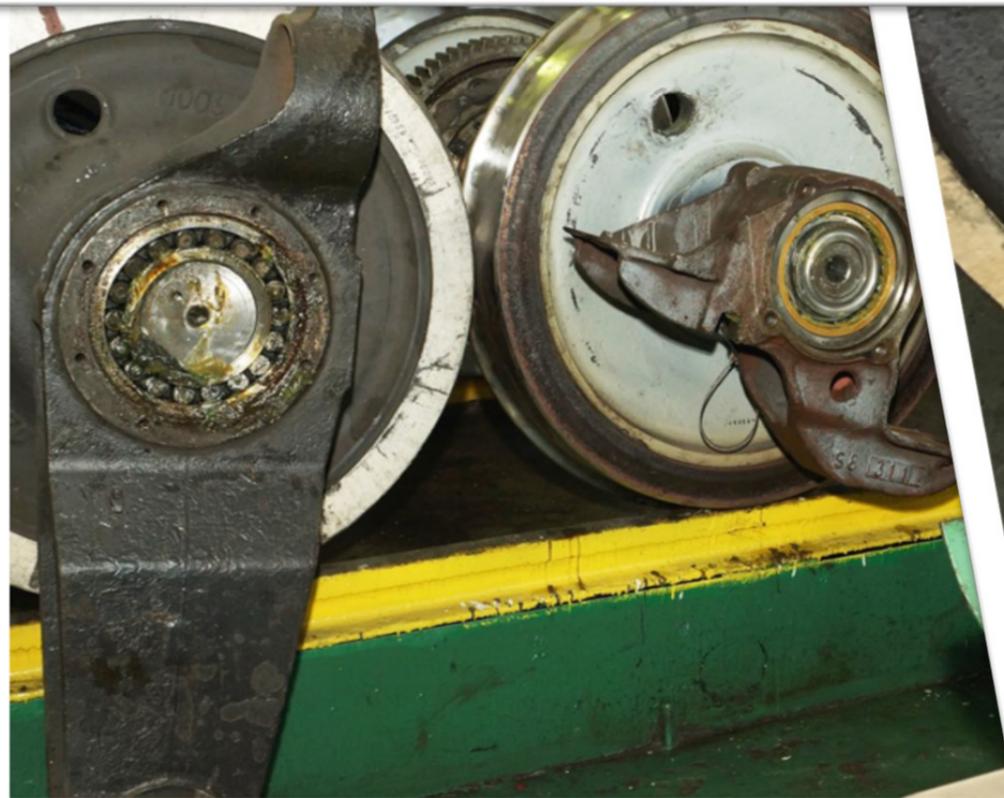
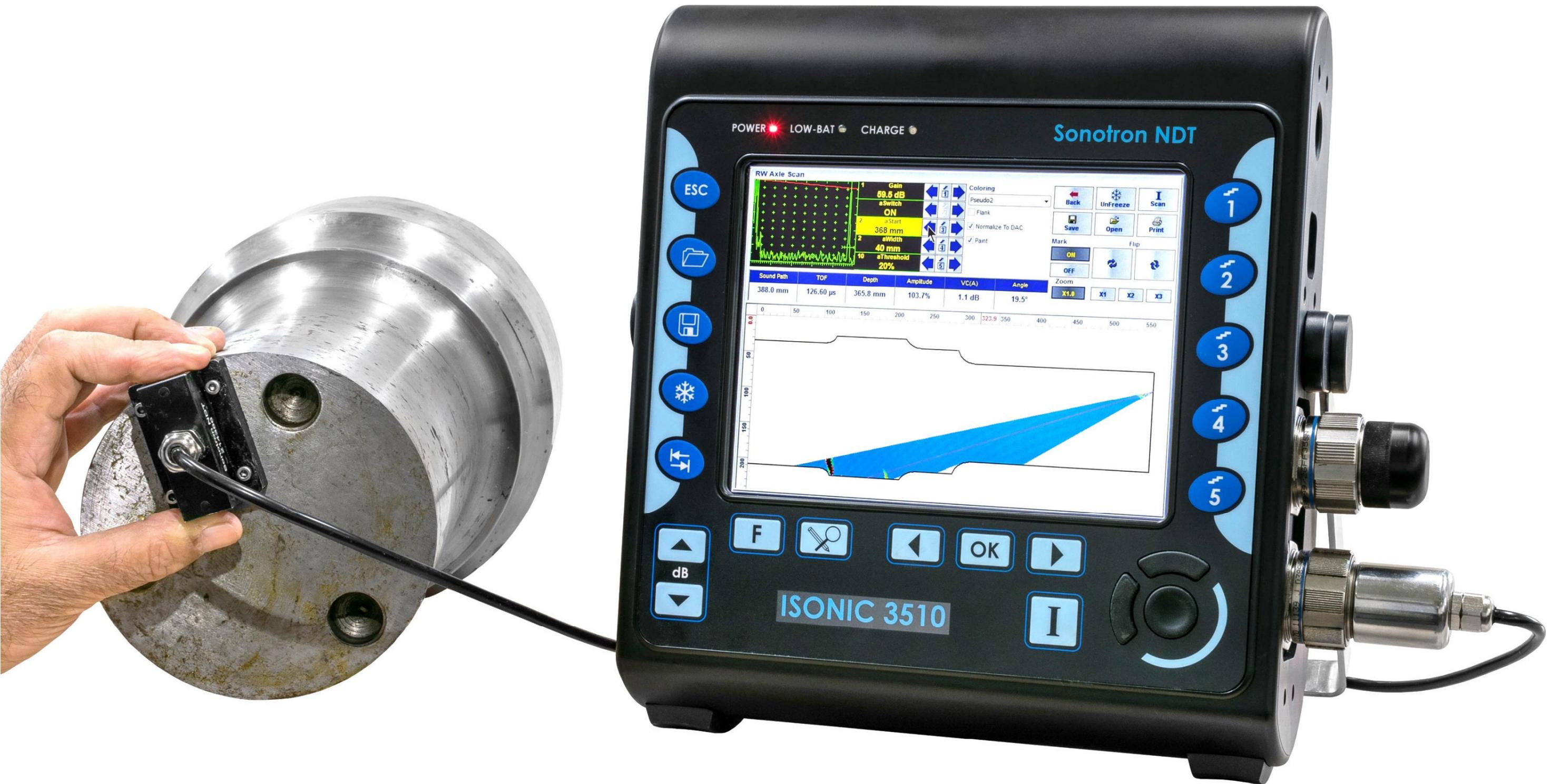


Item	Order Code (Part #)
Inspection SW Application for ISONIC 3510T, ISONIC 3510 - Phased Array Modality: EXPERT SHAFT - Inspection of various shafts, axles, bolts, spindles for the transversal cracks and other imperfections	SWA 3510029
Inspection SW Application for ISONIC 2010 / ISONIC 2010 EL - Phased Array Modality: EXPERT SHAFT - Inspection of various shafts, axles, bolts, spindles for the transversal cracks and other imperfections	SWA 910029
Inspection SW Application for ISONIC 2009 UPA-Scope - Phased Array Modality: EXPERT SHAFT - Inspection of various shafts, axles, bolts, spindles for the transversal cracks and other imperfections	SWA 909029
<ul style="list-style-type: none"> ⇒ True-To-Geometry Shaft/Axle/Bolt/Spindle Overlay Volume Corrected Imaging - Cross Sectional Along the Bridge Pin / Unfolded C-Scan / 3D ⇒ Sector-Scan Cross Sectional Along the Shaft/Axle/Bolt/Spindle Coverage with Probe Placed on the End Surface ⇒ Intuitive Image Guided PA Pulser Receiver with Beam Forming View ⇒ DAC / TCG Normalization ⇒ Built-In Shaft/Axle/Bolt/Spindle Geometry Editor and Ray Tracer - Scanning Pattern Design Geometry Editor and Ray Tracer - Scanning Pattern Design ⇒ Independent on TCG Angle Gain Compensation (AGC) - Gain Per Focal Law Correction ⇒ Encoded and Time based Unfolded C-Scan ⇒ 100% Raw Data Capturing ⇒ Automatic Defects Alarming Upon C-Scan Acquisition Completed ⇒ Automatic Generating of Editable Defects List ⇒ Comprehensive Postprocessing Including: <ul style="list-style-type: none"> → Recovery and Evaluation of Captured A-Scans from the Recorded Cross Sectional Along the Shaft/Axle/Bolt/Spindle Views (Sector Scan) and C-Scans → Recovery of Cross Sectional Along the Shaft/Axle/Bolt/Spindle Views from the Recorded C-Scans → Converting Recorded C-Scans or their Segments into 3D Images → Off-Line Gain Manipulation → Off-Line DAC to TCG / TCG to DAC toggling for all types of stored files (A-Scans, cross-sectional views, C-Scans, etc) → Off-Line DAC Normalization of the Recorded Images / DAC Evaluation → Off-Line editing of Angle Gain Compensation / Gain per Shot Correction applied to the stored the Cross-sectional Views / C-Scan data → Numerous Filtering / Reject Options (by Geometry / Position / By Amplitude / dB-to-DAC / etc) → Defects Sizing → Generating of Defect List and Storing it Into a Separate File → Automatic creating of inspection reports - hard copy / PDF File 	

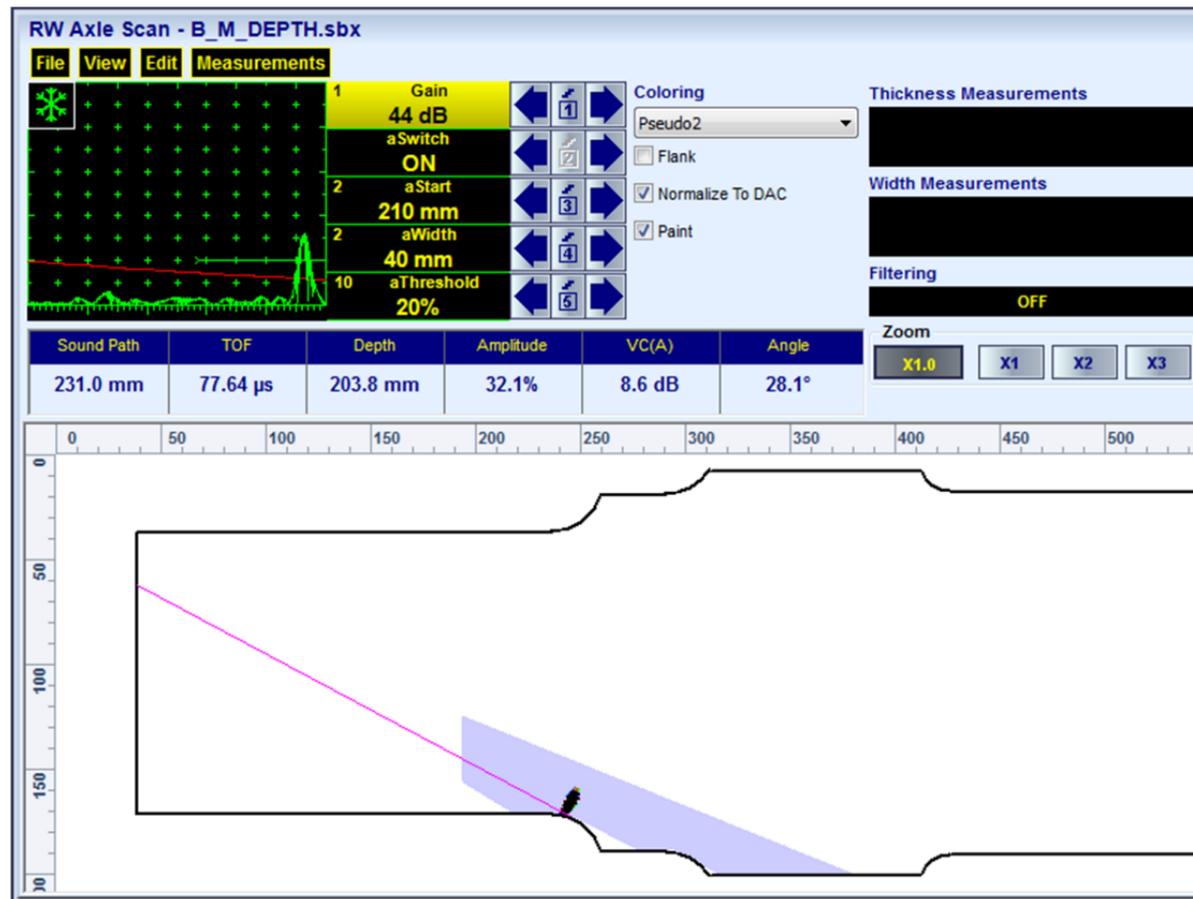


There is no disassembly of axle set required for the inspection, just the access to the end side surface of the railway axle from both sides

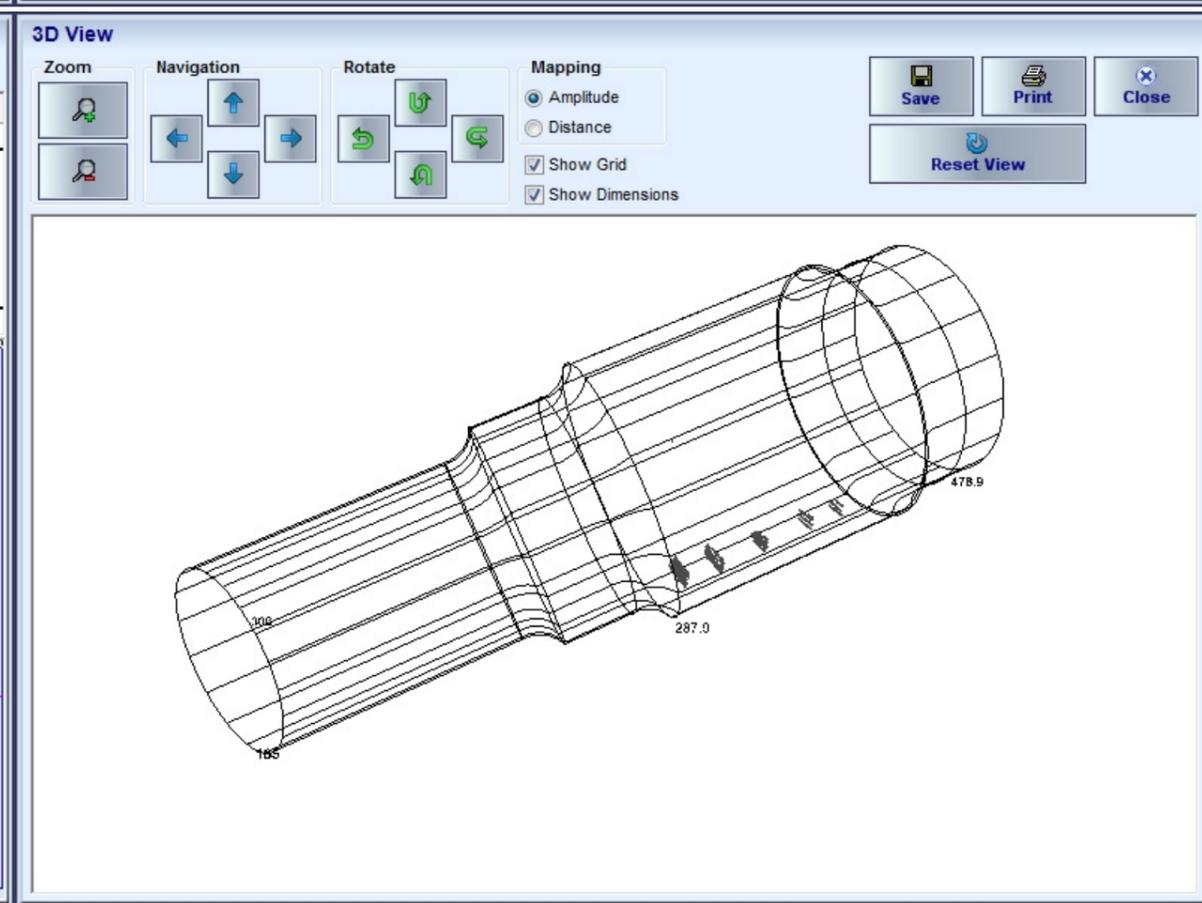
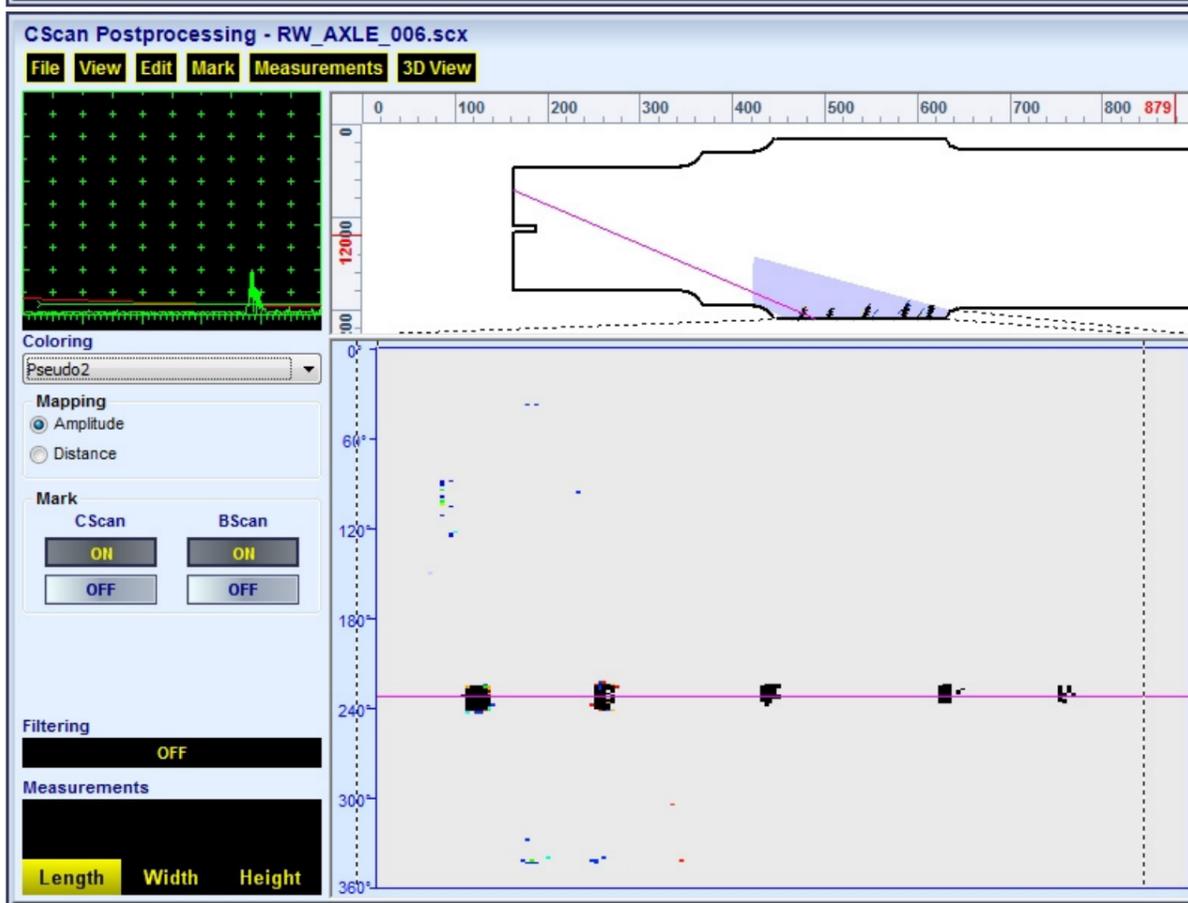
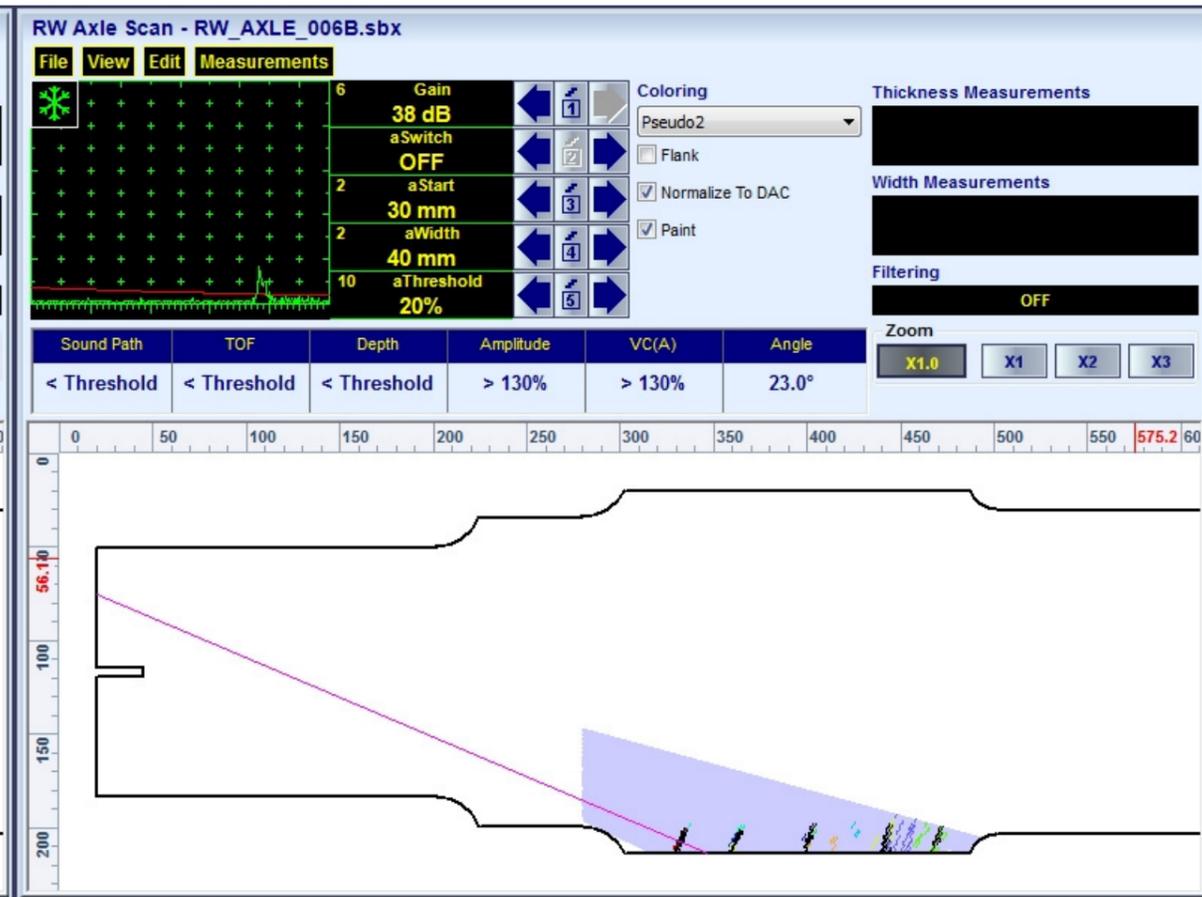
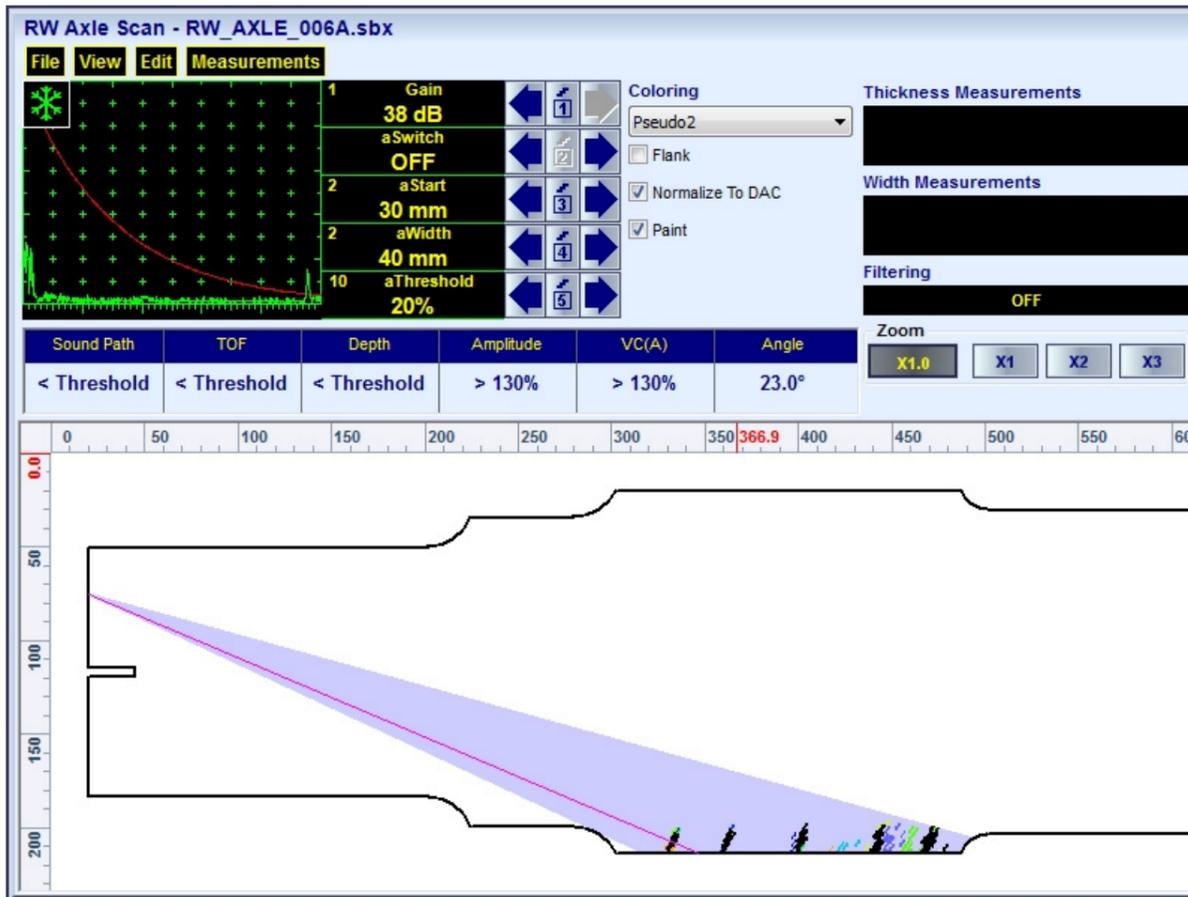




Inspection of Railway Axles



Inspection of Railway Axles

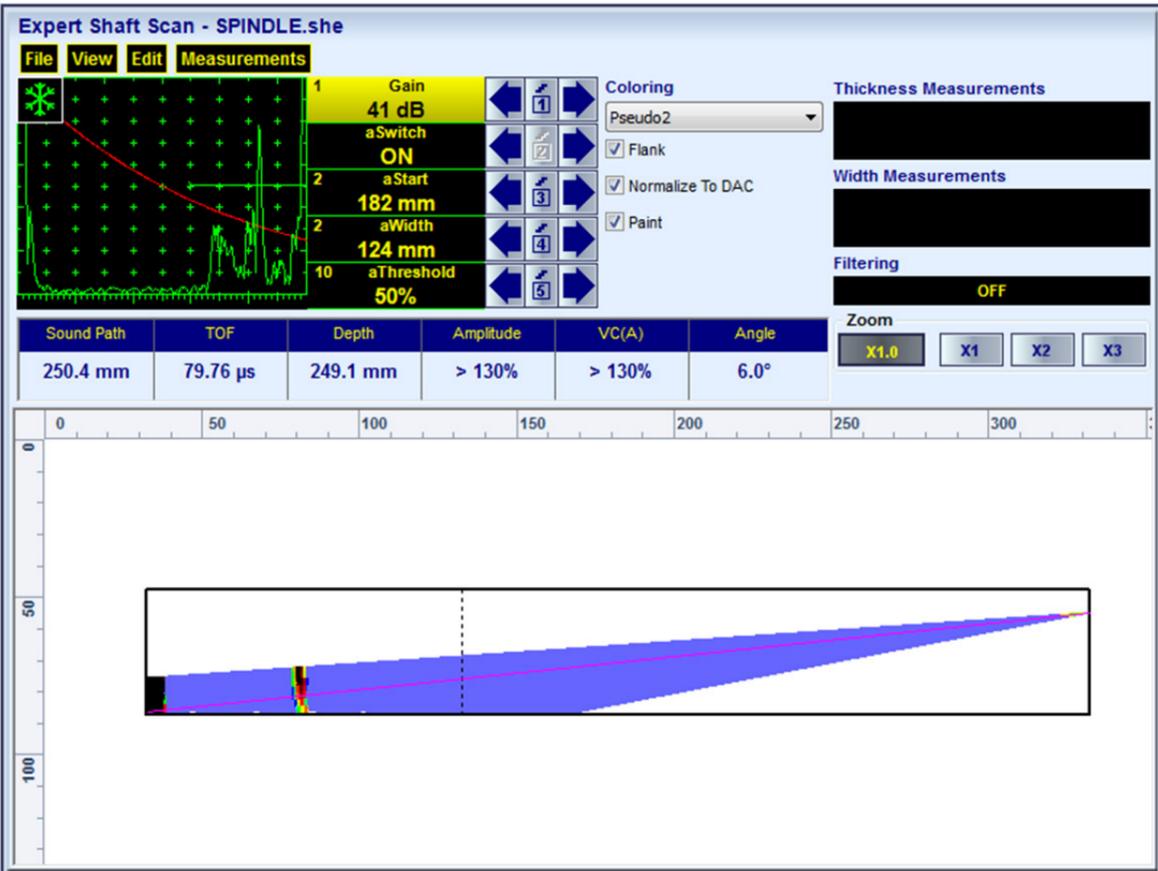




4, Pekeris st., Rabin Science Park, Rehovot, 7670204, Israel
Phone: +972-(0)8-9311000, Fax: +972-(0)8-9477712
www.sonotronndt.com

There is no disassembly required for the inspection of the axle shafts in the bridges, cranes, and the like, just the access to the end side surface





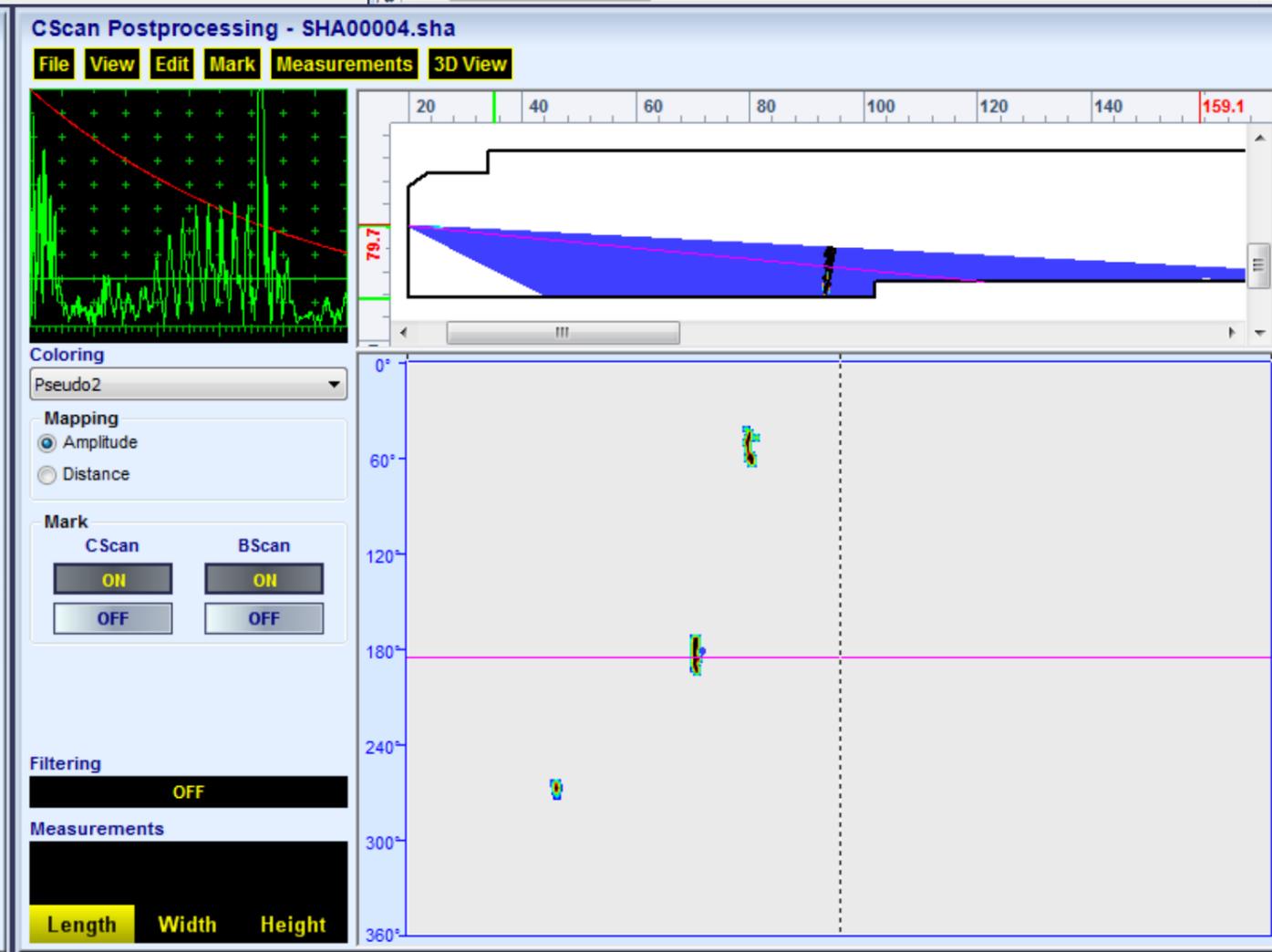
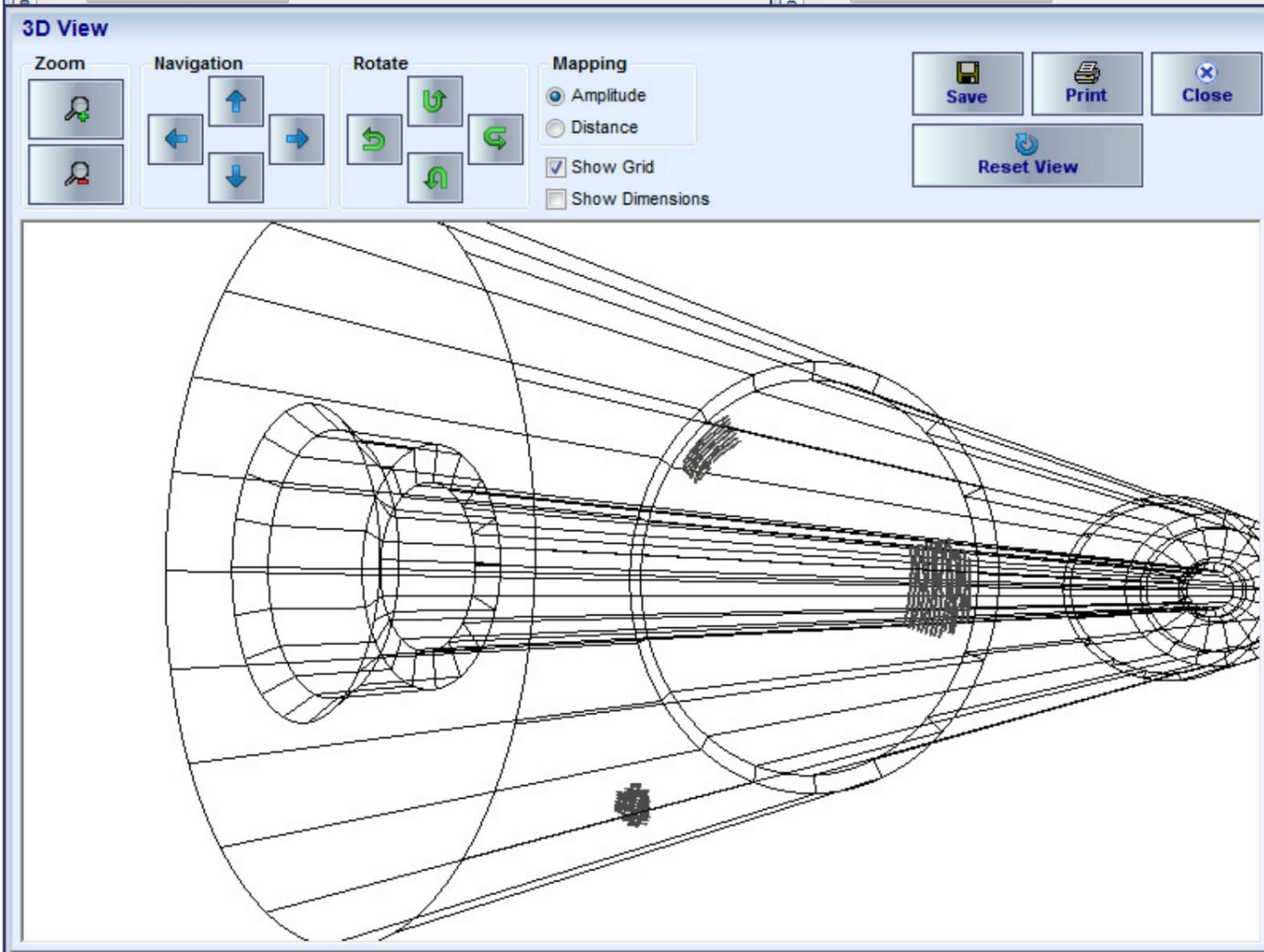
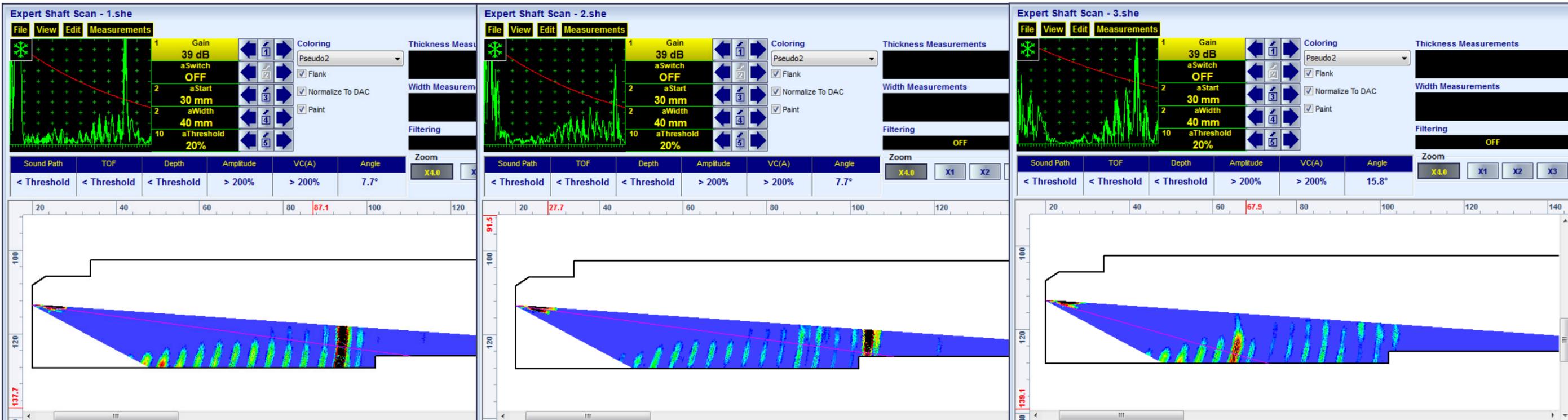
Inspection of bolts and spindles



Inspection of Solid Bolts

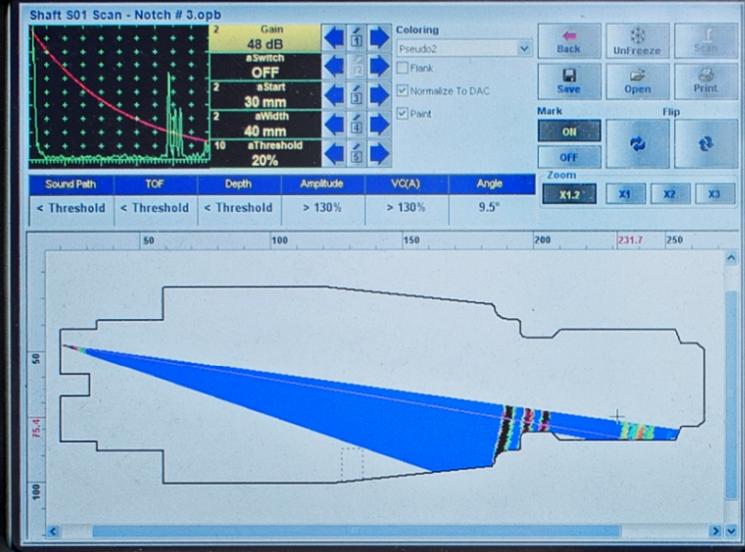


Inspection of Hollow Stud Bolts



Sonotron NDT

Power ● Low-Bat ●



ISONIC 2009

UPA - Scope

Inspection of the complex geometry shafts

SONOTRON NDT

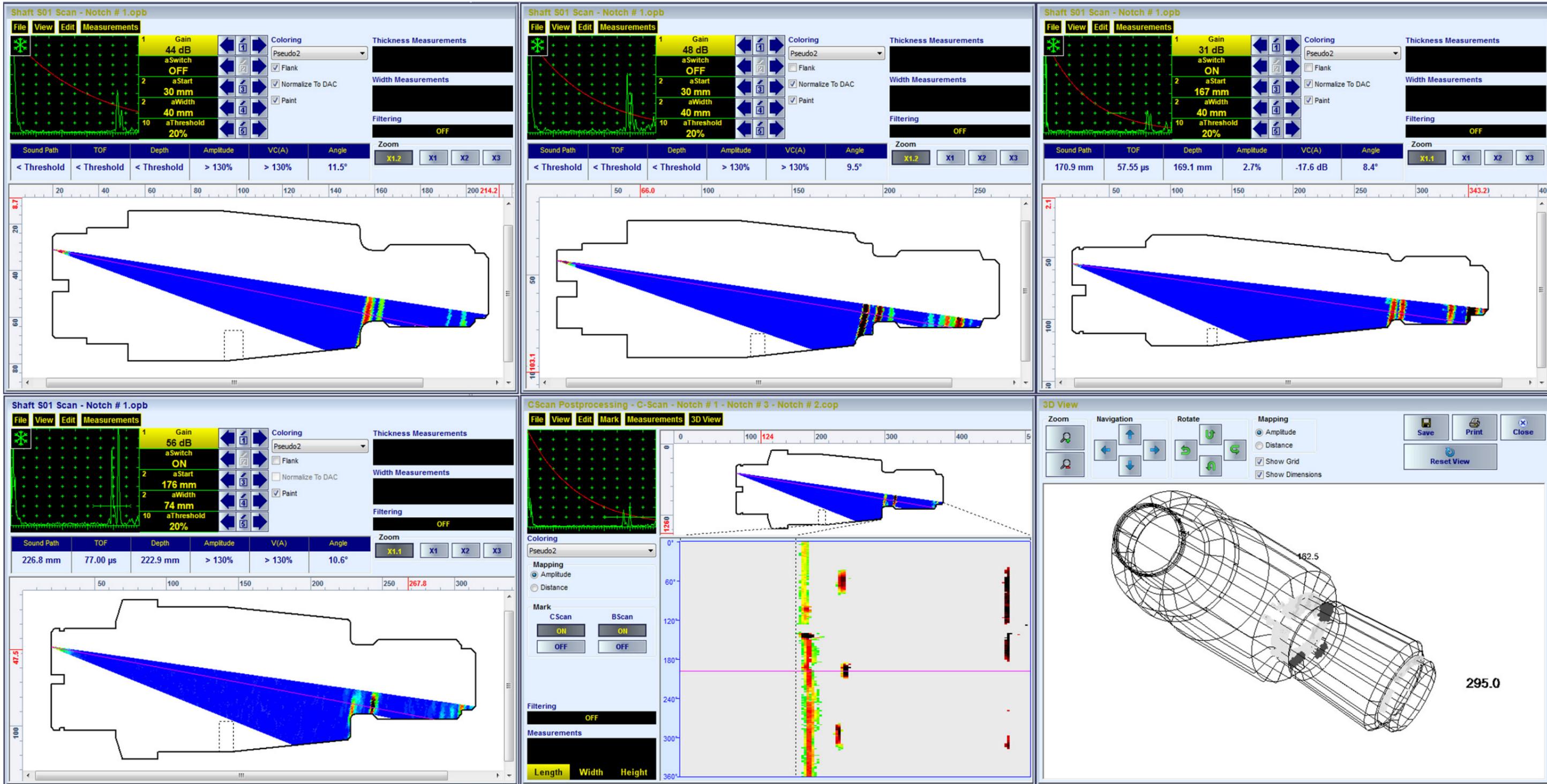


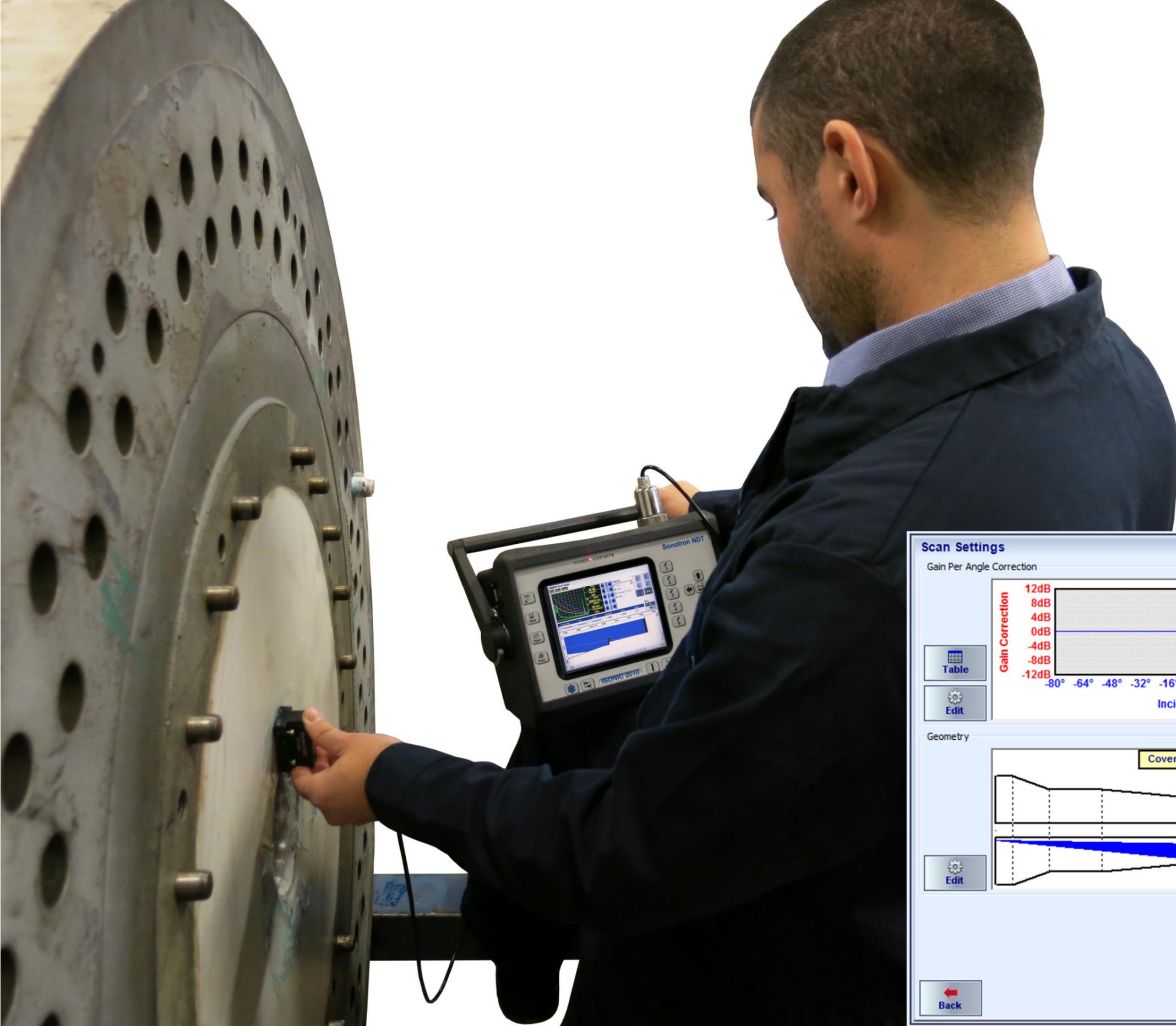
4, Pekeris st., Rabin Science Park, Rehovot, 7670204, Israel
Phone: +972-(0)8-9311000, Fax: +972-(0)8-9477712
www.sonotronndt.com



Inspection of the complex geometry shafts

Typical Postprocessing Screenshots





Inspection of the wind turbine shaft

Scan Settings

Gain Per Angle Correction

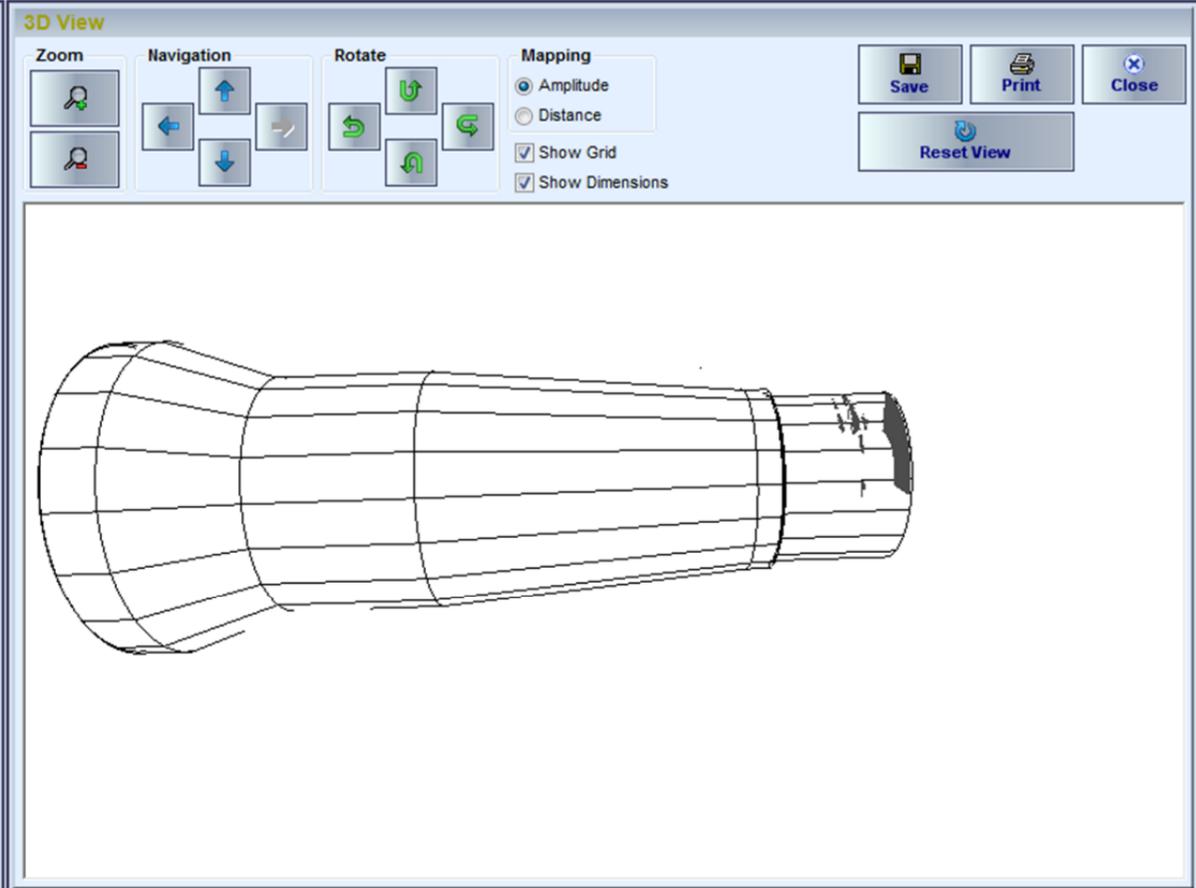
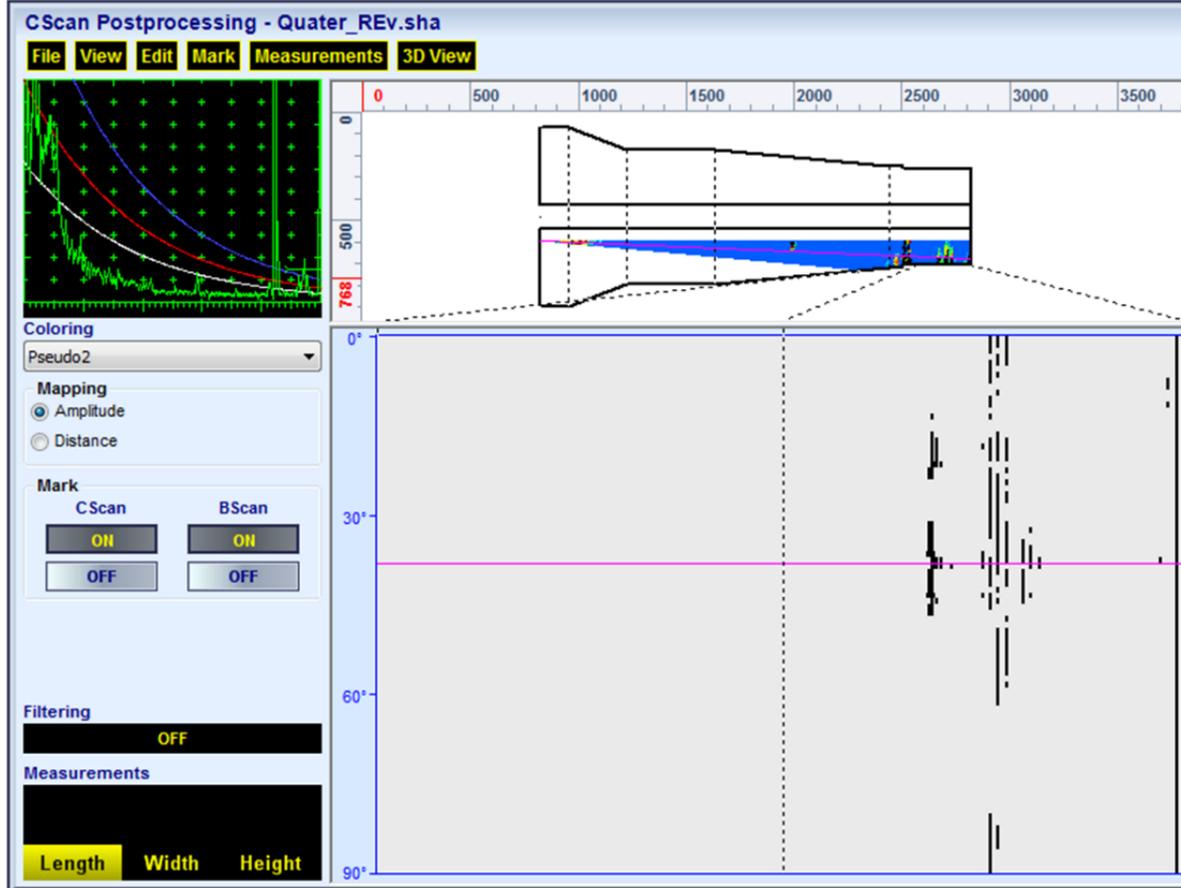
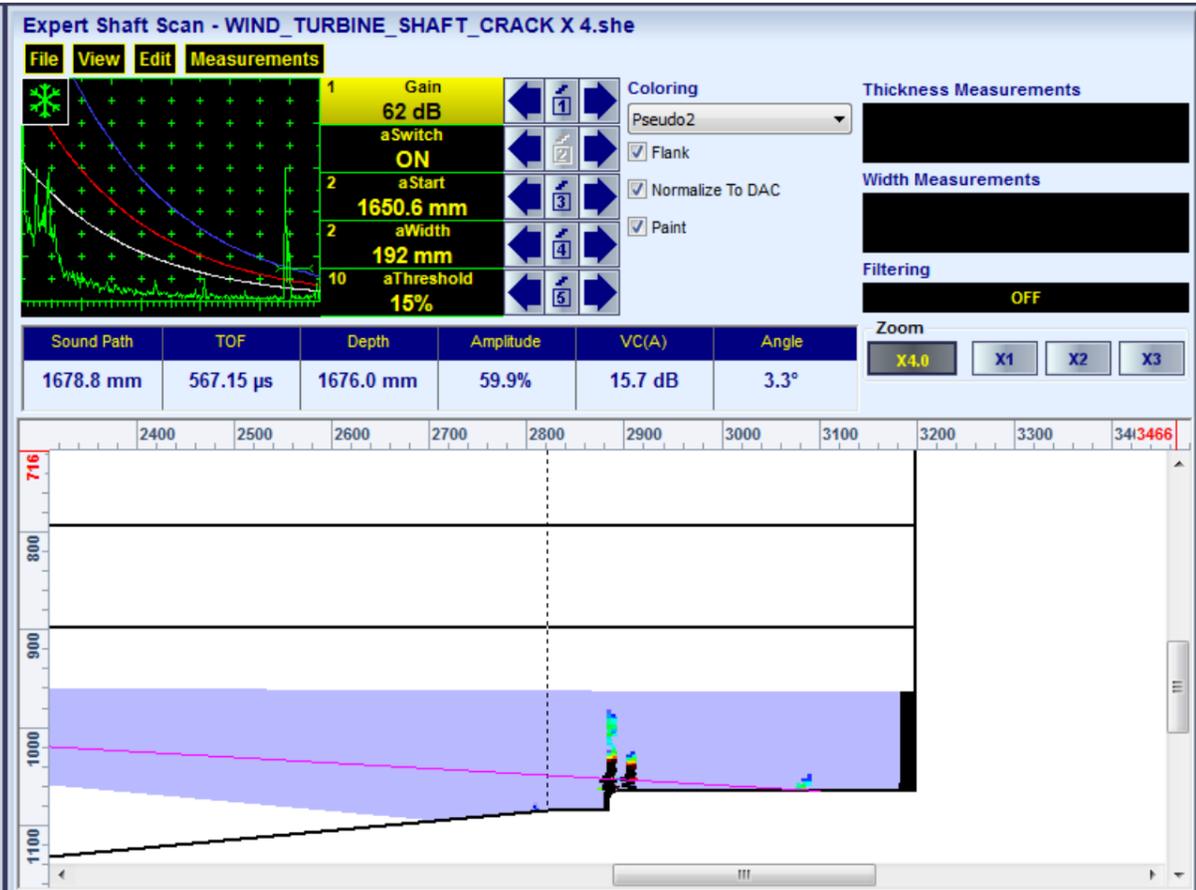
Gain Correction	Incidence Angle
12dB	-80°
8dB	-64°
4dB	-48°
0dB	-32°
-4dB	-16°
-8dB	0°
-12dB	16°
	32°
	48°
	64°
	80°

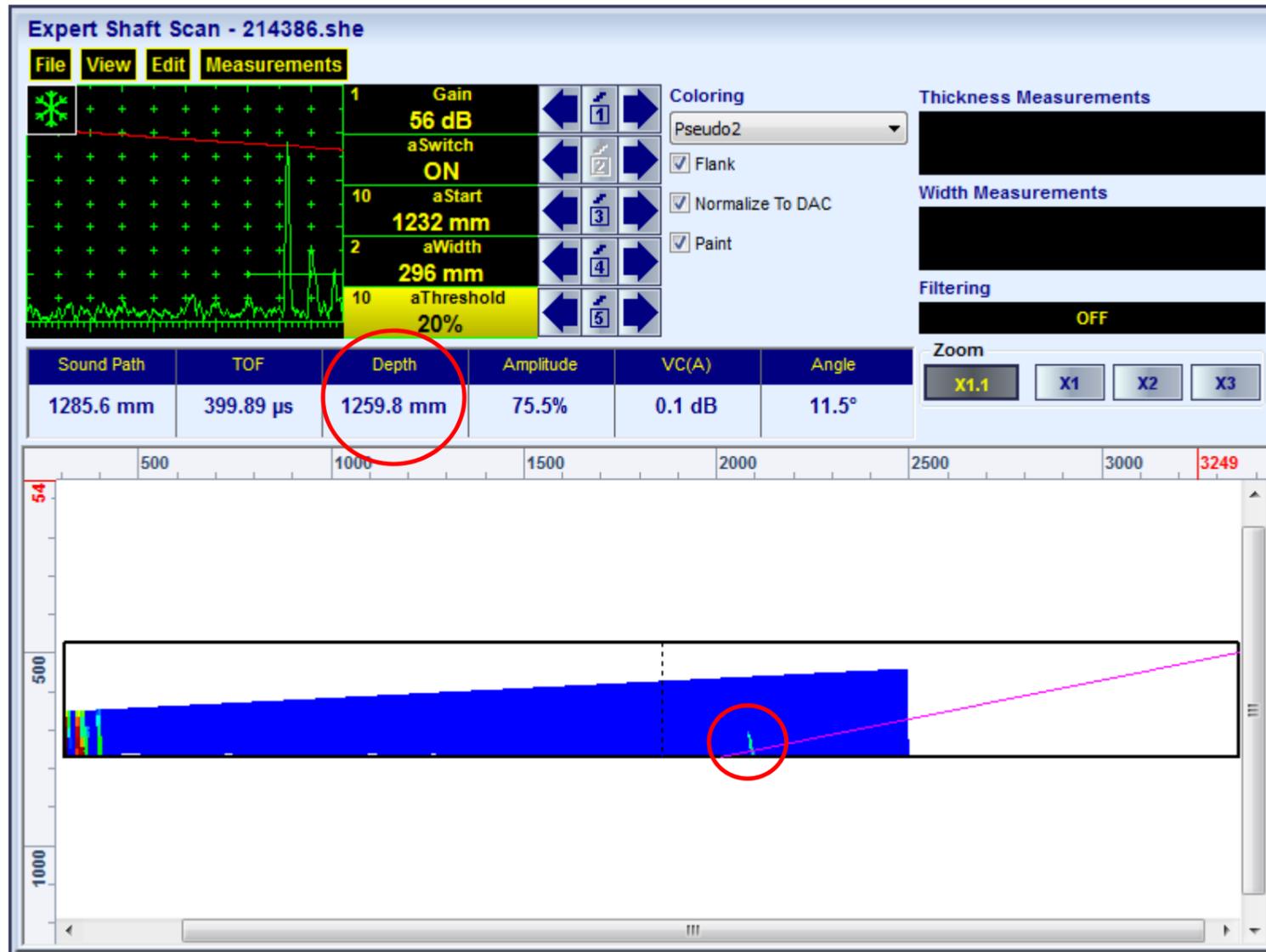
Scan Parameters

1	Min Angle	1°
0.1	Max Angle	5.5°
	Angle Increment	0.1°
2	Probe Position	294.5 mm

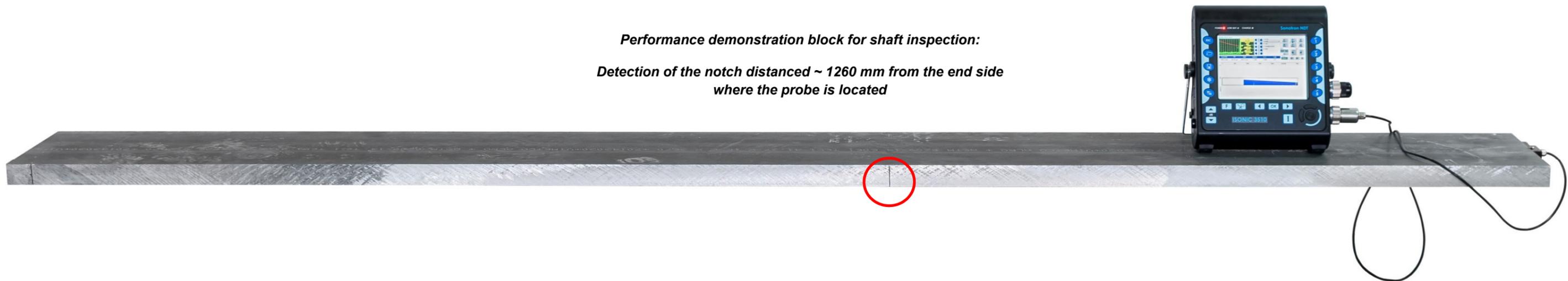
Coverage: Opposite Side Probe Side

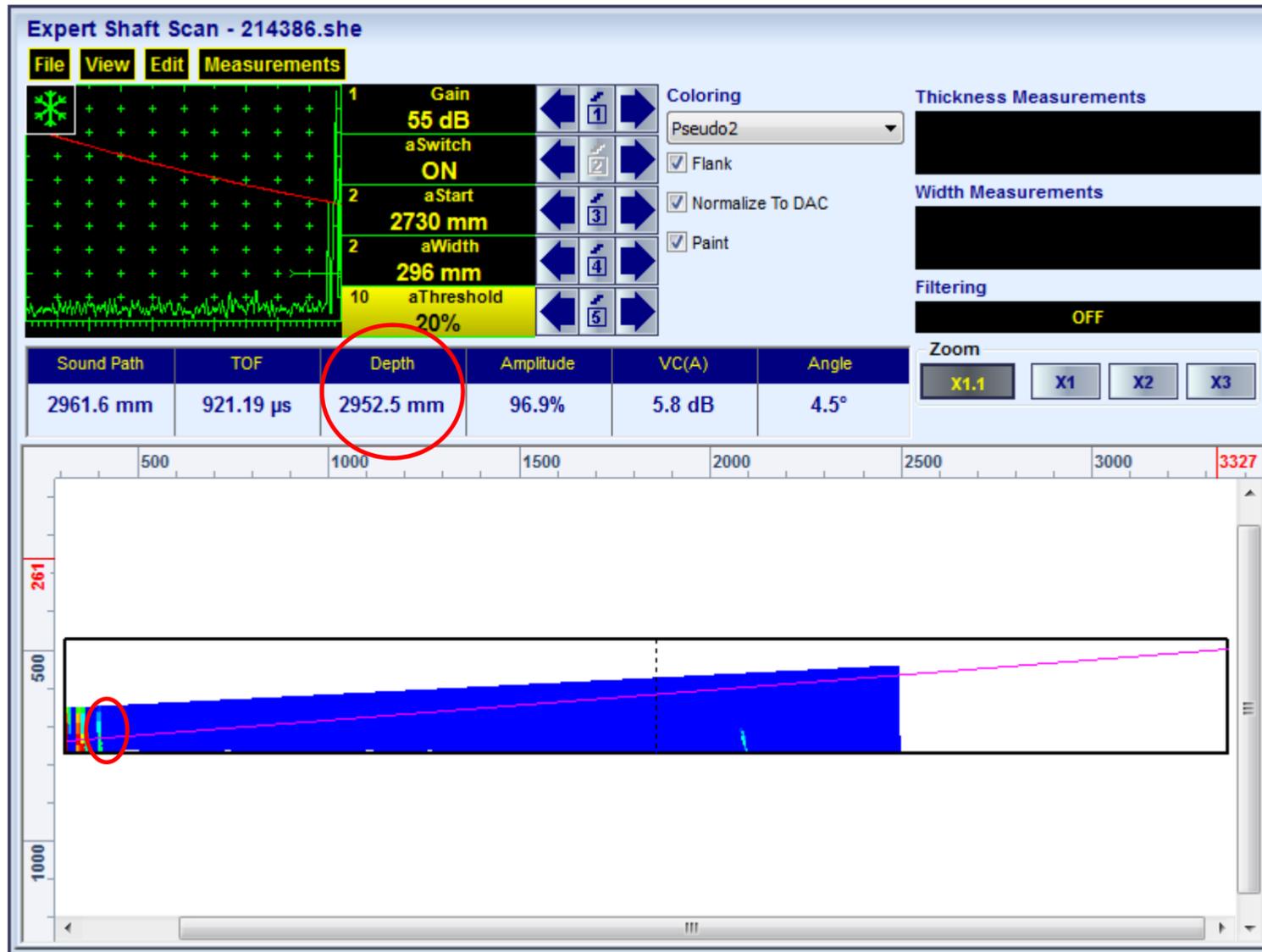
Buttons: Table, Edit, Back, Save, Open, Next





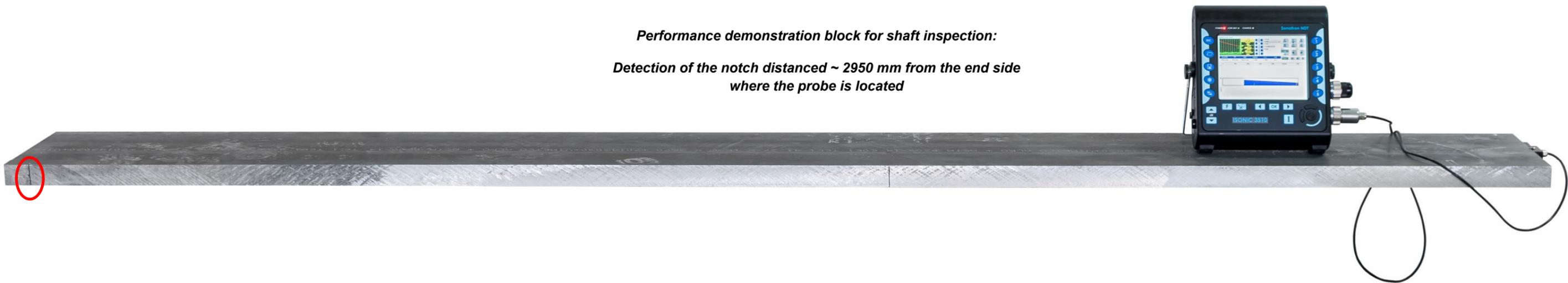
*Performance demonstration block for shaft inspection:
 Detection of the notch distanced ~ 1260 mm from the end side
 where the probe is located*

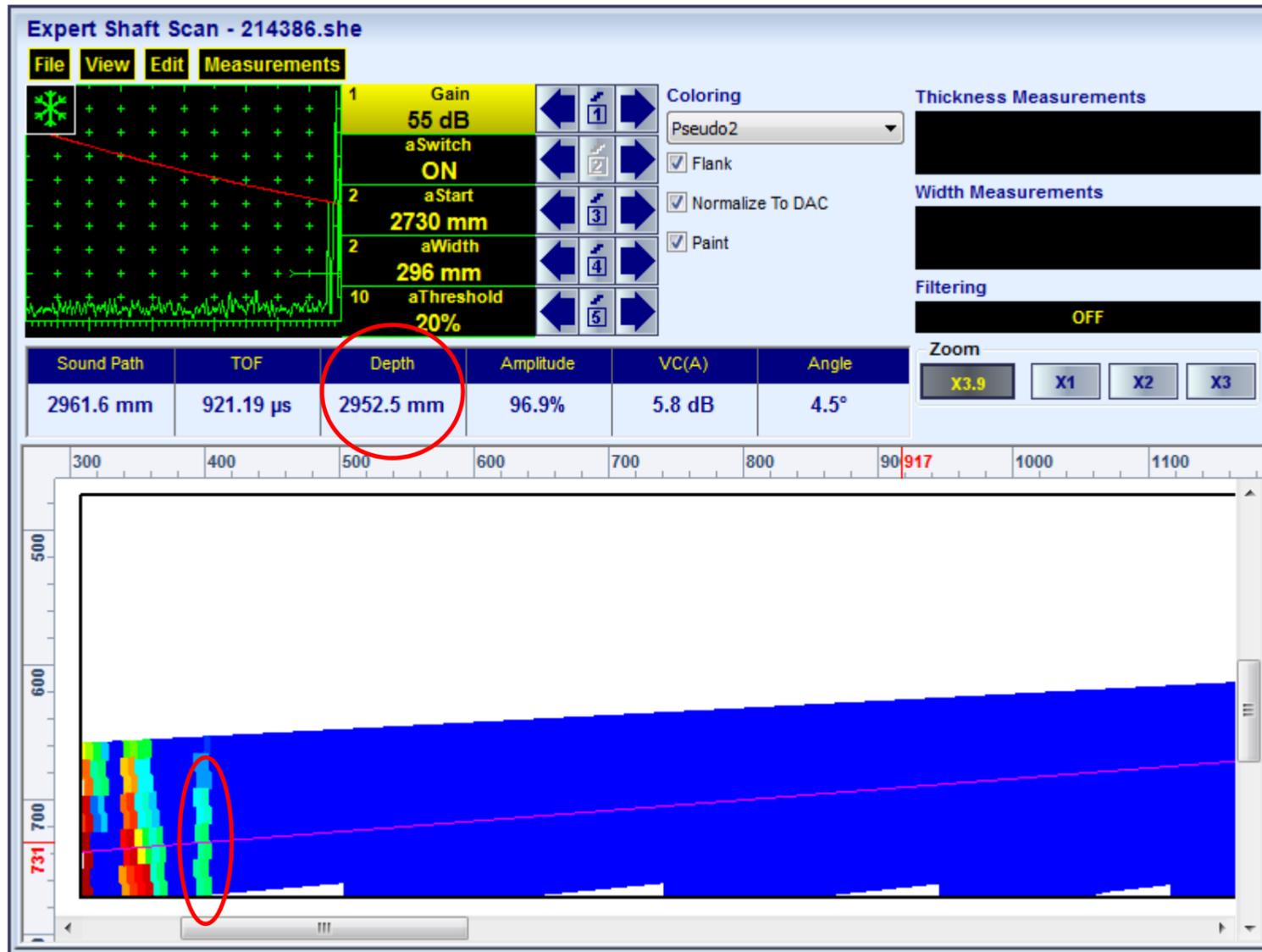




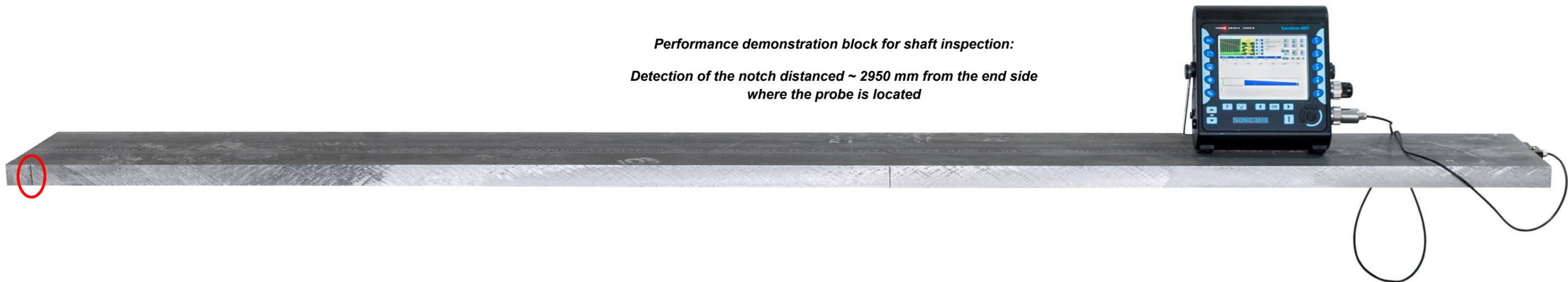
Performance demonstration block for shaft inspection:

Detection of the notch distanced ~ 2950 mm from the end side where the probe is located

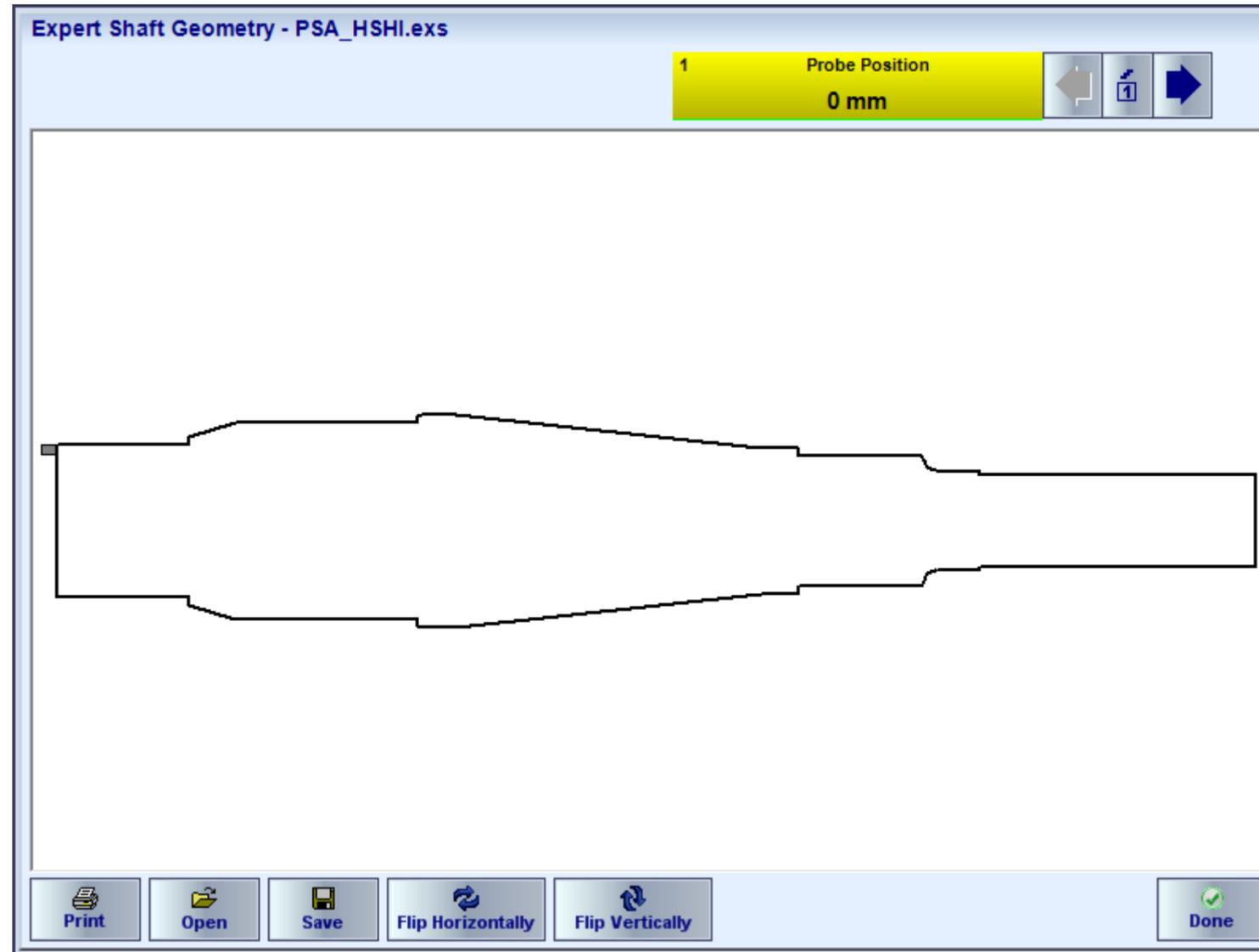




*Performance demonstration block for shaft inspection:
Detection of the notch distanced ~ 2950 mm from the end side
where the probe is located*



Shaft Geometry Entered into the Instrument from the CAD File



Expert Shaft Scan - REGION#1.she

File View Edit Measurements

Gain 53 dB
aSwitch ON
aStart 170 mm
aWidth 296 mm
aThreshold 40%

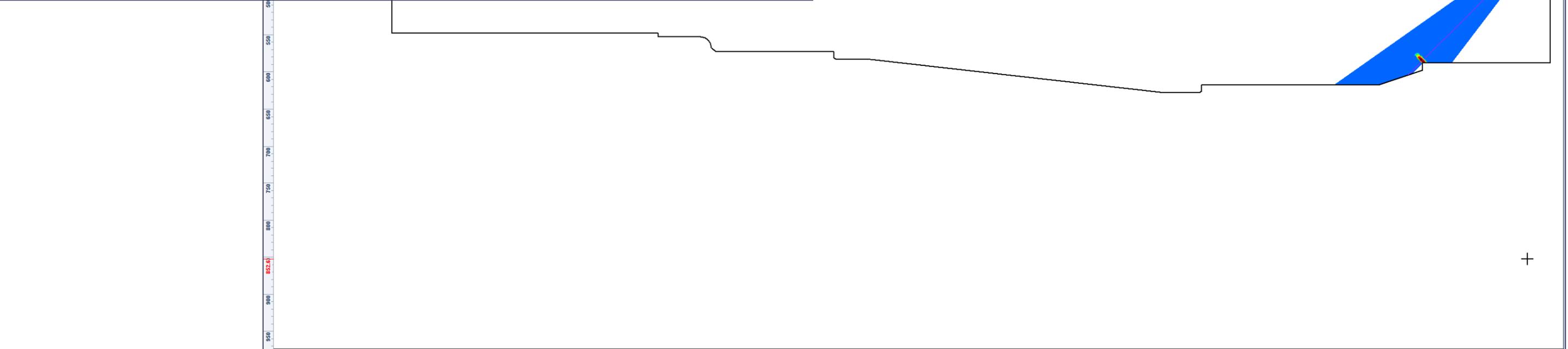
Coloring: Pseudo2
 Flank
 Normalize To DAC
 Paint

Thickness Measurements
 Width Measurements
 Filtering: OFF

Zoom: X1.0 X1 X2 X3

Sound Path	TOF	Depth	Amplitude	VC(A)	Angle
240.1 mm	75.03 μs	170.4 mm	> 130%	> 130%	44.8°

Scanning of the Region # 1



Expert Shaft Scan - REGION#2.she

File View Edit Measurements

1	Gain	60.5 dB	←	1	→
2	aSwitch	ON	←	2	→
2	aStart	690 mm	←	3	→
2	aWidth	296 mm	←	4	→
10	aThreshold	40%	←	5	→

Coloring
Pseudo2

Flank
 Normalize To DAC
 Paint

Thickness Measurements

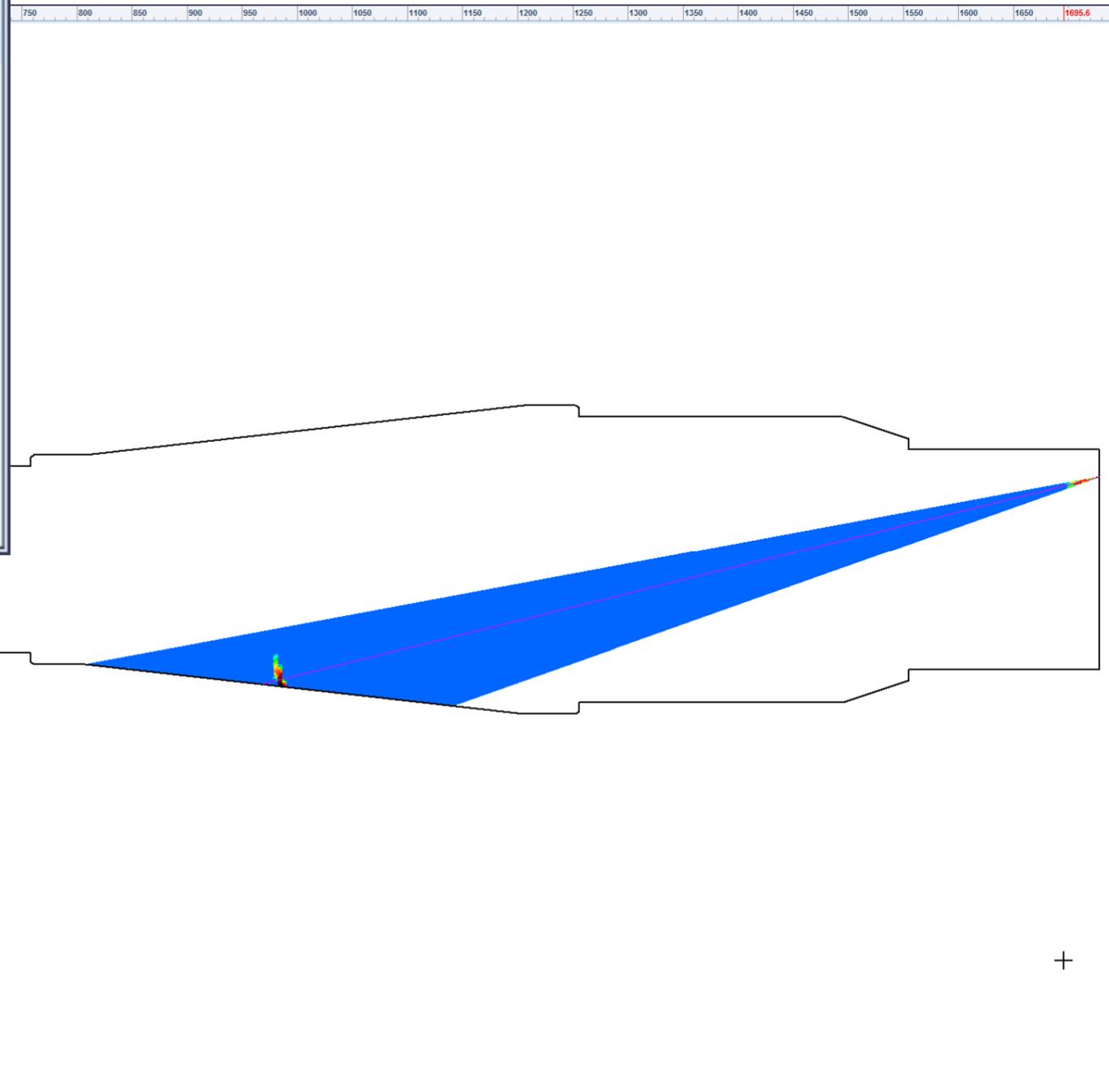
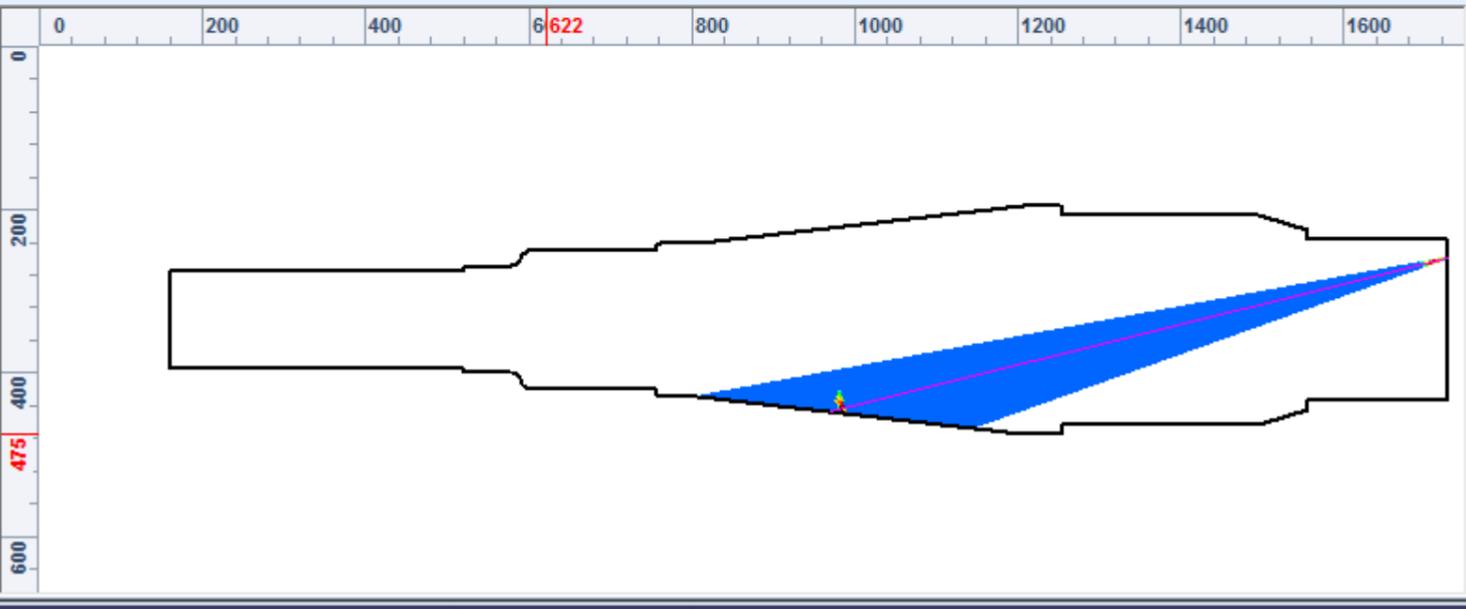
Width Measurements

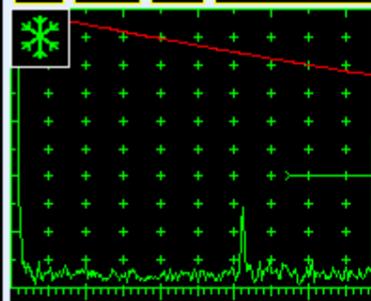
Filtering
OFF

Sound Path	TOF	Depth	Amplitude	VC(A)	Angle
763.3 mm	238.54 μs	741.0 mm	> 130%	> 130%	13.9°

Zoom
X1.0 X1 X2 X3

Scanning of the Region # 2





1	Gain	63.5 dB
	aSwitch	ON
2	aStart	910 mm
2	aWidth	296 mm
10	aThreshold	40%

Coloring
Pseudo2

Flank

Normalize To DAC

Paint

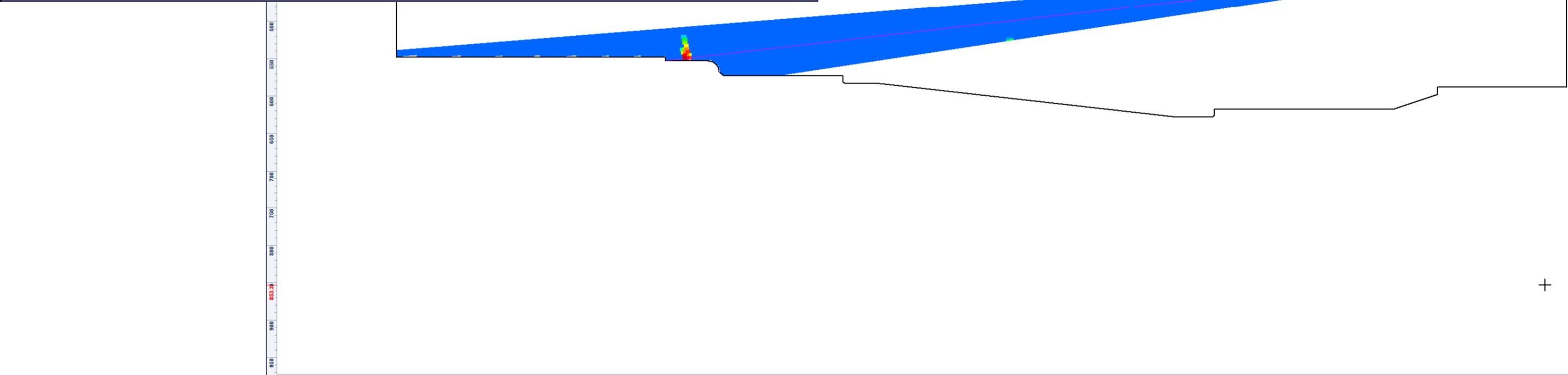
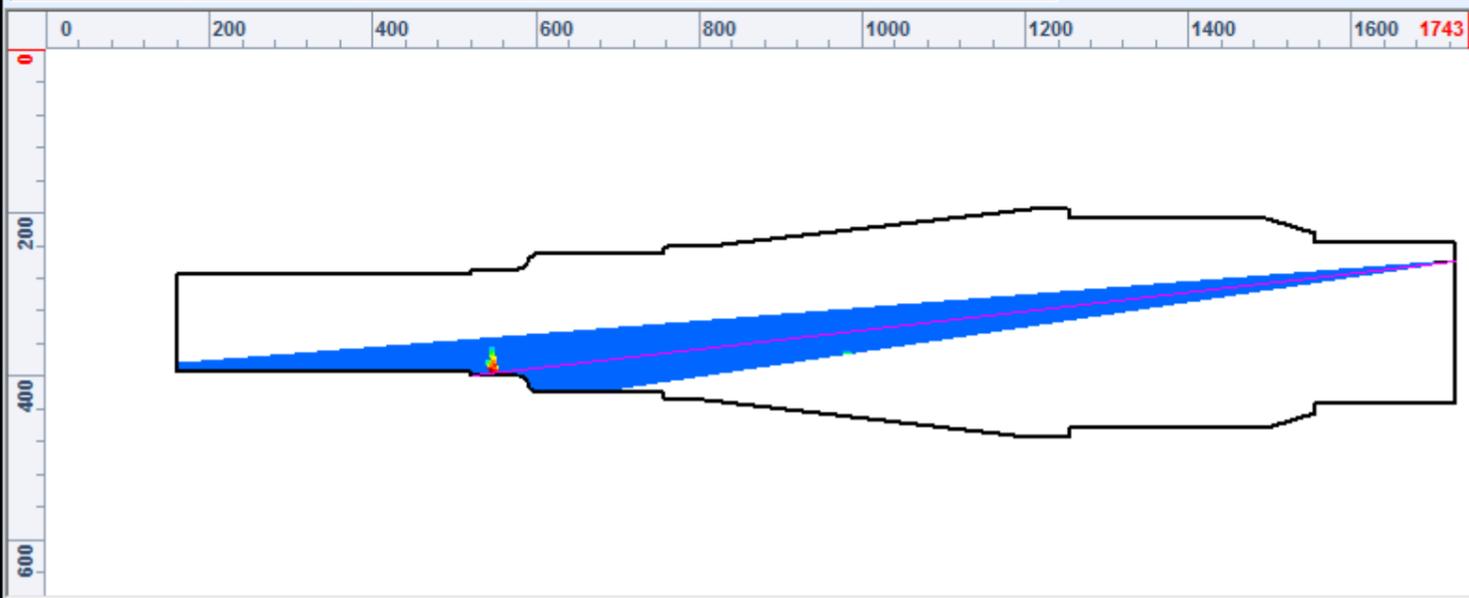
Thickness Measurements

Width Measurements

Filtering
OFF

Zoom
X1.0 X1 X2 X3

Sound Path	TOF	Depth	Amplitude	VC(A)	Angle
1191.7 mm	372.40 μs	1183.8 mm	122.5%	4.2 dB	6.6°



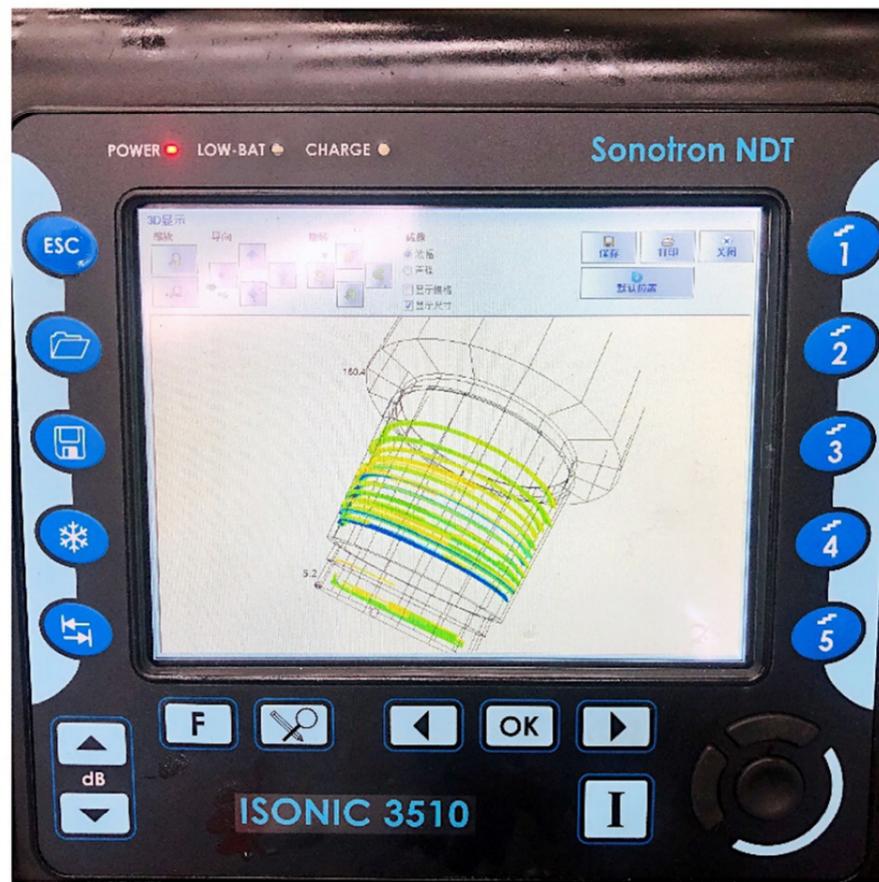
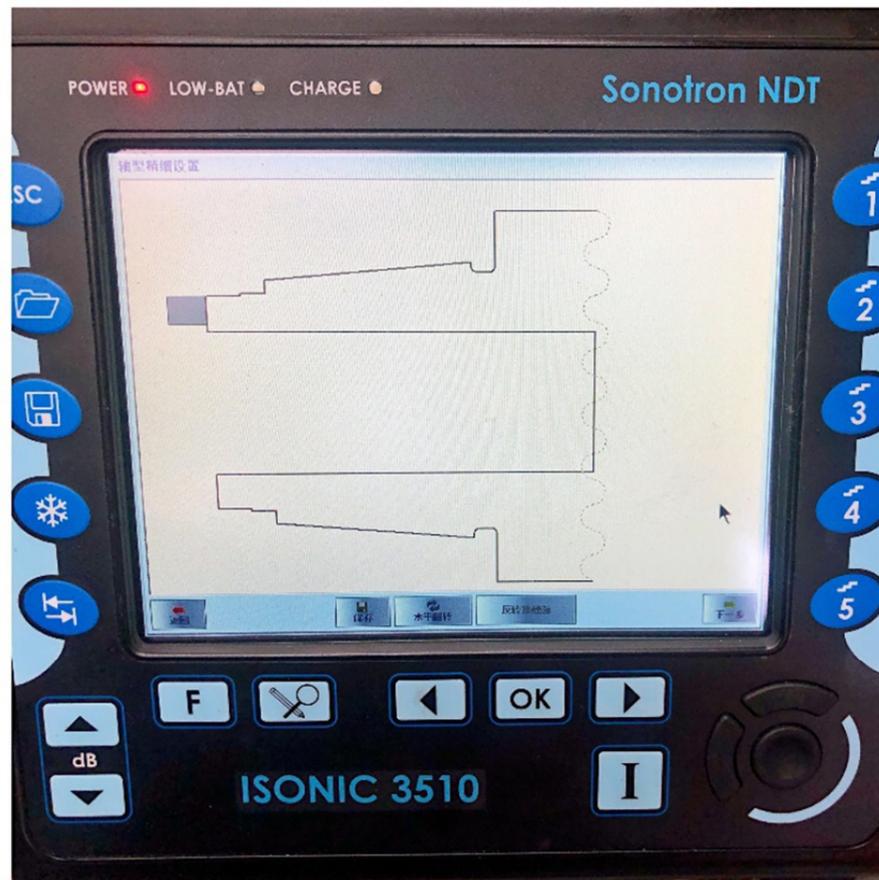
Scanning of the Region # 3

Encoded Scanning of the hollow shaft – calibration block



Encoded Scanning of the solid shaft – calibration block



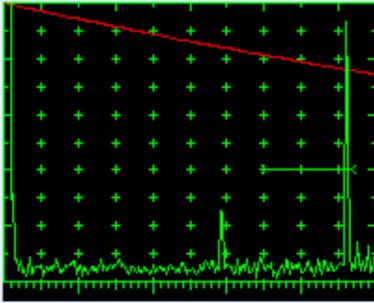


Inspection of the thread end area in the hollow shaft

Item	Order Code (Part #)
Inspection SW Application for ISONIC 3510T, ISONIC 3510 - PA Modality: Multi-Group D – Implementation of Several (up to 4) Linear Scan Insonification Schemes Simultaneously with Use of One Linear Array Probe with / without Delay Line	SWA 3510020
Inspection SW Application for ISONIC 2010 - PA Modality: Multi-Group D – Implementation of Several (up to 4) Linear Scan Insonification Schemes Simultaneously with Use of One Linear Array Probe with / without Delay Line	SWA 910820
Inspection SW Application for ISONIC 2009 UPA-Scope - PA Modality: Multi-Group D – Implementation of Several (up to 4) Linear Scan Insonification Schemes Simultaneously with Use of One Linear Array Probe with / without Delay Line	SWA 909820
<ul style="list-style-type: none"> → Multi-Group Cross Sectional Coverage - Built-In Intuitive Material Coverage Composer → Straight Beam and Inclined B-Scan (Linear Scan), and Combined Cross Sectional Coverage → DAC / TCG Normalization → Independent on TCG Gain Per Focal Law Correction → Encoded and Time Based Recording → 100% Raw Data Capturing → Automatic Creation of Editable Defects List for Each Group Scanning → Comprehensive Postprocessing Including: <ul style="list-style-type: none"> → Recovery and Evaluation of Captured A-Scans from the Recorded Cross Sectional Along the Shaft/Axle/Bolt/Spindle Views (Sector Scan) and C-Scans → Recovery of Cross Sectional Along the Shaft/Axle/Bolt/Spindle Views from the Recorded C-Scans → Converting Recorded C-Scans or their Segments into 3D Images → Off-Line Gain Manipulation → Off-Line DAC to TCG / TCG to DAC toggling for all types of stored files (A-Scans, cross-sectional views, C-Scans, etc) → Off-Line DAC Normalization of the Recorded Images / DAC Evaluation → Off-Line editing of Angle Gain Compensation / Gain per Shot Correction applied to the stored the Cross-sectional Views / C-Scan data → Numerous Filtering / Reject Options (by Geometry / Position / By Amplitude / dB-to-DAC / etc) → Defects Sizing → Generating of Defect List and Storing it Into a Separate File → Automatic creating of inspection reports - hard copy / PDF File 	

MULTIGROUP_D – Scanning of 3 regions of the shaft simultaneously

Multi Group Scan View - MGROUP.mgd



aSwitch	ON	←	→
2 aStart	910 mm	←	→
2 aWidth	296 mm	←	→
10 aThreshold	40%	←	→

Sound Path	1187.3 mm
TOF	371.04 μs
Depth	1180.8 mm
Amplitude	92.8%
VC(A)	1.7 dB
Angle	6.0°

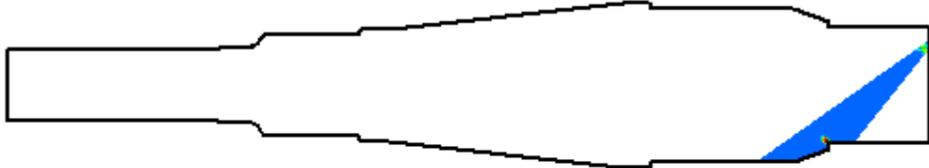
Flip

Print All

Save All

Coloring: Pseudo2

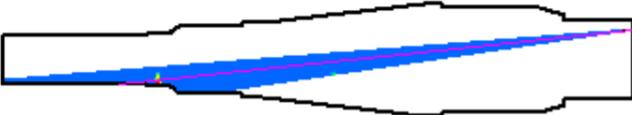
Flank Normalize To DAC



REGION#1.she



REGION#2.she

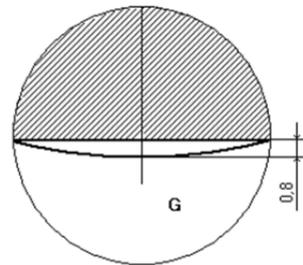
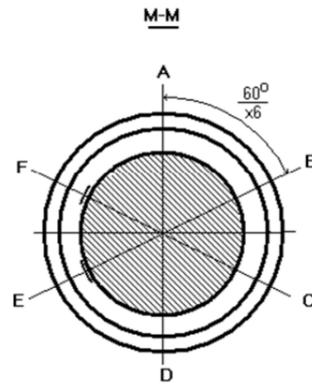
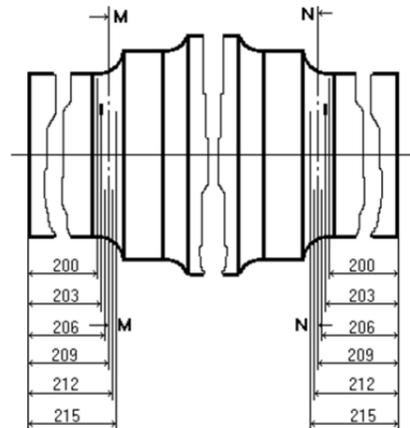
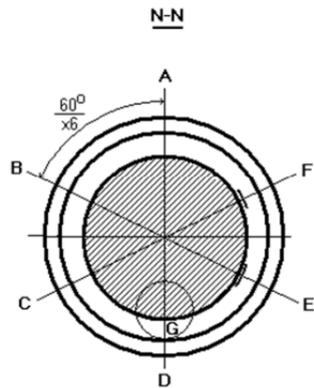
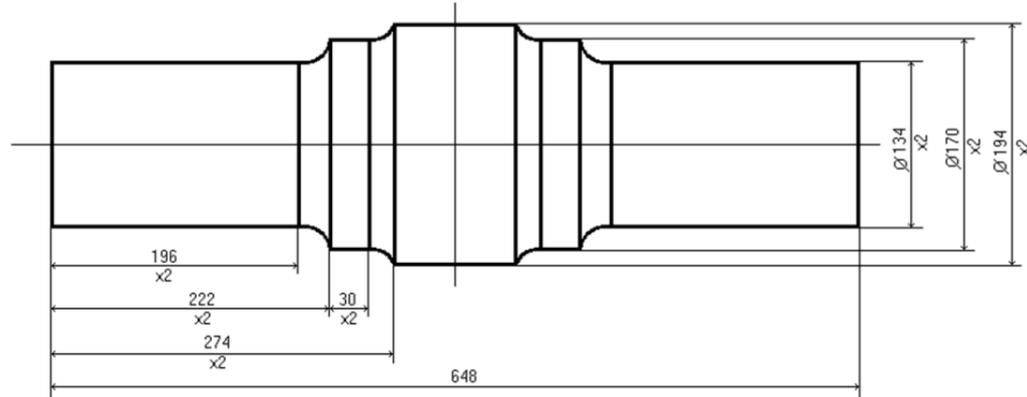


REGION#3.she

← Back

**On the next 7 pages there are presented the results of
International Case Study for the Detection and Precision of
Imaging of the Small Defects in the Journal to Dust Guard Radius**

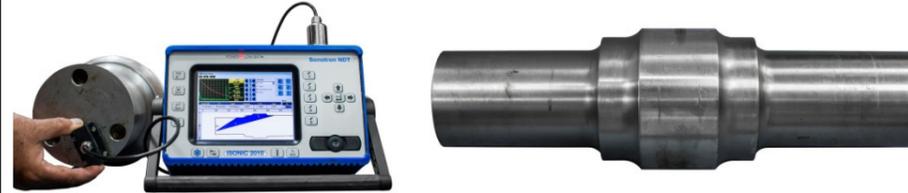
Dimensioned sketch of the shaft sample and notches in the journal to dust guard radius (6 at each side)
 Образмеренный эскиз образца оси с пропилами в галтельном переходе между шейкой и предподступицей (по 6 пропилов с каждой стороны)



N-N			
Cuts	Width	Depth	Location
A	0.2mm	0.2 mm	200
B	0.2mm	0.4 mm	203
C	0.2mm	0.5 mm	206
D	0.2mm	0.8 mm	209
E	0.2mm	1.0 mm	212
F	0.2mm	1.2 mm	215

M-M			
Cuts	Width	Depth	Location
A	0.2mm	0.5mm	200
B	0.2mm	0.8mm	203
C	0.2mm	1.0mm	206
D	0.2mm	0.5mm	209
E	0.2mm	0.2mm	212
F	0.2mm	0.5mm	215

Shaft Sample and placement of the PA probe (Образец и расположение ФР-преобразователя при обнаружении пропилов)



File naming policy (наименование файлов):

X_Y.sbx – cross-view along the shaft (sectorial scan) for the cut **X** (A through F) at the side **Y** (M or N) of the sample with the recovery of the maximal echo A-Scan from the plurality of A-Scans composing the image and the corresponding beam trace

X_Y_DEPTH.sbx – cross-view along the shaft (sectorial scan) for the cut **X** (A through F) at the side **Y** (M or N) of the sample with the recovery of the cut root echo A-Scan used for the determining of the distance between the cut and shaft end

File naming policy (наименование файлов):

X_Y.sbx – разрез вдоль оси (сектор скан) для пропила **X** (A ... F) со стороны **Y** (M или N) образца с отображением А-Скана, содержащего максимальный эхо-сигнал, выбранного из совокупности А-Сканов, формирующих изображение, и соответствующего хода по лучу

X_Y_DEPTH.sbx – разрез вдоль оси (сектор скан) для пропила **X** (A ... F) со стороны **Y** (M или N) образца с отображением А-Скана, содержащего эхо-сигнал от корня пропила, используемого для определения расстояния от пропила до торца

Insonification has been performed through the beam steering whilst the focal point travels along the outer surface of the shaft

Прозвучивание осуществляется способом качающегося луча, причем фокальная точка перемещается вдоль внешней поверхности оси

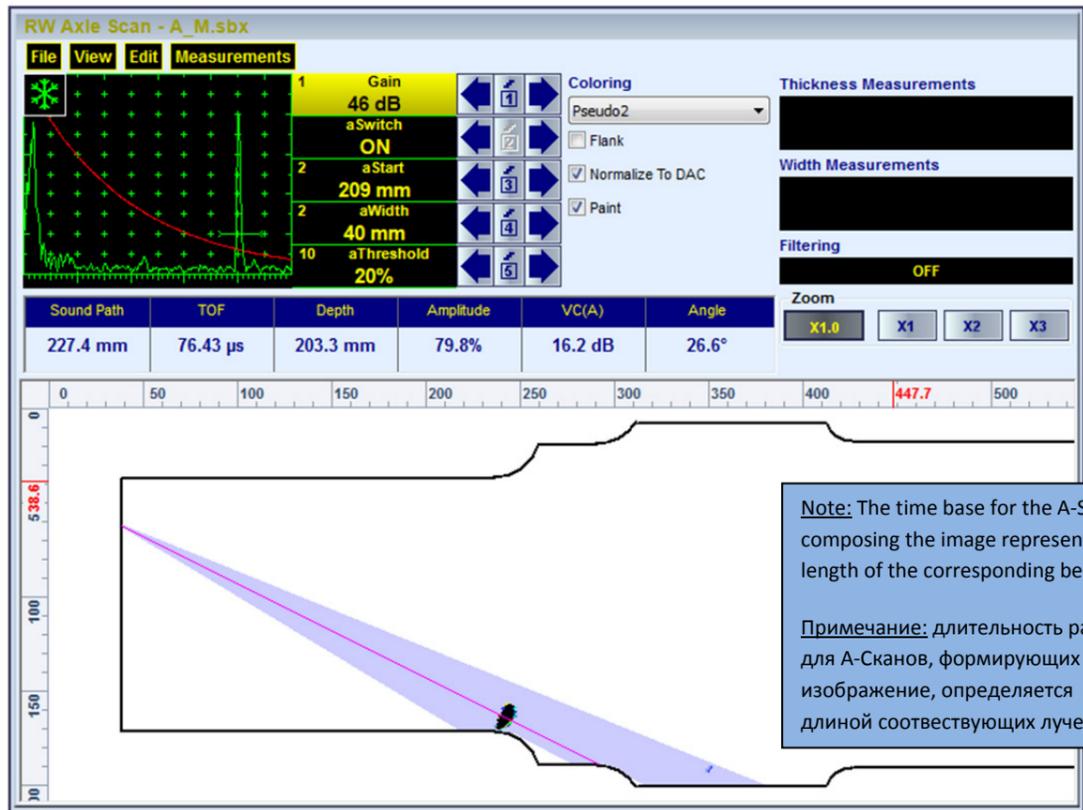
The following PA probe was used / Применялся нижеуказанный ФР преобразователь:

PA-5M32E1P - LINEAR ARRAY PROBE / ЛИНЕЙНАЯ РЕШЕТКА
 Frequency / Частота: **5 MHz**
 Pitch Size / Шаг решетки (размер элемента): **1 mm**
 Number of Elements / Количество элементов: **32**
 Elevation / Ширина: **10 mm**

Sonotron NDT part #
 Sonotron NDT артикул:
 S 4922214381

The aperture composed of all 32 elements was received for the emitting / receiving whilst performing pulse echo sectorial scan coverage (Апертура излучения / приема, состоящая из всех 32 элементов, применялась для реализации прозвучивания способом качающегося луча)

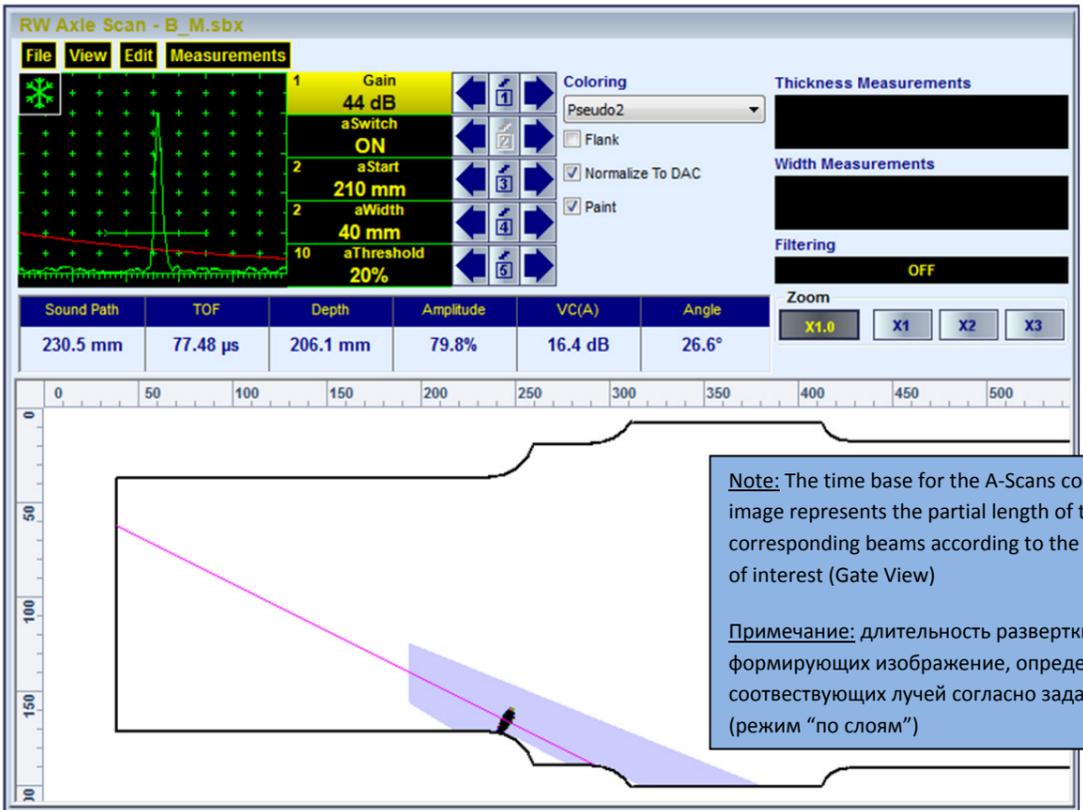
A_M.sbx



Note: The time base for the A-Scans composing the image represents full length of the corresponding beams

Примечание: длительность развертки для А-Сканов, формирующих изображение, определяется полной длиной соответствующих лучей

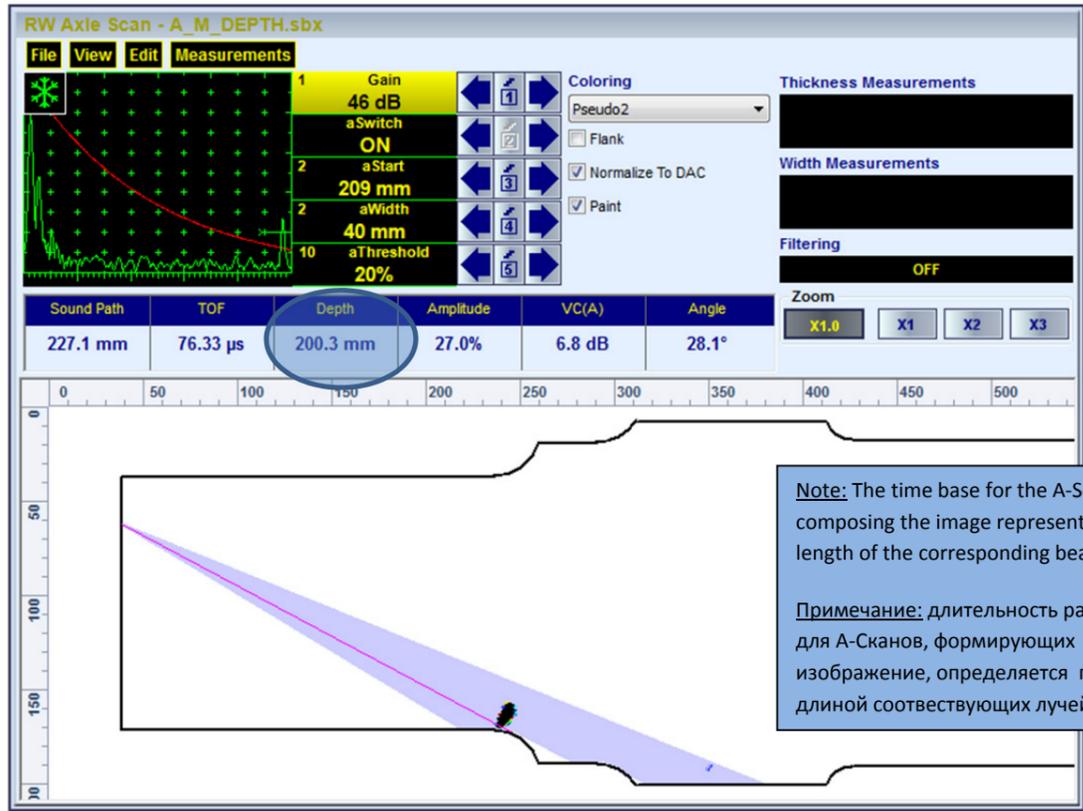
B_M.sbx



Note: The time base for the A-Scans composing the image represents the partial length of the corresponding beams according to the desired region of interest (Gate View)

Примечание: длительность развертки для А-Сканов, формирующих изображение, определяется длиной соответствующих лучей согласно заданному "слою" (режим "по слоям")

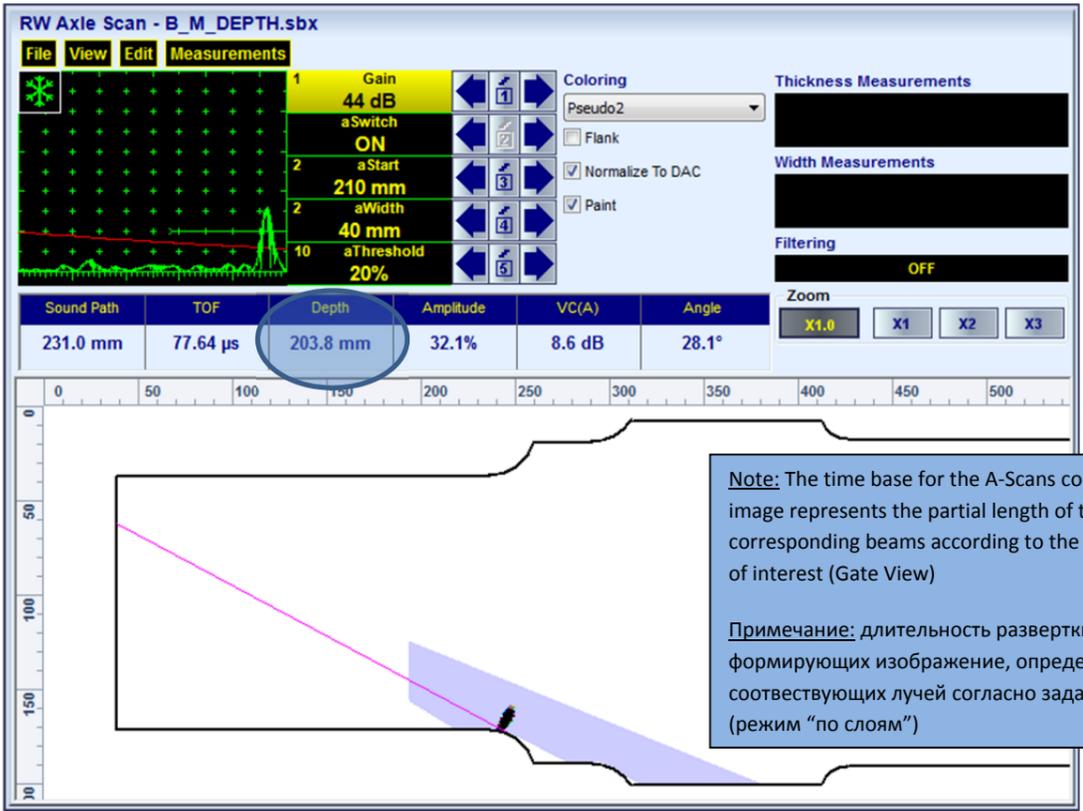
A_M_DEPTH.sbx



Note: The time base for the A-Scans composing the image represents full length of the corresponding beams

Примечание: длительность развертки для А-Сканов, формирующих изображение, определяется полной длиной соответствующих лучей

B_M_DEPTH.sbx



Note: The time base for the A-Scans composing the image represents the partial length of the corresponding beams according to the desired region of interest (Gate View)

Примечание: длительность развертки для А-Сканов, формирующих изображение, определяется длиной соответствующих лучей согласно заданному "слою" (режим "по слоям")

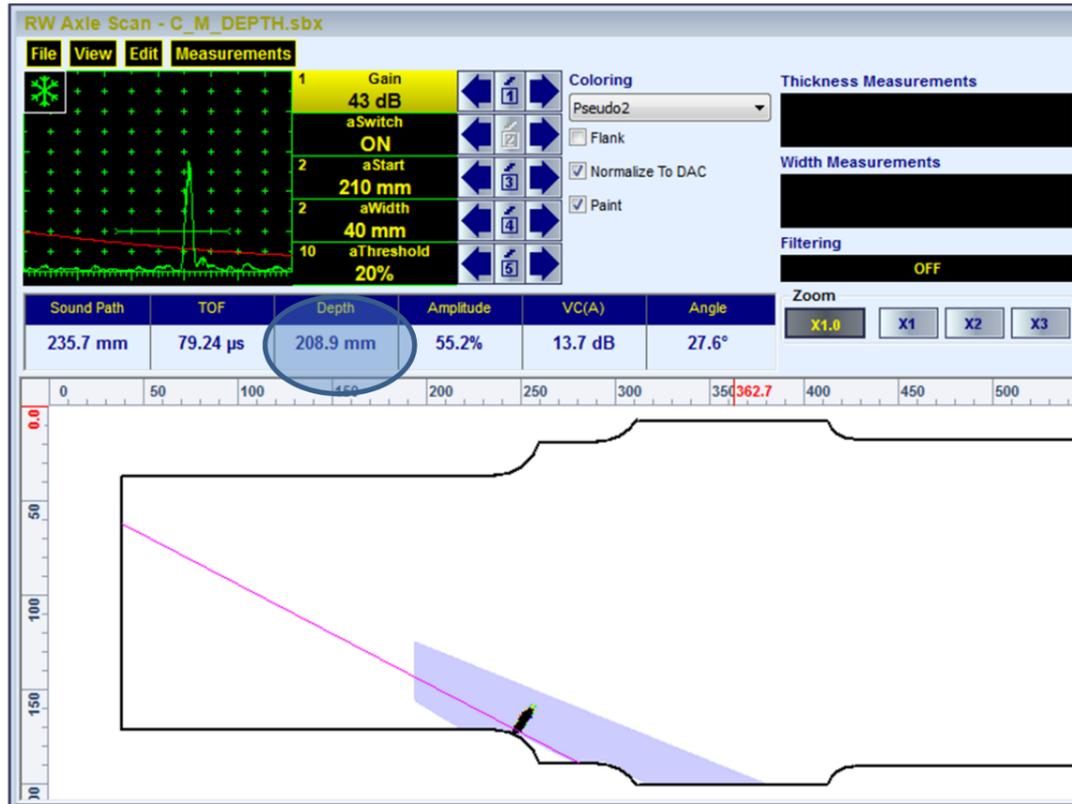
C_M.sbx



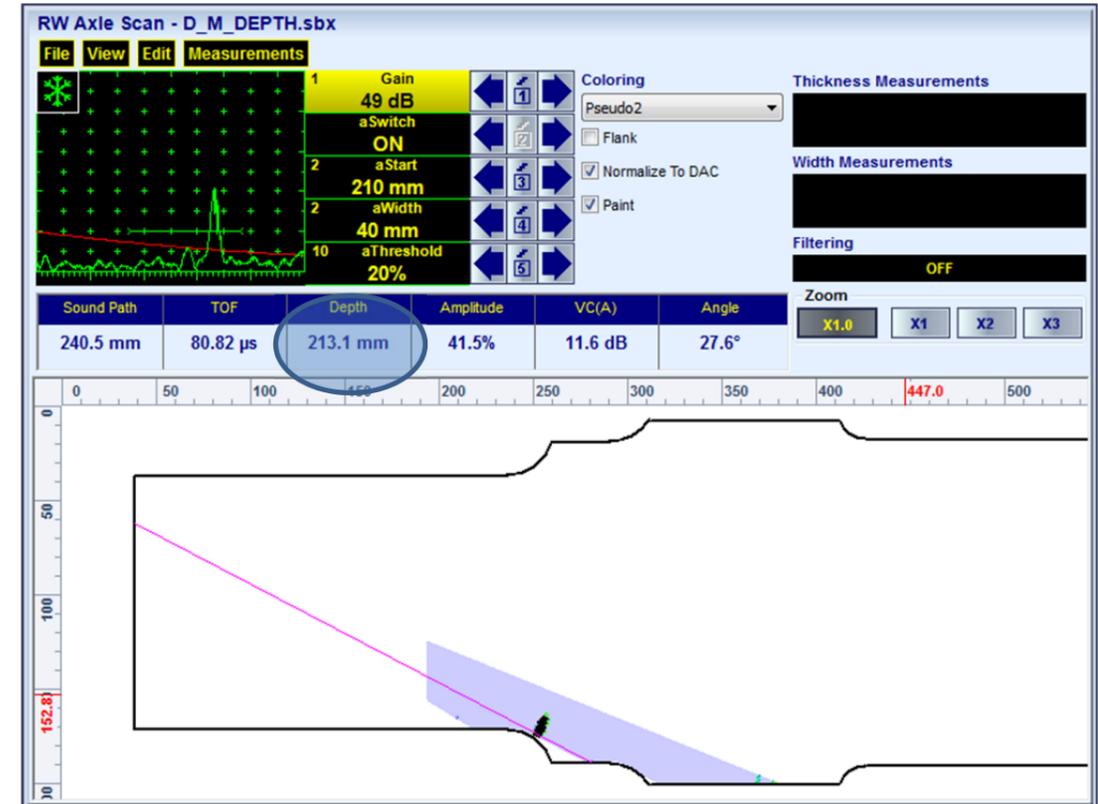
D_M.sbx



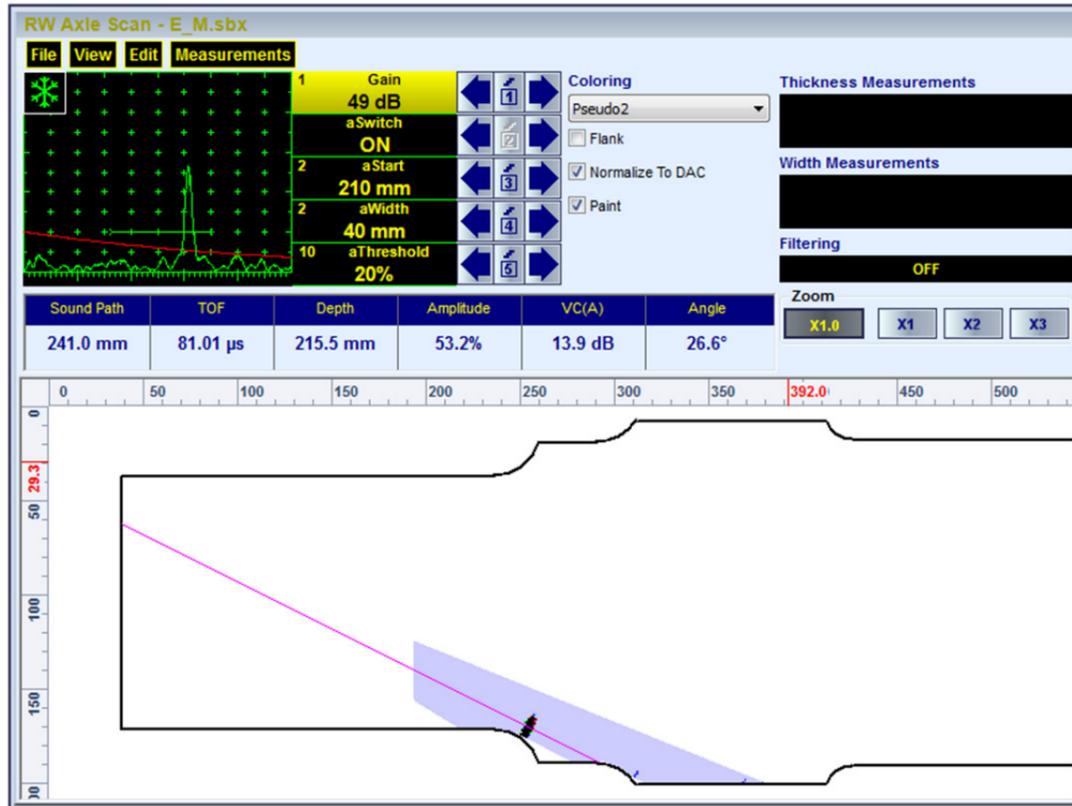
C_M_DEPTH.sbx



D_M_DEPTH.sbx



E_M.sbx



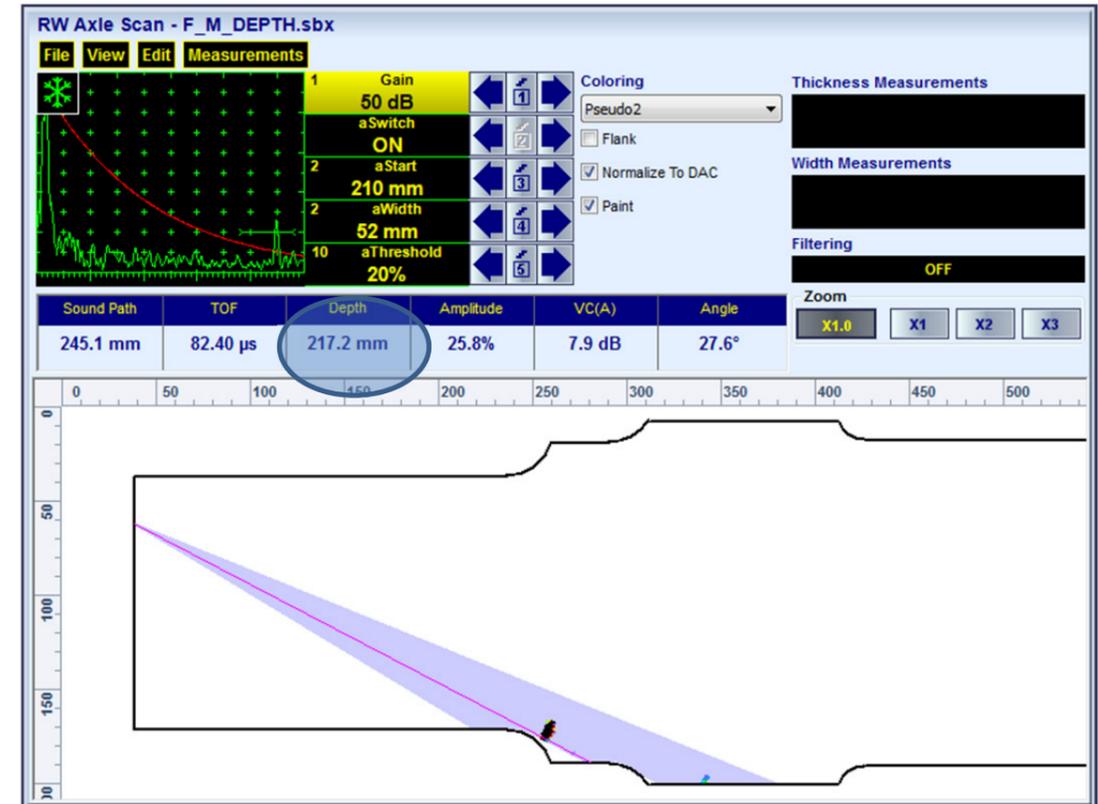
F_M.sbx



E_M_DEPTH.sbx



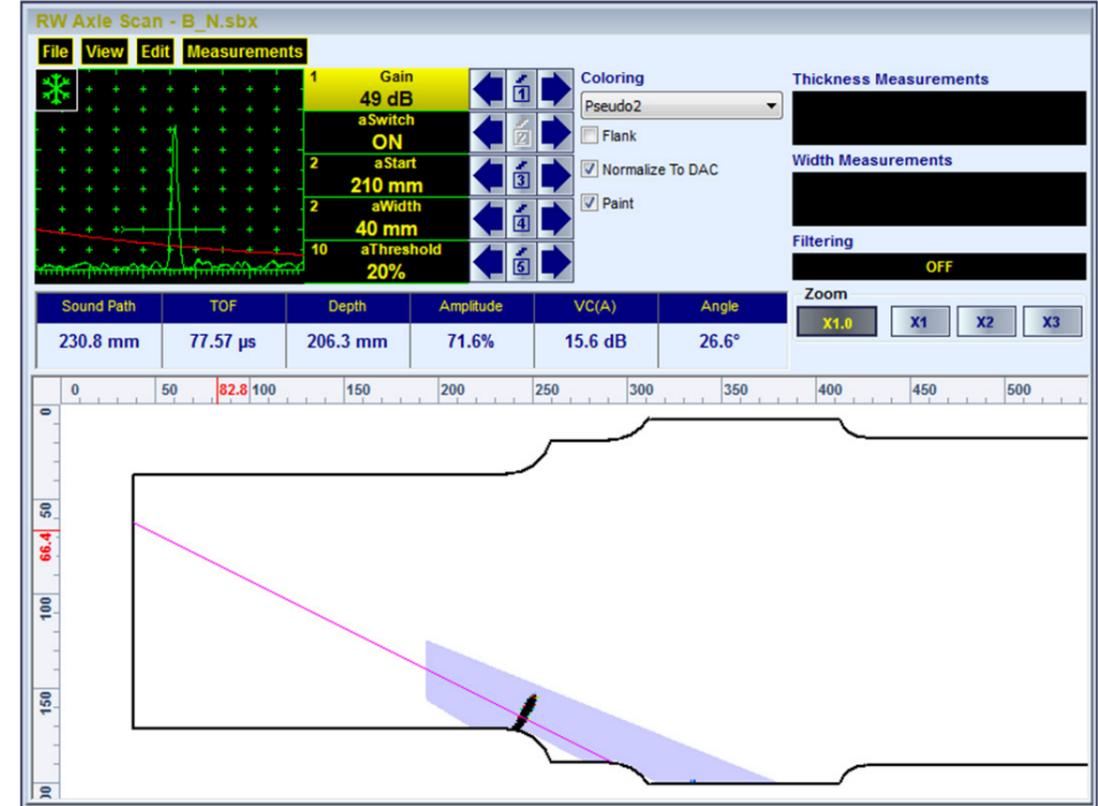
F_M_DEPTH.sbx



A N.sbx



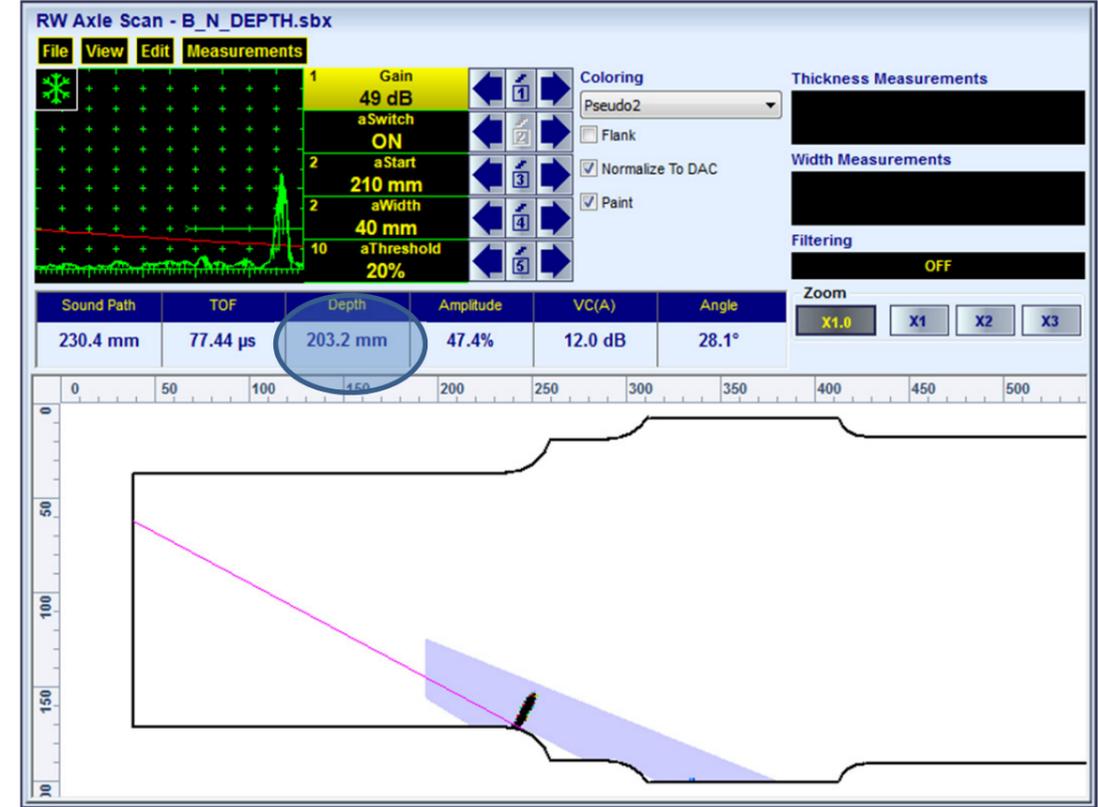
B N.sbx



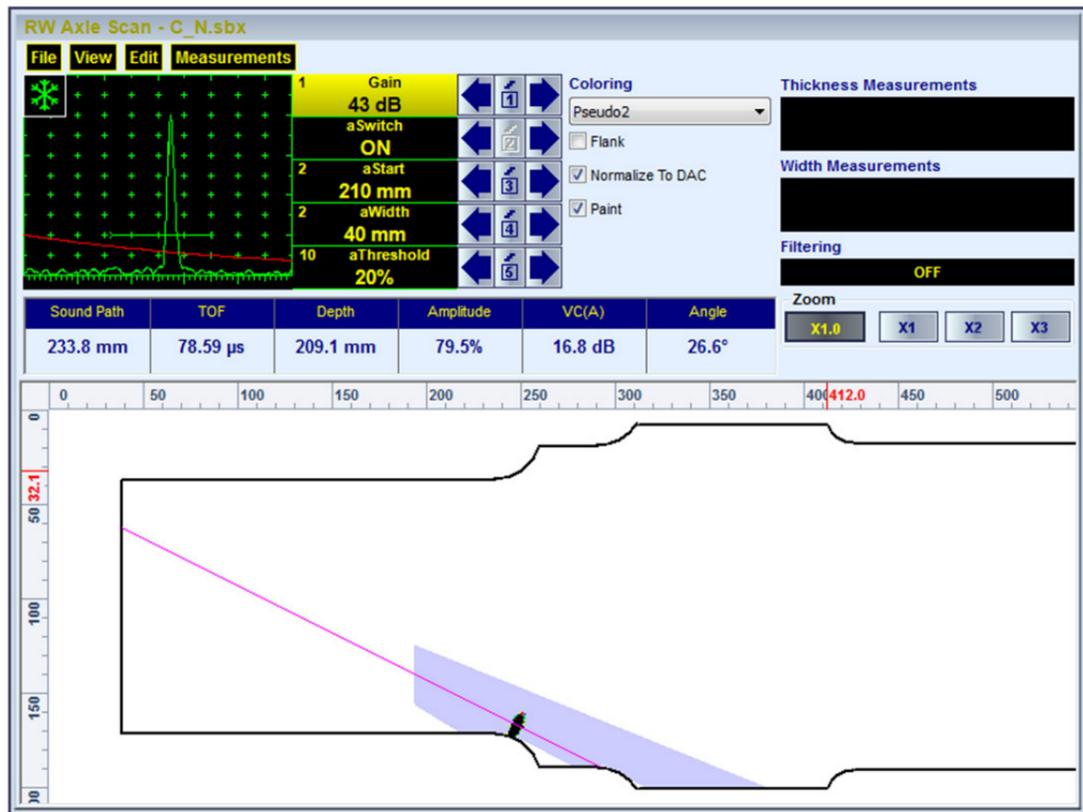
A_N_DEPTH.sbx



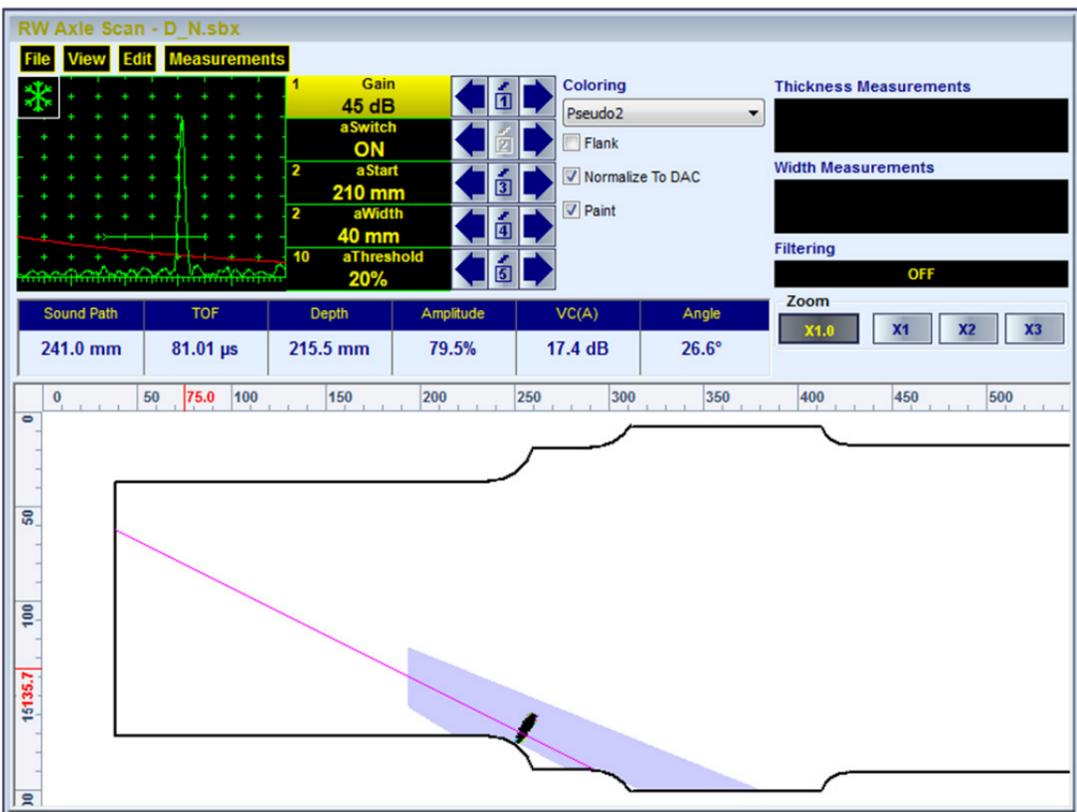
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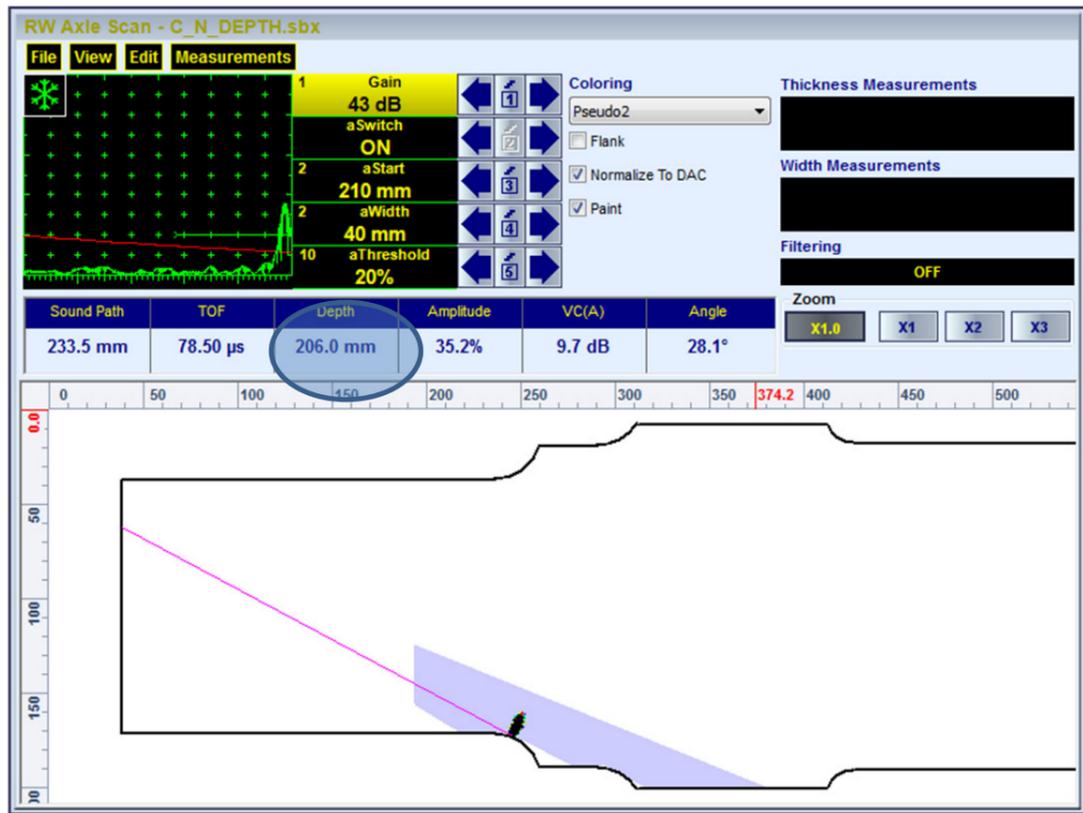
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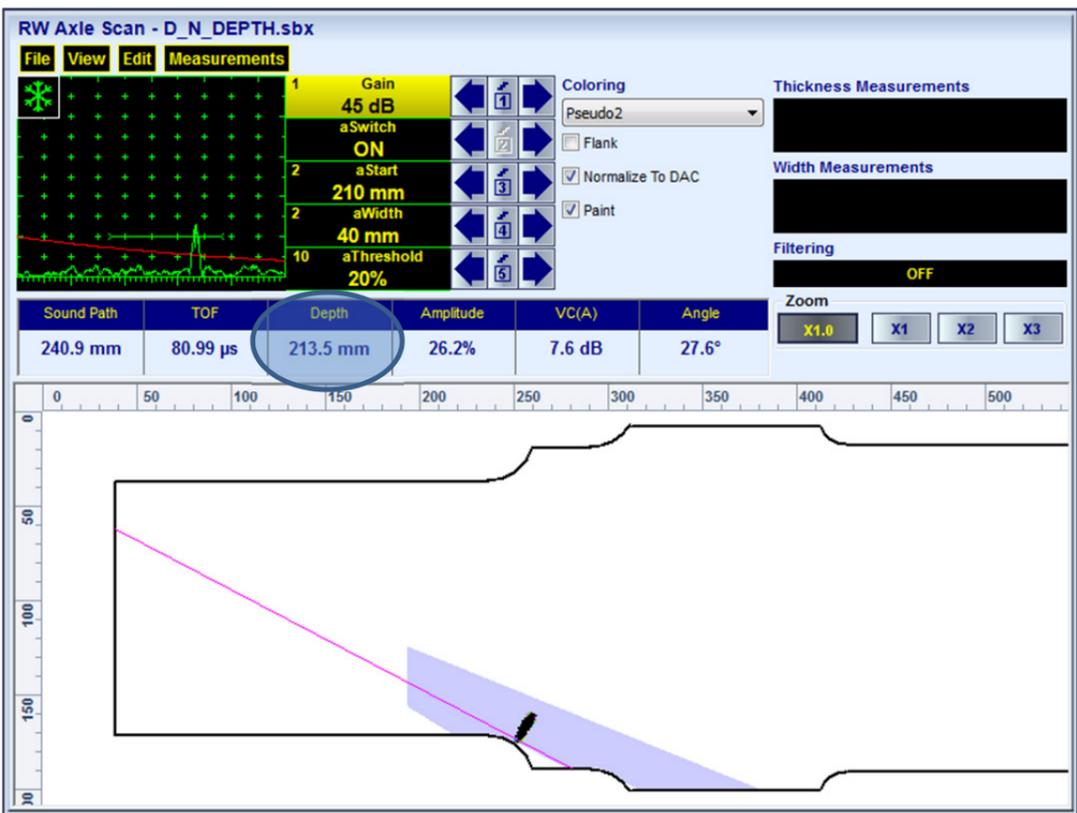
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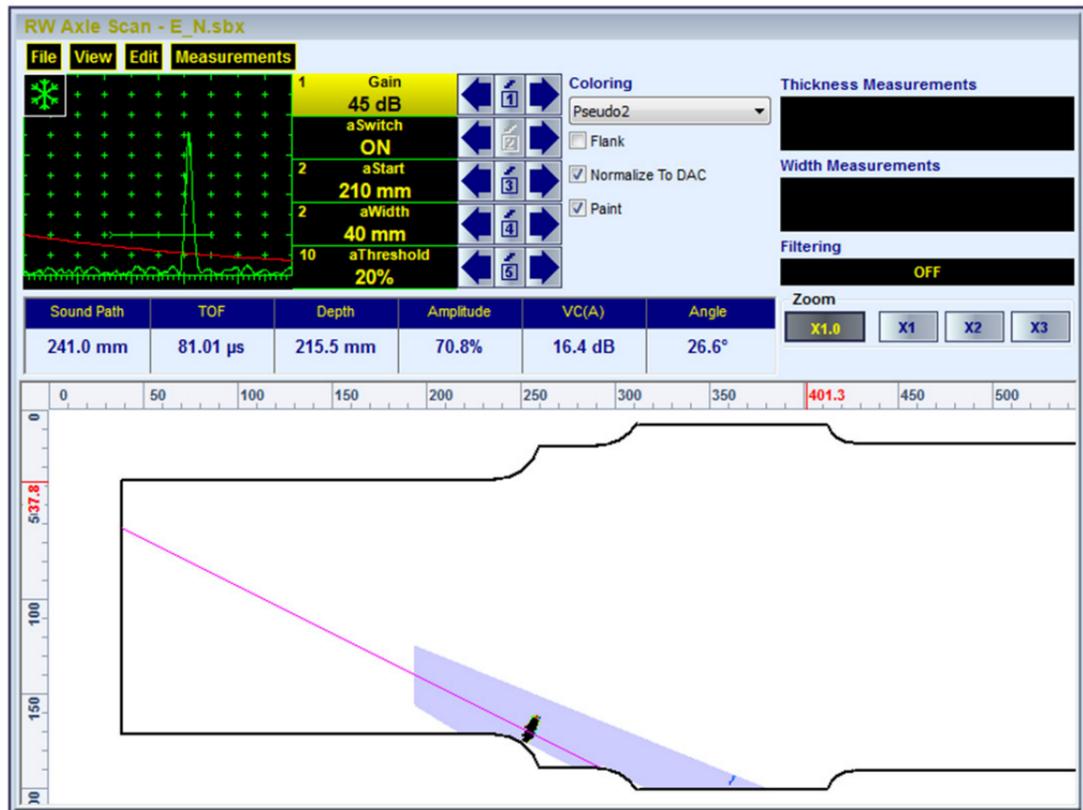
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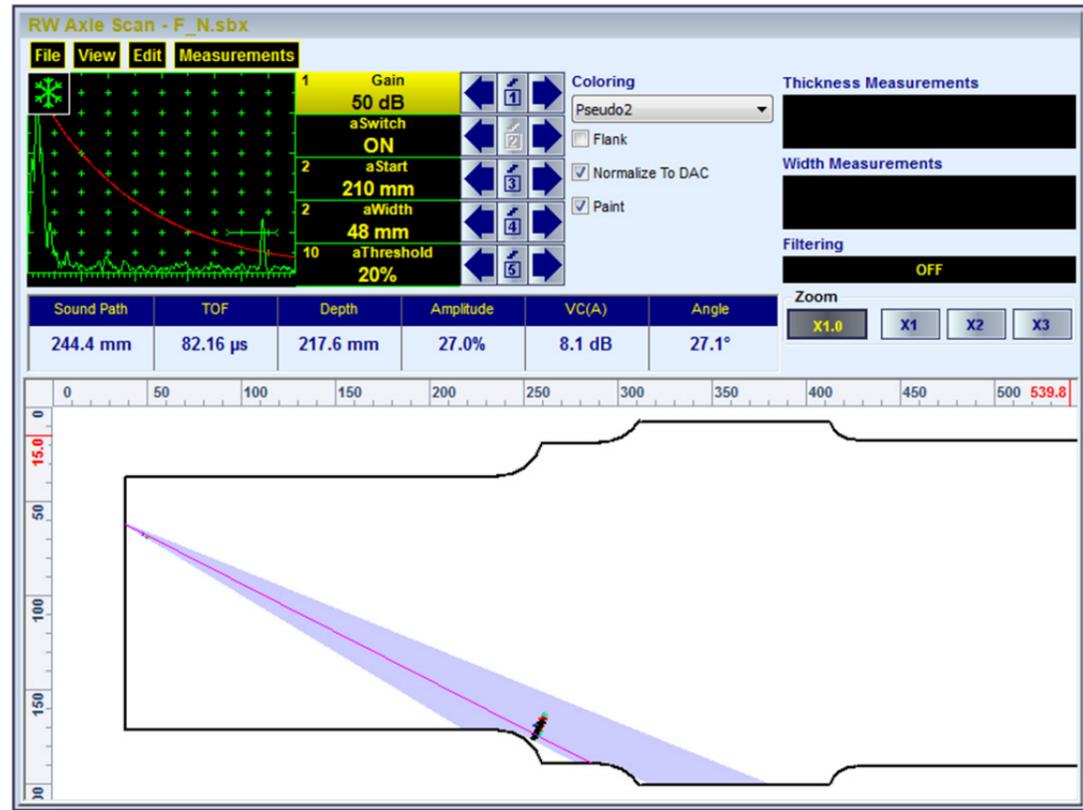
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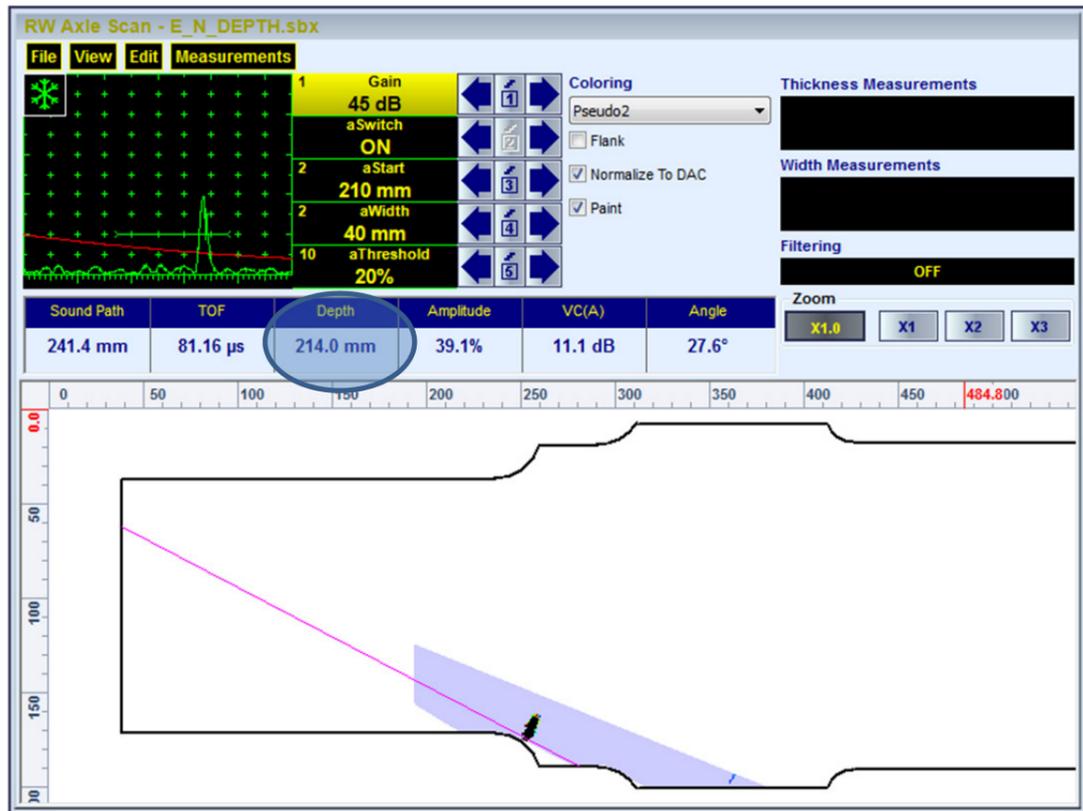
E_N.sbx



F_N.sbx



E_N_DEPTH.sbx



F_N_DEPTH.sbx

