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HydroFORM Phased Array Corrosion Mapping System Part 3 – Omniscan Setup and Acquisition

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HydroFORM System – Omniscan Setup

- Omniscan MXU set up for the HydroFORM system requires completing the following tasks:
 - Loading the default Setup file “HydroFORM.opd.
 - Configure the Part thickness.
 - Configuring the UT parameters.
 - Configuring Range.
 - Configuring Gate Positions and Gate Modes.
 - Configuring Point Quantity.
 - Configuring TCG.
 - Configuring the Omniscan Displays.
 - Configuring Displays for Setup and Inspection.
 - Configuring Relevant Readings.
 - Configuring Color Palette.
 - Configuring Thickness Range.
 - Configuring the Scan Parameters for the Inspection.
 - Configuring Encoders.
 - Configuring the C-scan Area.
 - Name the data file and start the inspection.

HydroFORM System – Omniscan Setup - Default File

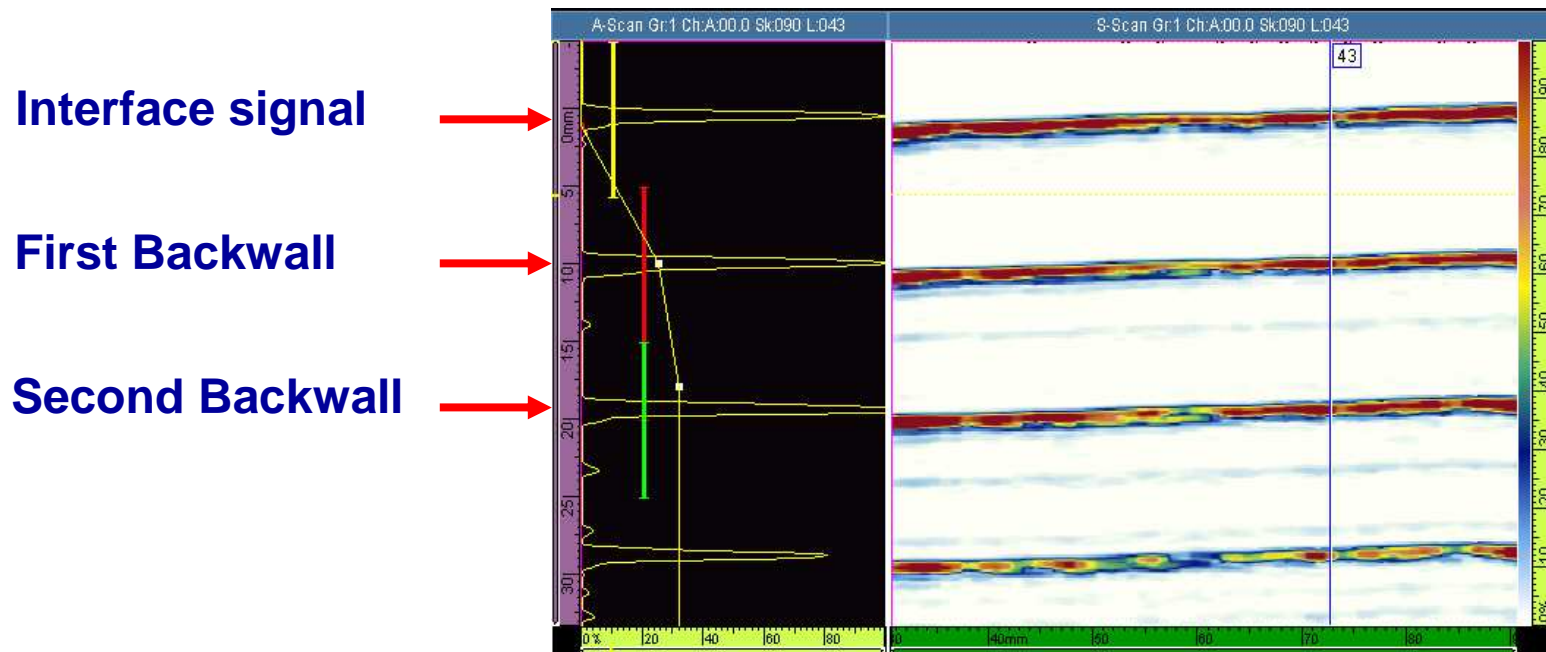
- ◆ The latest version of the default Hydro.opd file will always be available on the ONDT Extranet. If creating a set up from the Group Wizard use parameters below:
- ◆ Basic Focal Law configuration
 - Focal Law Config = Linear at 0 degree
 - Aperture = Element qty 4, Start element 1, Last element 64, Element step 1
 - Beam = Min Angle 0, Focal depth 4mm
- ◆ UT Configuration
 - Pulser TX/RX mode PE, Freq 7.5MHz, Voltage 45V, PW Auto, PRF Optimum
 - RX Filter 7.5MHz, Video Filter On, Averaging 1, Reject 0%.
- ◆ Scan Configuration
 - Probe Position Index Offset = 30.5mm (For 0,0 at indicated position on template)

HydroFORM System – Omniscan Setup - Default File

- The HydroFORM Corrosion Mapping System requires Omniscan MXU software version 2.0R20 or later.
- This instructional Power Point assumes that the operator has basic phased array training, is familiar with the Omniscan user interface, and has a basic understanding of corrosion mapping applications. It is not intended to be an A-Z for a new Omniscan user.
- Included in this version are specific features for C-scan compression, Readings related to corrosion mapping, modified color palette behavior, updated probe and wedge database to include the 7.5L64 probe and Hydro wedge.
- Also included in the software version is the default HydroFORM file that includes the focal laws. (4 element aperture X 61 laws, 4mm focal depth, Linear 0 mode).
- Load the default file “HydroFORM.opd and ensure that the probe was automatically detected or manually selected and that the Hydro wedge is selected.
- In the Part menu, enter the nominal thickness of the component.

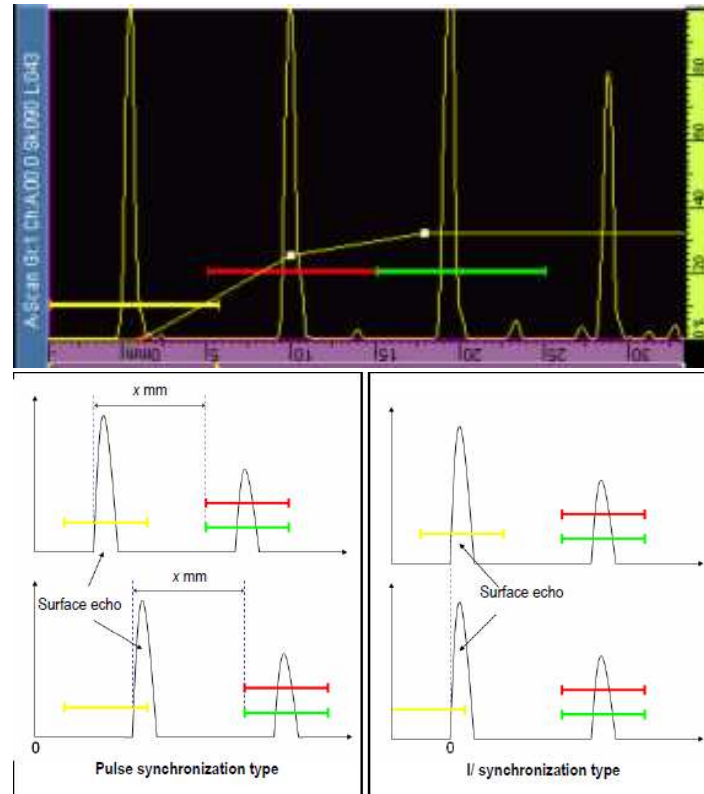
HydroFORM System – Omniscan Setup – Range\dB

- Flood the water chamber and clear the bubbles.
- Set the UT Range Start to -10mm so the complete interface signal is visible
- Set the UT Stop to 3-4 times the thickness.
- The first signal visible in the A-scan is the interface signal between the water column → and the pipe.
- Successive back wall signals should also be visible.
- With 0 dB the interface signal should still be saturated (Over 100%) If required increase gain until interface signal is 100%.



HydroFORM System – Gate Logic and Readings Modes

- ◆ This Power Point is designed to provide a basic 0 degree inspection using I/ Synchronization type logic for internal corrosion monitoring which is the most common application for this system.
- ◆ The Readings mode in the examples and screen shots is measuring the thickness of the data point based on gate A leading edge (A/) minus floating gate I leading edge (A/ - I/).
- ◆ Optimizing the HydroFORM system for external and internal corrosion under different conditions requires a complete understanding of the Readings modes and gate logic configuration for I, A, and B gates and ability to manipulate thickness readings for different conditions.
- ◆ See Omniscan Software manual for complete list of options and definitions for Measurement Menu (Section 7.4) and Gate Configuration Menu (Section 7.3)



| |
|---------|
| A/ |
| A/ - I^ |
| A/ - I/ |
| B^ |
| B^ - I^ |
| B^ - I/ |
| B^ - A/ |
| I^ |
| I/ |

HydroFORM System – Omniscan Setup – Syncro I Gate

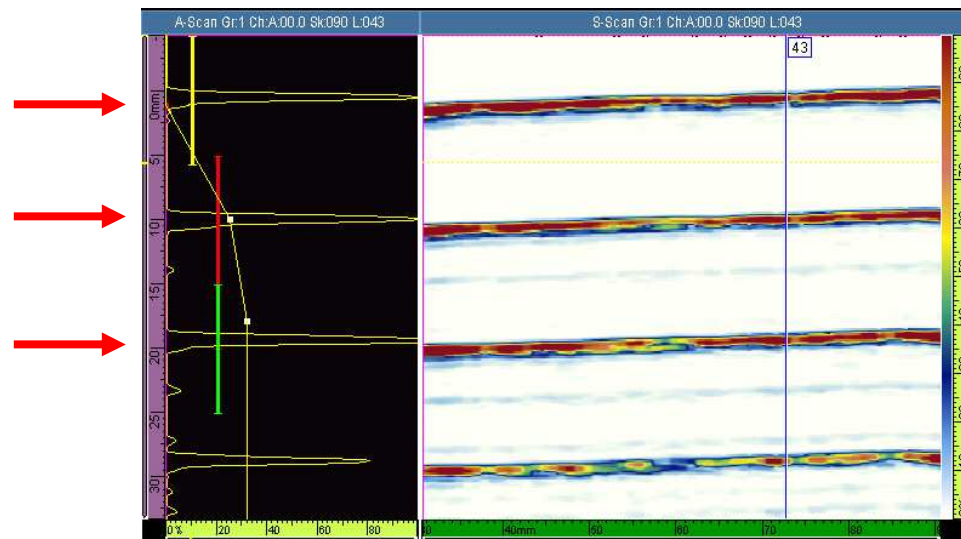
- Position the Interface gate (Yellow) 5mm before and 5mm after the interface signal. (If the water path matched the wedge height the interface signal will be at or very near 0mm).
- Set the mode of the I gate to /I. This synchronizes the A-scan on the interface signal so 0mm always starts at the component surface regardless of the probe position as the scanner moves.
- If external corrosion measurement is required the A-scan cannot be synchronized on the I gate.

| I | Mode | I/ | Edge (I) | Positive |
|------|------------|-------------|----------|----------|
| Gate | Parameters | A-Scan Sync | Measure | RF |

Interface signal

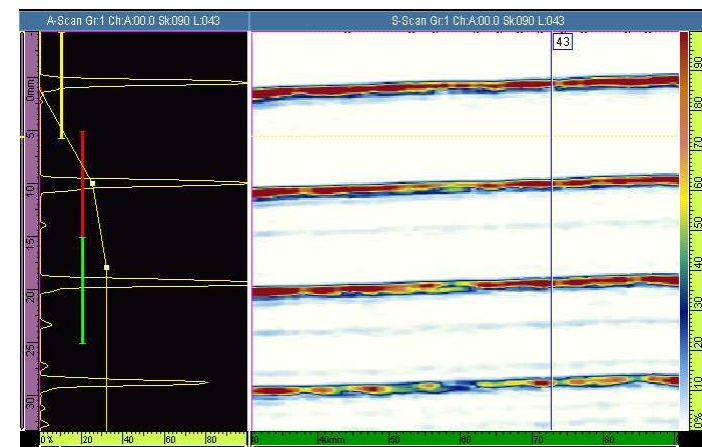
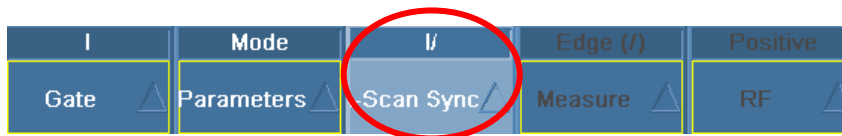
First Backwall

Second Backwall








HydroFORM System – Omniscan Setup – Syncro I Gate

- The default set up file for the Hydro system will initially have the I gate A-scan Syncro set to Pulse.
- Change the Interface Gate (Yellow) to I/ , this will move the 0mm position of the A-scan to the surface interface creating a “Floating gate”.
- This will eliminate any external corrosion monitoring ability from the inspection and should only be used for internal corrosion monitoring.
- Changing the Interface Gate from I/ back to Pulse will requires setting the UT wedge delay back to zero, adjusting A-scan range and repositioning Gate A and B.



HydroFORM System – Omniscan Setup – A and B Gate

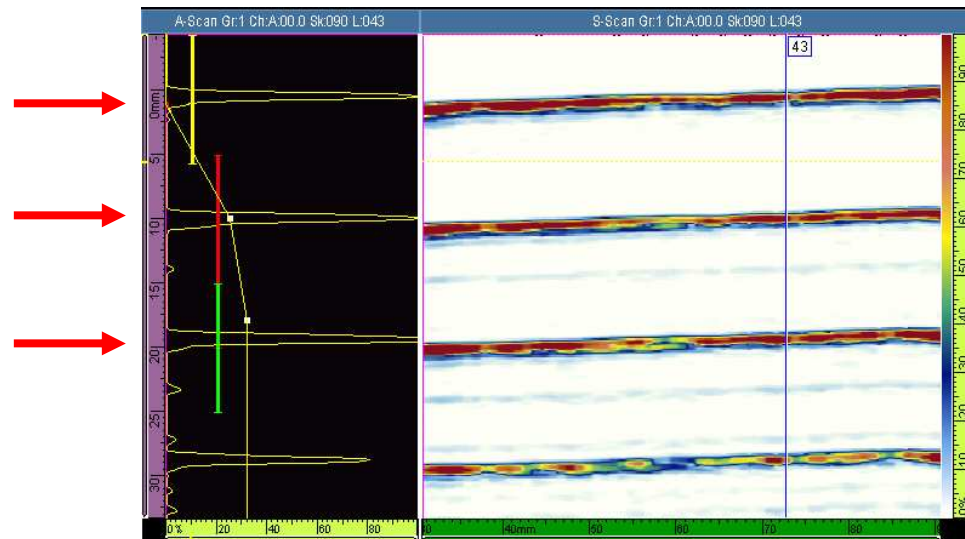
- Position the A gate (Red) 5mm before and 5mm after the first backwall signal.
- Set the mode of the A gate to /I/. This synchronizes the A gate (Red) on the interface signal creating a “Floating Gate”.
- Position the B gate (Green) 5mm before and 5mm after the second backwall signal.
- Set the mode of the B gate to /I/. This synchronizes the B gate (Green) on the interface signal creating a “Floating Gate”.

| A | Mode | I/ | Edge (/) | Positive |
|--|---|--|---|--|
| Gate  | Parameters  | Synchro.  | Measure  | RF  |

Interface signal

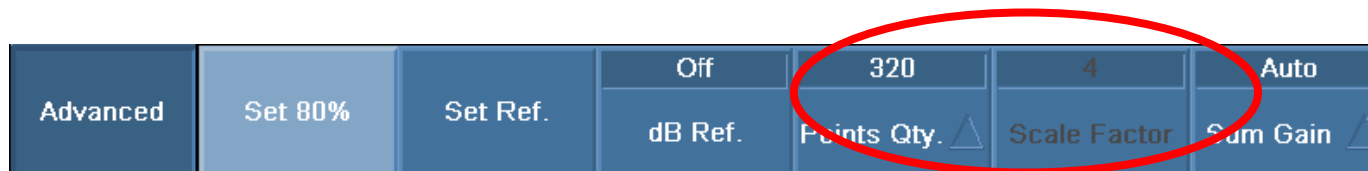
First Backwall

Second Backwall



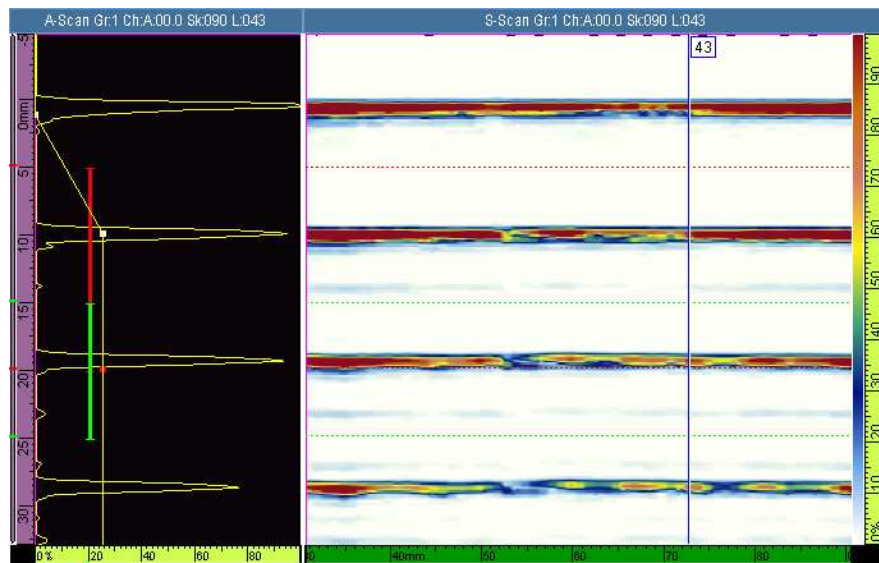
HydroFORM System – Omniscan Setup – Point Quantity

- The A-scan point quantity is located in the UT-Advanced menu and the default is 320 points.
- The point quantity is directly related to the resolution of the A-scan and the file size. The Omniscan A-scan compression is automatically configured based on the point quantity selected and A-scan range.
- The maximum file size (C-scan size) can be increased by reducing the point quantity.



HydroFORM System – Omniscan Setup – TCG

- The TCG is required to increase the amplitude of the first and second back wall signals.
- Increasing hardware gain will unnecessarily increase the interface signal reducing the near surface resolution.
- Do not modify point number TCG point number 1. Leave it at 0mm with 0 dB.
- Create TCG point 2 and 3 on the first and second back walls and increase TCG gain until each point is approximately 100% amplitude.

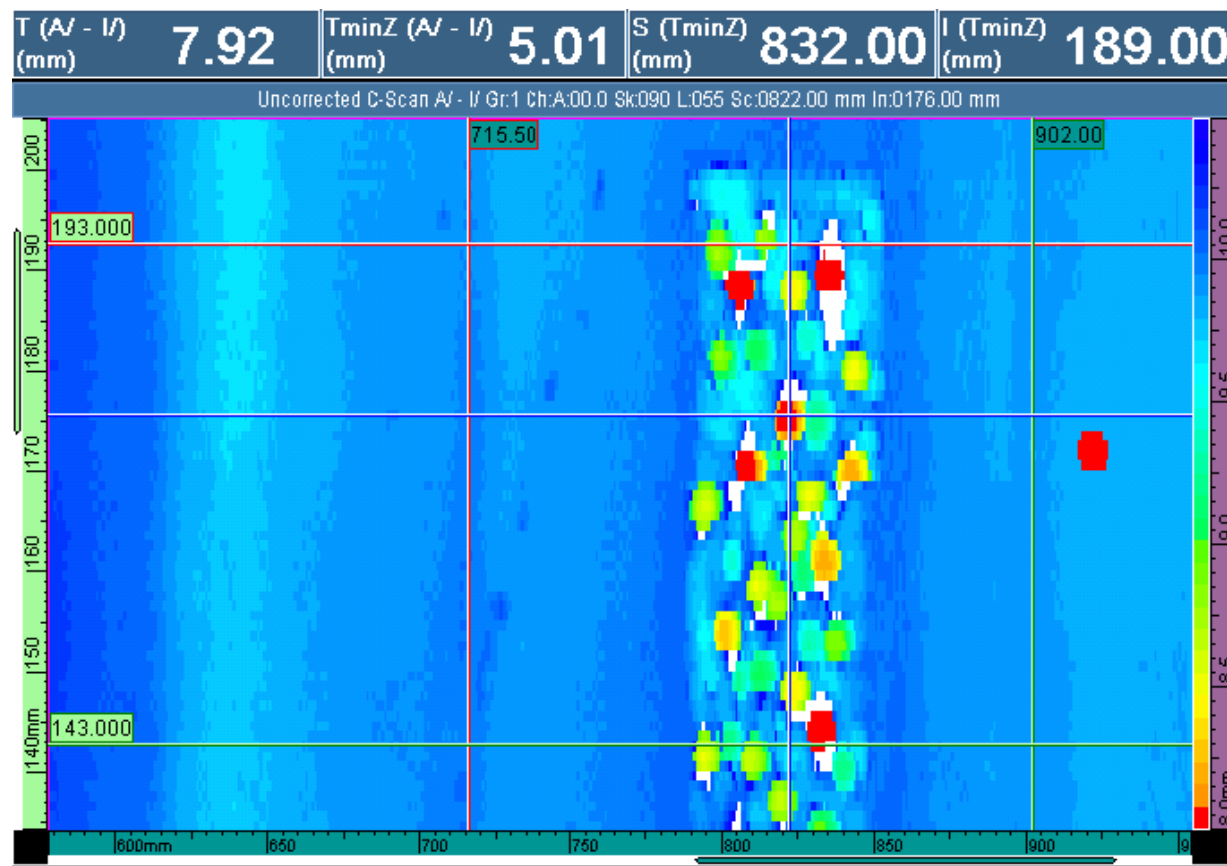


| Setup | TCG |
|-------|-------|
| Mode | Curve |

| | | | |
|------|-------|---------------|-----------|
| Edit | 1 | 0.88 | 0.0 |
| Mode | Point | Position (mm) | Gain (dB) |
| Edit | 2 | 10.00 | 6.0 |
| Mode | Point | Position (mm) | Gain (dB) |
| Edit | 3 | 20.00 | 9.0 |
| Mode | Point | Position (mm) | Gain (dB) |

HydroFORM System – Omniscan Setup – Displays

- The displays configuration was already created in the default HydroFORM.ops setup file.
- The A-S-C scan with C-scan configured for Thickness is used during setup and analysis.
- During acquisition only the C-scan need be displayed.

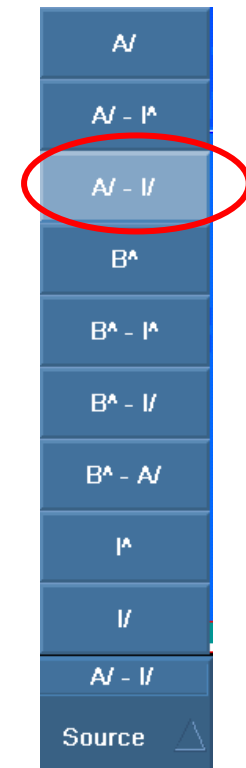


HydroFORM System – Omniscan Setup – Displays

- The 8 default readings are available in two lists in the custom Corrosion Group in the Readings menu.

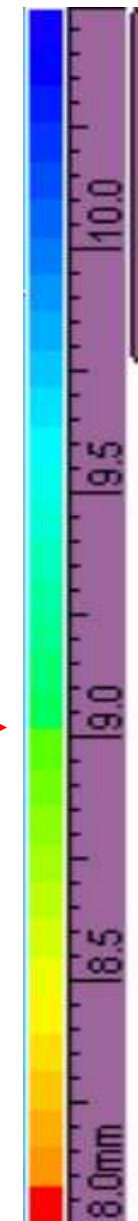
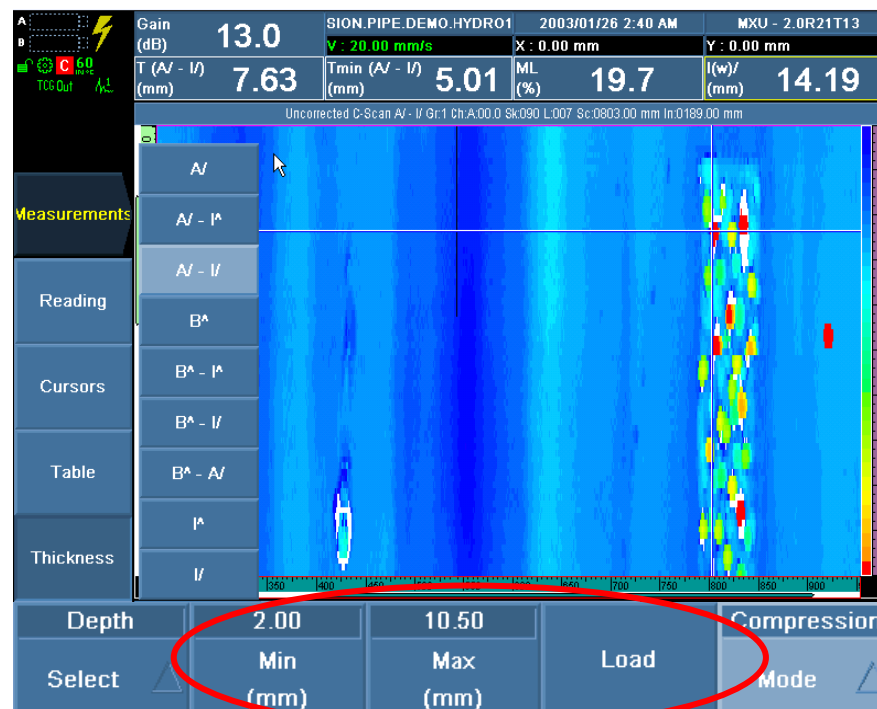
| | | | | | | | |
|-----------------|------|---------------------|------|-------------------|--------|-------------------|--------|
| T (A/I) (mm) | 6.74 | Tmin (A/I) (mm) | 5.01 | ML (%) | 29.0 | I(w)/ (mm) | 14.38 |
| T (A/I) (mm) | 7.92 | TminZ (A/I) (mm) | 5.01 | S (TminZ) (mm) | 832.00 | I (TminZ) (mm) | 189.00 |

- Configure Reading Source mode for the best results under the Measurement-Thickness-Source menu.
- Adapting to different inspection environments requires a complete understanding of the Measurement – Thickness options. See Omniscan software manual section 7.4



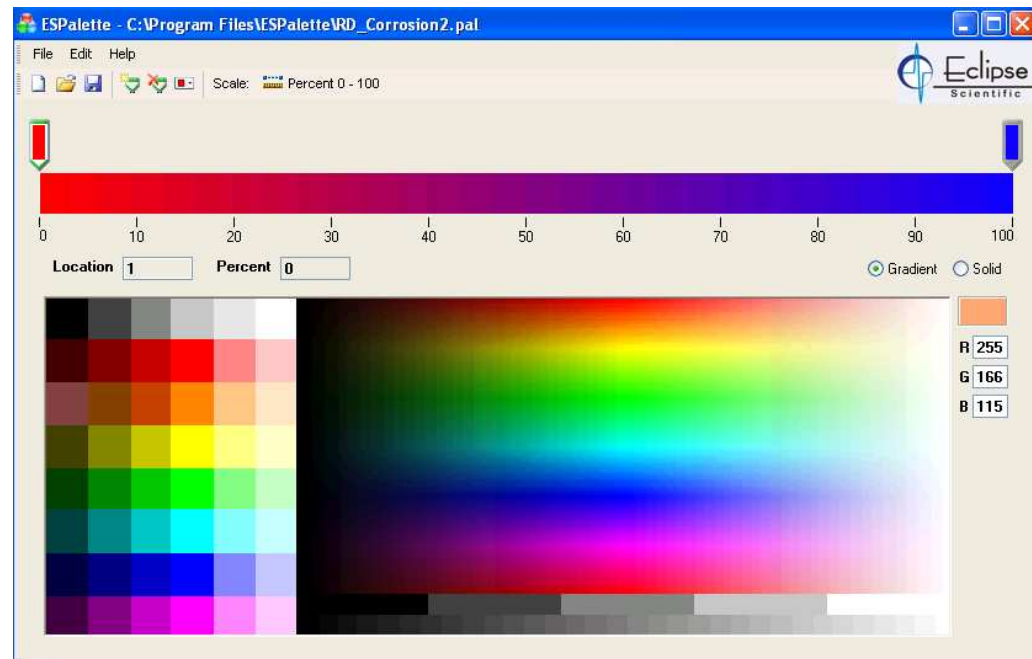
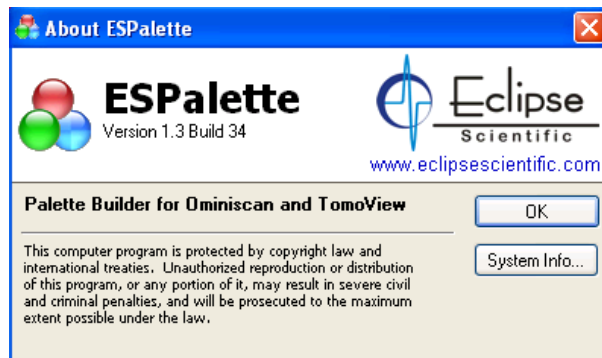
HydroFORM System – Omniscan Setup – Displays

- In the Measurement-Thickness menu, enter the minimum and maximum thickness. The default setting is 0mm – nominal part thickness. This is where individual erroneous data points can be excluded from the statistics after analysis by obtaining the minimum reading and manipulating the minimum thickness (mm).



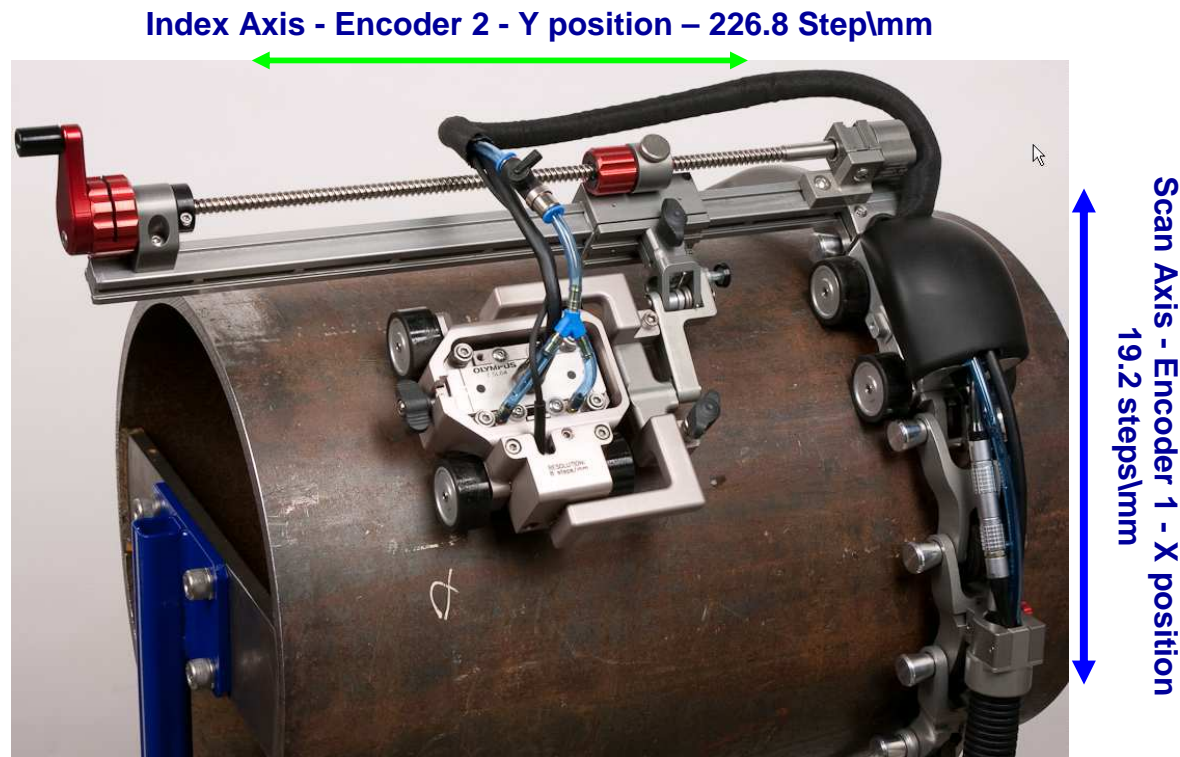
HydroFORM System – Omniscan Setup – Color Palette

- The Eclipse ESPalette program is a free utility that allows the operator to create custom color palettes and import them directly into the Omniscan.
- Custom color palettes are saved as .pal files and are available in the Omniscan when placed in the User\Palette folder on the storage card and loaded.
- The utility is available on the Eclipse Scientific web site at www.eclipsescientific.com



HydroFORM System – Omniscan Setup – Scan

- In the default HydroFORM.ops setup file, the encoders have already been configured for the 2 axis Chain scanner. Verify that the encoder resolution is correct for the chain (Encoder 1 = 19.20 step/mm) and for the arm (Encoder 2 = 226.8 step/mm).
- Earlier generations of the chain scanner had different resolutions so existing chain scanner owners should check their manual for the correct encoder resolutions or calibrate using the Omniscan Calibration Wizard.



HydroFORM System – Omniscan Setup – C-scan Area

- In the Scan-Area menu, enter the Scan Start and End, Index Start and End for the C-scan.
- When using the Chain scanner the Scan axis is the chain wheels (Pipe diameter), and the Index axis is the arm.
- The Omniscan MXU has a standard 160 megabyte data file limit or an optional 300 megabyte data file limit.
- The software will not allow a C-scan to be programmed that will exceed the maximum available file size. Factors that affect this are the length of scan and index axis, scan and index resolution and A-scan point quantity.
- The probe can acquire acquisitions of 61mm per line scan. When using the chain scanner, the arm length can accommodate five “Strokes” before repositioning the scanner. Scan = circumference of the pipe. Index = 300mm (5 strokes X 60mm). One mm per stroke is reserved for overlap.
- When in Linear 0 mode, the Index End is automatically calculated based on the probe aperture and number of focal laws.

| | | | | | |
|--------------------|------------------|-------------------------|---------------------|---------------------------|--------------------------|
| 0.00 | 1020.00 | 1.00 | 0.00 | 183.00 | 61.00 |
| Scan Start (mm) | Scan End (mm) | Scan Resolution (mm) | Index Start (mm) | Index End (mm) Δ 61.00 | Index Resolution (mm) |

HydroFORM System – Omniscan Setup – File

- Enter a unique file name for the acquisition. The Omniscan will not allow a file of the same name to be overridden when present on the storage card.
- Ensure the scanner is positioned at 0,0.
- Flood the water chamber and clear the bubbles
- Select Start. The encoders will reset to 0,0 and the scan can begin.
- Select Pause when the C-scan is complete.
- Select Save Data.

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Please send questions, comments and corrections to
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