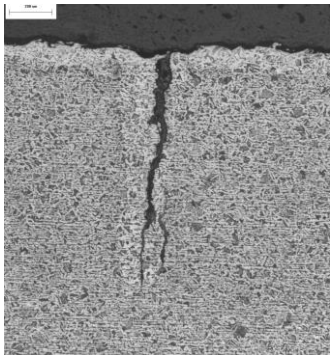
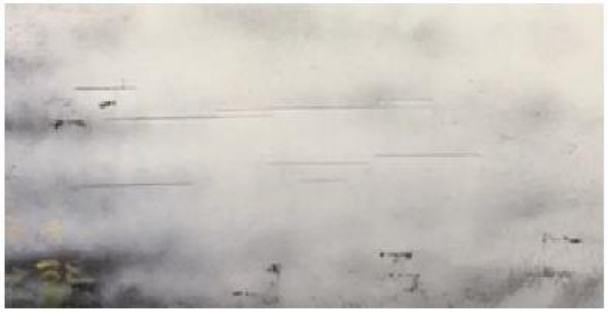
Piping Stress Corrosion Cracking (SCC)

Application Solution

March 2020





Inspection Challenge

- Pipeline operators are increasingly finding pipeline degradation in the form of crack-like defects from stress corrosion cracking (SCC) in certain vintage ERW pipelines and other select seam types
- Pipeline operators are challenged in employing NDE techniques that can reliably determine the axial depth profile of these cracks, especially when occurring in colonies
- PRCI has identified a need to further investigate and define the capabilities and limitations of different NDE methodologies typically used and/or identified as feasible to characterize and size crack-like features

PRCI Round Robin

Courtesy of PRCI

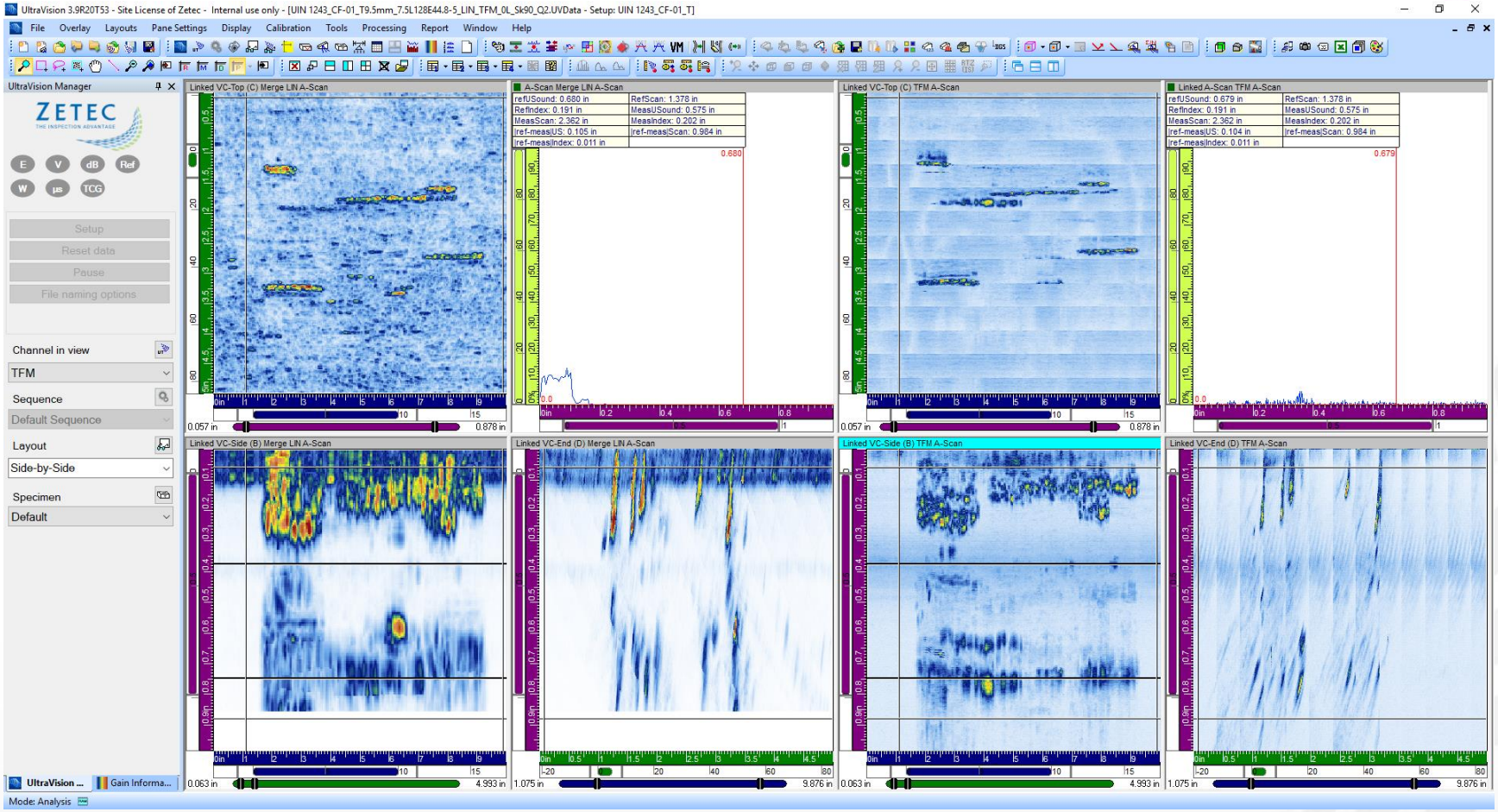
Zetec/Nucleom setup at PRCI test facility in Houston, Texas

PRCI Round Robin

Courtesy of PRCI

Artificial SCC sample – MT Results

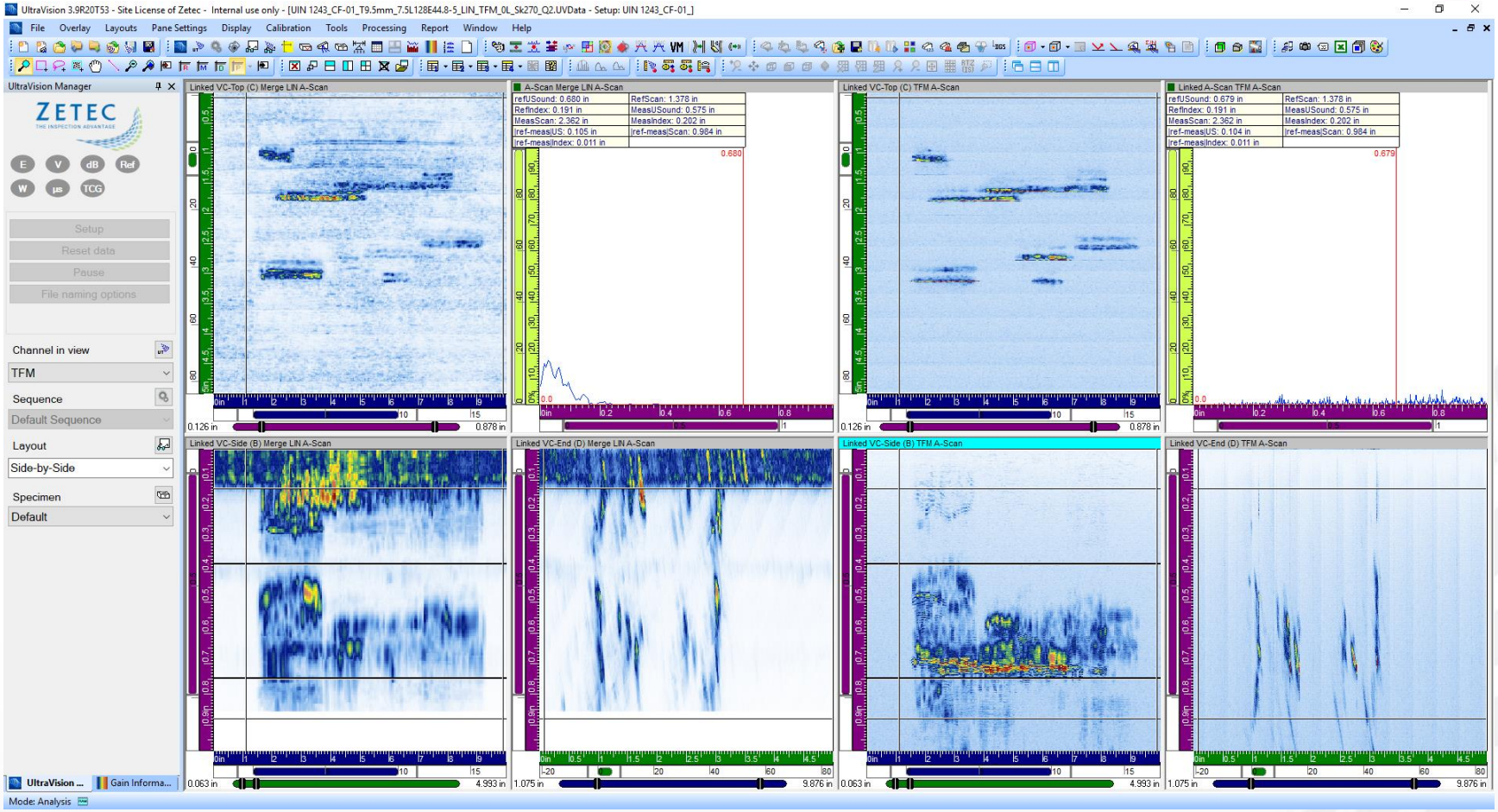
PRCI Round Robin - Detection



Courtesy of PRCI

Artificial SCC sample – Skew 90: Linear 60T (left) vs. TFM (right)

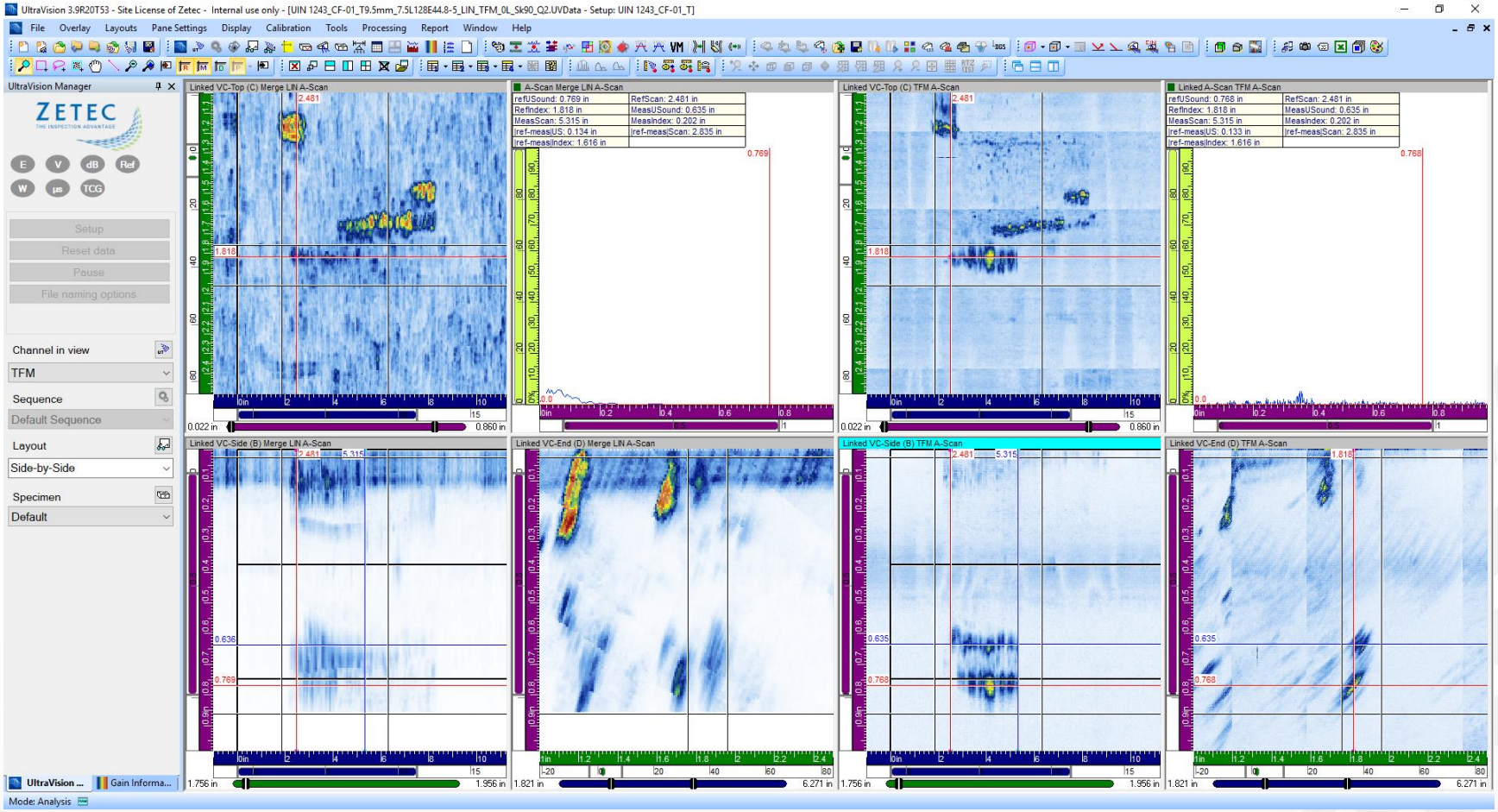
PRCI Round Robin - Detection



Courtesy of PRCI

Artificial SCC sample – Skew 270: Linear 60T (left) vs. TFM (right)

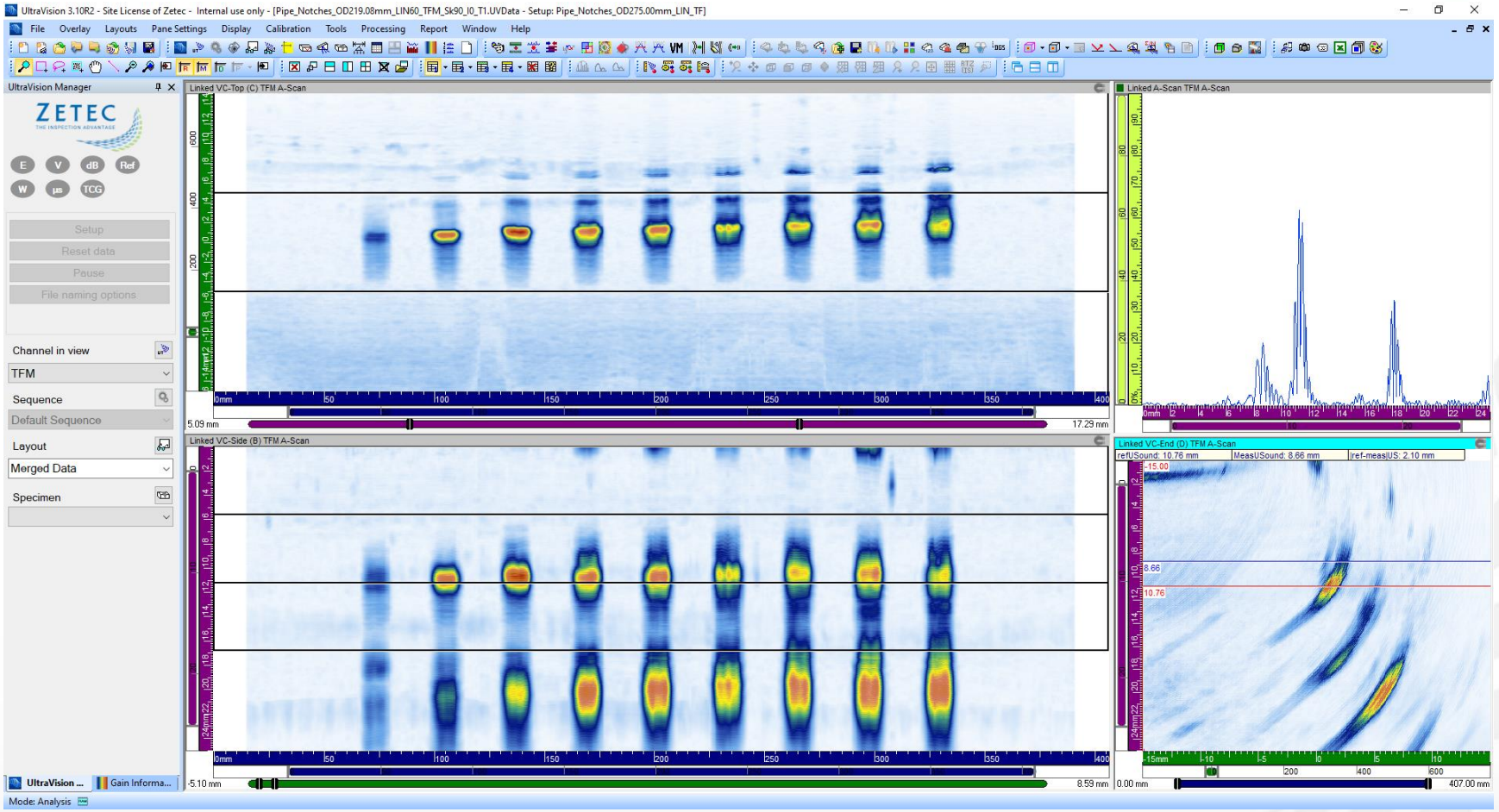
PRCI Round Robin – TW Sizing



Courtesy of PRCI

Artificial SCC sample – Flaw 3: Linear 60T (left) vs. TFM (right)

Through-Wall Sizing



Courtesy of Acuren

Sample with OD notches: TFM channel

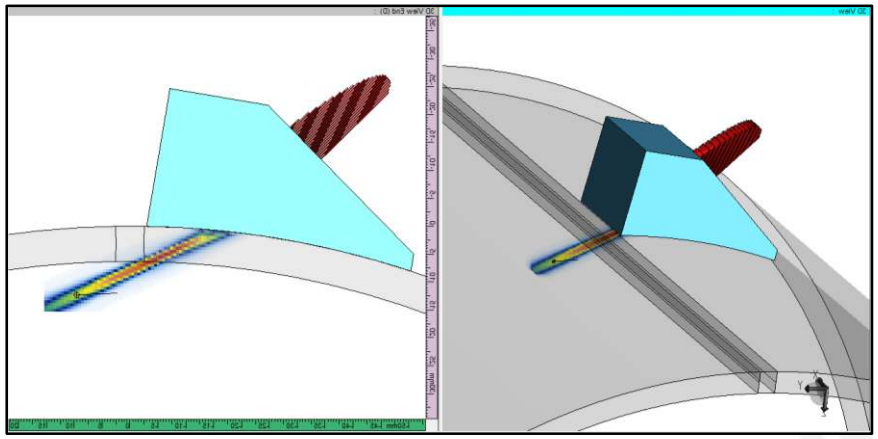
Through-Wall Sizing

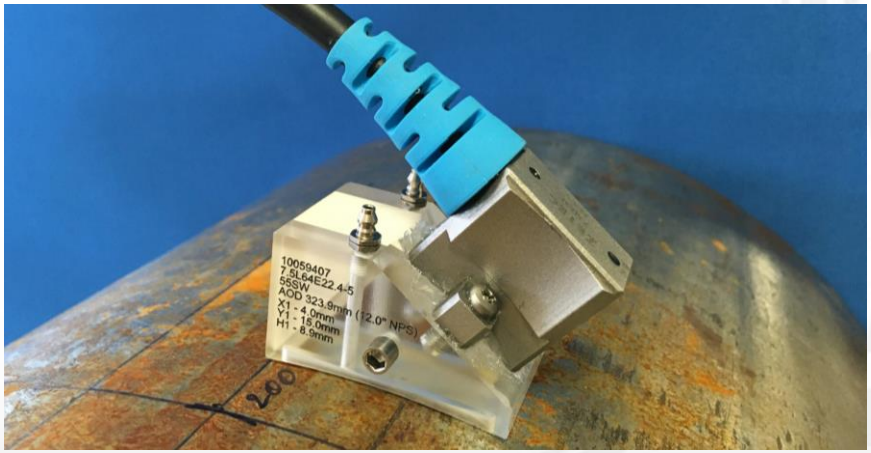
Sample: Notches			
#	Measured Height (mm)	Fabricated Height (mm)	Delta (mm)
1	0.44	0.50	-0.06
2	0.88	1.00	-0.12
3	1.60	1.50	0.10
4	2.01	2.00	0.01
5	2.10	2.10	0.00
6	2.25	2.20	0.05
7	2.30	2.30	0.00
8	2.35	2.40	-0.05
9	2.84	2.50	0.34
		Average	0.03
		RMS	0.13

Courtesy of Acuren

Probe & Wedge configuration

- Probe 7.5L64E22.4-5:
  - 1D Linear array 64 elements
  - Frequency 7.5 MHz
  - Aperture: 22.4 x 5 mm
  - Primary pitch: 0.35 mm
- Wedges:
  - Dedicated for probe
  - Nominal 55SW
  - Multiple curvatures available (COD & AOD)





Probe & Wedge configuration

Sales Part Number	Short Description	Detailled Description
10058947	ZPA-PB1D-7.5L64E22.4-5-REX-3.0M-ZPAC	Dedicated 1D Linear Phased Array probe - 7.5 MHz - 64 elements - Active aperture 22.4 mm x 5.0 mm - Acoustic matching to Rexolite - 3.0 m cable length - ZPAC connector

Sales Part Number	Short Description	Detailed Description
10059781	ZPA-ACC-W-7.5L64E22.4-5-55SW-H-OD12-CIRCFLAW	Dedicated wedge for 7.5L64E22.4-5 phased array probe - Designed for azimuthal scanning from 40 to 70 degree using shear waves - 55-degree SW nominal angle in carbon steel - probe holder fixtures - Contoured for NPS 12 (Ø323.85mm) - Circumferential flaw detection
10059782	ZPA-ACC-W-7.5L64E22.4-5-55SW-H-OD16-CIRCFLAW	Dedicated wedge for 7.5L64E22.4-5 phased array probe - Designed for azimuthal scanning from 40 to 70 degree using shear waves - 55-degree SW nominal angle in carbon steel - probe holder fixtures - Contoured for NPS 16 (Ø406.40mm) - Circumferential flaw detection
10059783	ZPA-ACC-W-7.5L64E22.4-5-55SW-H-OD30-CIRCFLAW	Dedicated wedge for 7.5L64E22.4-5 phased array probe - Designed for azimuthal scanning from 40 to 70 degree using shear waves - 55-degree SW nominal angle in carbon steel - probe holder fixtures - Contoured for NPS 30 (Ø762.00mm) - Circumferential flaw detection
10059784	ZPA-ACC-W-7.5L64E22.4-5-55SW-H-OD12-AXFLAW	Dedicated wedge for 7.5L64E22.4-5 phased array probe - Designed for azimuthal scanning from 40 to 70 degree using shear waves - 55-degree SW nominal angle in carbon steel - probe holder fixtures - Contoured for NPS 12 (Ø323.85mm) - Axial flaw detection
10059785	ZPA-ACC-W-7.5L64E22.4-5-55SW-H-OD16-AXFLAW	Dedicated wedge for 7.5L64E22.4-5 phased array probe - Designed for azimuthal scanning from 40 to 70 degree using shear waves - 55-degree SW nominal angle in carbon steel - probe holder fixtures - Contoured for NPS 16 (Ø406.40mm) - Axial flaw detection
10059786	ZPA-ACC-W-7.5L64E22.4-5-55SW-H-OD30-AXFLAW	Dedicated wedge for 7.5L64E22.4-5 phased array probe - Designed for azimuthal scanning from 40 to 70 degree using shear waves - 55-degree SW nominal angle in carbon steel - probe holder fixtures - Contoured for NPS 30 (Ø762.00mm) - Axial flaw detection

TOPAZ 64 - Versatile PA UT Unit

ZETEC

- Fully integrated, portable PA UT unit
- Excellent *64 active element PA UT*
- 2 high-SNR TOFD channels at 200 V
- *12” Hi-Res multi-touch* display
- Best-in class *« live » TFM*
- Parallel recording of PA UT & TFM
- *Bipolar pulse (150Vpp)* option
- Driven by *UtraVision Touch*

Successfully used for PRCI Round Robin!

Benefits of Zetec Solution

- Complete offering of high-quality standard and application specific PA UT probes required for efficient detection and characterization of SCC damage

- TOPAZ 64 portable PA UT unit, includes all required tools and features to efficiently set up and deploy all recommended examination techniques : Standard Phased Array UT and live TFM