME DOES FAST™ SAVE AS COMPARED TO TRADITIONAL METHODS?

- 75% for detection
- For through wall sizing the time savings is:
 - ⇒ 100% when the sizing is done at the same as the detection.
 - ⇒ 75% or greater when the sizing is done as a separate operation.

WHY IS FAST™ MORE RELIABLE FOR DETECTION OF PLANAR FLAWS?

- Only flaws are seen.
 - ⇒ Geometric reflections are minimized.
 - ⇒ Interpretation of indications is simplified.
- Reliable inspection through the weld (far side examination) even with austenetic welds. L-waves penetrate austenetic weld material.
 - ⇒ Flaw confirmation from both sides of weld is achieved.
- Probability of detection increases with increased flaw depth.
 - ⇒ 70° L-wave beam reflects from the flaw face. Does not rely on "corner trap".
 - ⇒ Large amplitude signals with long echo-dynamics with deep flaws
- Axial flaws in pipe welds are more easily found with FAST™.

WHY IS FAST™ MORE RELIABLE FOR SIZING OF PLANAR FLAWS?

- Through wall sizing is done with backscatter tip diffraction.
 - ⇒ Tip diffraction is the most accurate method for through wall sizing.
- Flaw orientation does not affect through wall sizing results with FAST™.
- No use of collateral echoes, (AKA confusing echoes, i.e. CE-1 and CE-2), from multi-mode techniques.
- Diffracted signals from flaw tips are more easily identified than with other techniques.

WHAT INDUSTRIES WILL BENEFIT MOST FROM THE CAPABILITIES OF FAST™?

- Any industry where component integrity is monitored in-service by NDE.
 - ⇒ Service related and original fabrication flaws are reliably and efficiently detected, characterized and sized.
 - ⇒ The sizing data is suitable for accurate analysis by fracture mechanics.
 - ⇒ Monitoring of flaw growth over time is reliable.
 - ⇒ Sizing of flaws from the scan surface is reliable and straightforward.

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