Sonatest

NDTS

RapidScan2
Ultrasonic Instrumentation

Quick Start Guide

Part Number: 147361

Setting up the RapidScan2 System

Terminology used in this document includes:

- “instrument” – the black Peli-case and its contents; this does not include the laptop
- “laptop” – the laptop which is connected to the instrument

Connecting RapidScan Components

Connecting the Cardbus Adapter

The laptop should be supplied with a PCMCIA or PCIe adapter card to connect itself with the data capture electronics within the RapidScan instrument. PCIe can only be used on newer laptops.

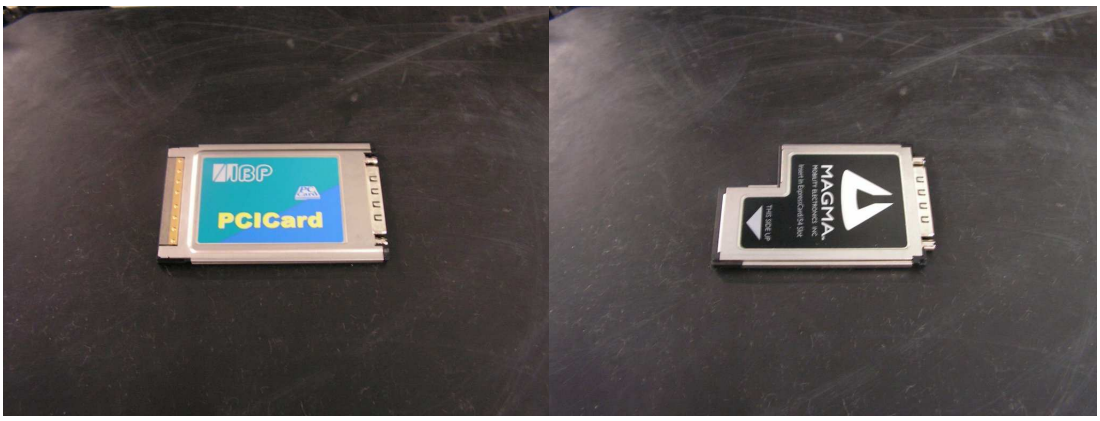

Figure 1: PCMCIA and PCIe Adapter Cards

The socket for the adapter card is usually on the left hand-side of the laptop. The adapter card may currently be separate as in Figure 1: PCMCIA and PCIe Adapter Cards.

The adapter card may be supplied already inside the laptop, as in Figure 2: An attached but unconnected adapter card.

Figure 2: An attached but unconnected adapter card.

If the cardbus adapter is already attached to the laptop, remove it (usually by pressing it in and then it can be pulled out).

If the cardbus adapter is not already attached to the cable from the RapidScan instrument, attach the adapter and tighten both screws. This cable can be identified as it is black and on the left hand side of the top of the instrument, near to the power connector and switch. See Figure 3: A correctly connected adapter card and RS instrument.

Figure 3: A correctly connected adapter card and RS instrument

⚠ Insert the adapter card connected to the cable into the PCMCIA/PCIe slot on the left-hand side of the laptop. Double-check that the two screws on the connector are tight. See Figure 4: Inserting adapter card into laptop.

Figure 4: Inserting adapter card into laptop.

A successfully connected RapidScan instrument and laptop can be seen in Figure 5 below.

Figure 5: A successfully connected RapidScan instrument and laptop.

Connecting Power to the Instrument

Figure 6: RapidScan Instrument Power Connector

⚠ Insert the mains cable into the instrument as shown in Figure 6, and switch the instrument on using the power switch. Note that the cardbus adapter must be inserted properly before this step if the data capture electronics are to work properly.

If the button does not illuminate when switched, check the condition of the fuse. The fuse holder is located below the socket.

The equipment is able to run on 110V AC power or 220V AC power.

Filling Wheel Probe Tyre with Water

Ensure wheel probe tyre is filled with water. If the wheel probe has not been used since delivery, it will not contain water. To fill, remove both plastic bungs on the side of the wheel, see Figure 7.

Figure 7: Removing Wheel Probe Bungs

Use provided funnel to insert water until the tyre is full, see Figure 8.

Figure 8: Filling Wheel Probe Tyre with Water

Replace both bungs back in wheel probe.

Connecting the Wheel Probe Ultrasonics

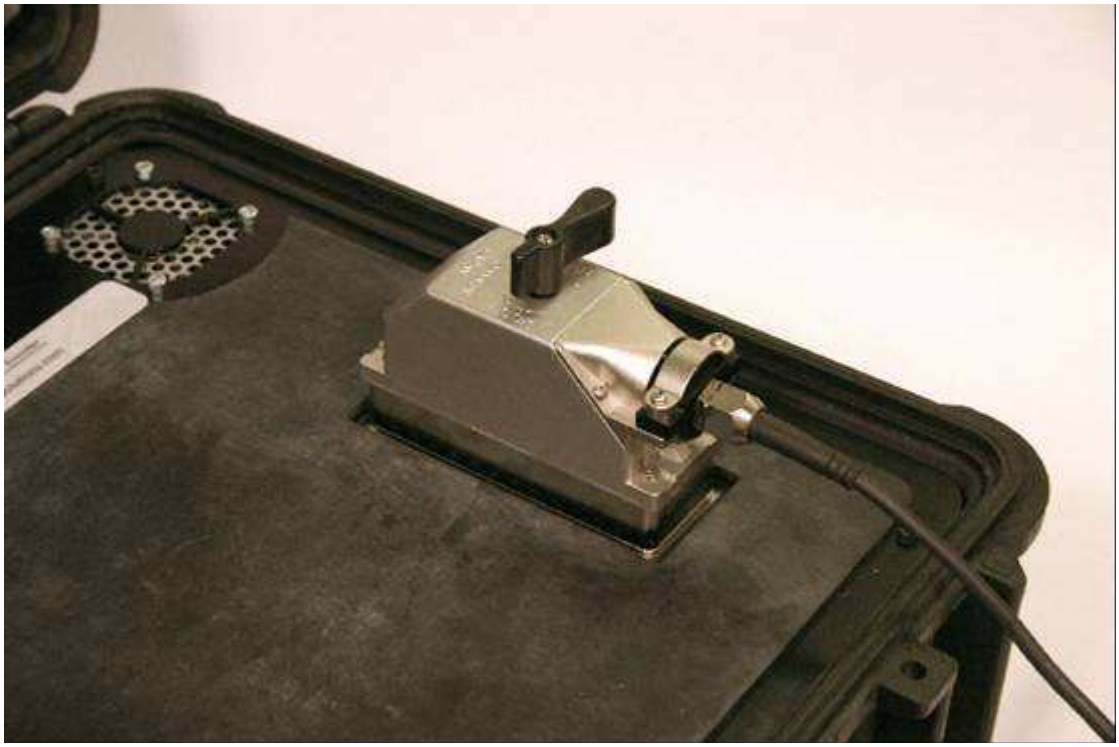

Figure 9: RapidScan2 Wheel Probe Connector

⚠ Connect the wheel probe to the instrument by plugging in the large multiway connector as shown in Figure 9. With the connector unplugged, turn the black handle on the connector to the open position and offer the connector up to the RapidScan2 unit. Little or no force should be required in order to do this. If the connector does not fit with zero force applied, check the condition of the connector terminal pins. With the connector in place, turn the handle to the lock position.

Connecting the Wheel Probe Encoder

The RapidScan 2 system uses a simple 1-dimensional encoder to measure the distance that the wheel-probe has moved during the scan. The output from the encoder is provided to the instrument via the second cable attached to the probe. This must be connected to the socket marked “Encoder” on the instrument.

Figure 10: RapidScan2 Position Encoder Connector

Insert the encoder connector into the first encoder socket on the RapidScan2 as in Figure 10.

This completes the steps for the connection of the items making up the RapidScan 2 system.

Powering up the Laptop

Connect power to the laptop, and re-check that the cardbus adapter card is inserted properly in to the laptop.

Ensure that the RapidScan instrument is switched on. The laptop can now be switched on. Switching on the laptop before the instrument means that the communication between the laptop and ultrasonic hardware will not work correctly and C-scan sessions cannot be started.

Log on using the **`Operator`** user account, no password is required.

Starting the Software

Figure 11: RapidScan Desktop Screenshot

Click on the **RapidScan 2** icon to start the software.

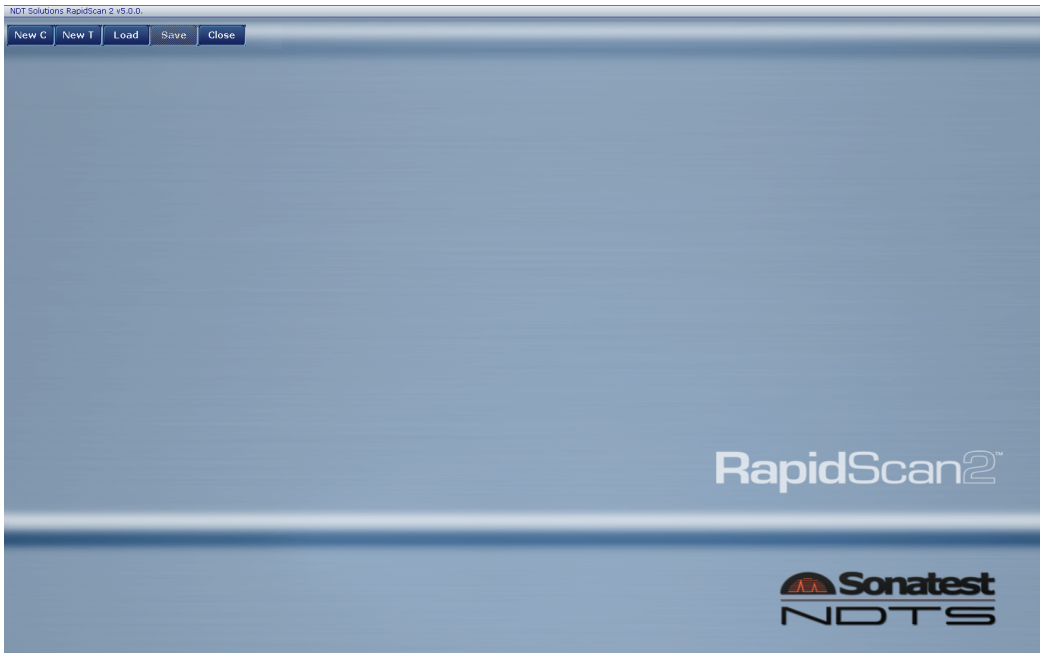

Figure 12: RapidScan 2 Opening screen

Click on the **New C** button to start a new C-scan session.

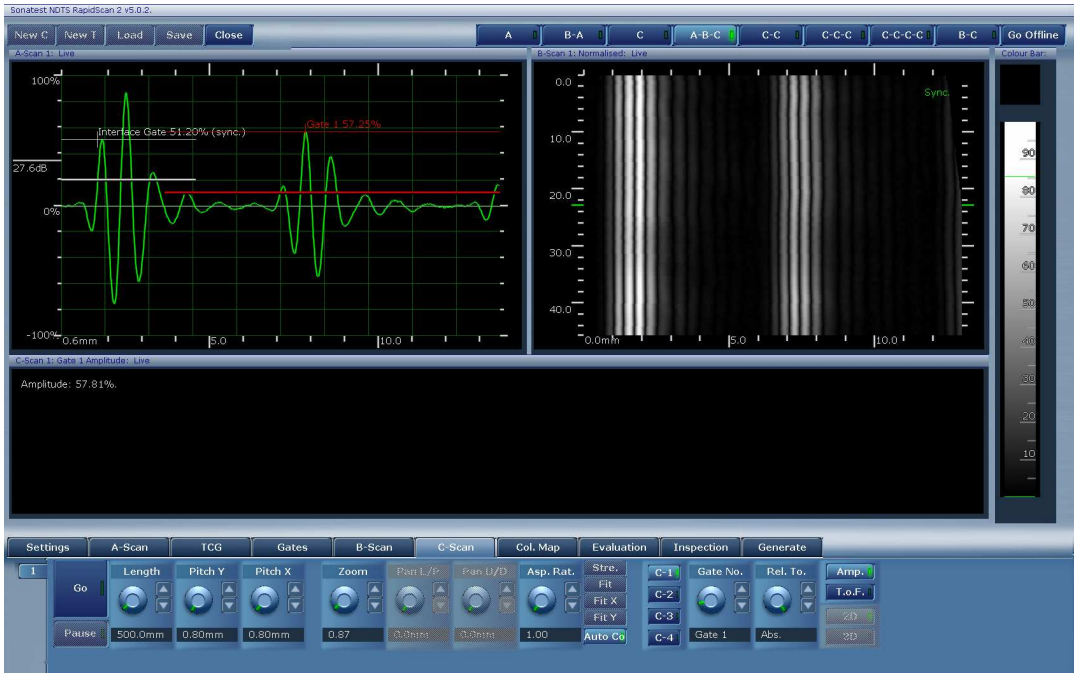

Figure 13: RapidScan 2 C-Scan Session Initial View

After selecting **New C**, the above display will appear.

Using Predefined Instrument Settings

The RapidScan software includes some pre-defined instrument settings for various tools, including the wheel probe. These can be easily recalled using the **Inspection** menu, and then either used directly or altered for the current scan requirements.

To configure the RapidScan instrument with the predefined inspection settings for the wheel probe, select the **Inspection** menu. See Figure 14.

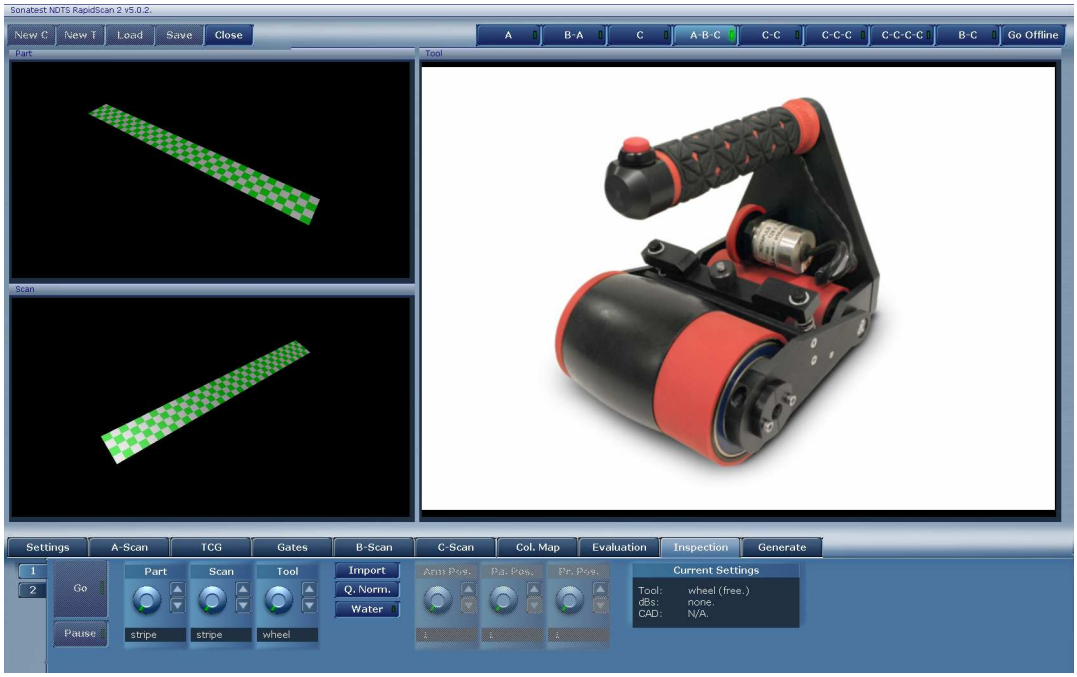

Figure 14: Selecting Pre-defined Wheel Probe Instrument Settings

Select **stripe** under the **Part** control and **wheel** under the **Tool** control. Select the **Import** button. The RapidScan system is now ready to scan, continue to the Performing a C Scan section on page 17.

Alternatively, a custom inspection can be set up using the following Configuring the Ultrasonic Settings section.

Configuring the Ultrasonic Settings

Select the **`Generate`** menu, see Figure 15.

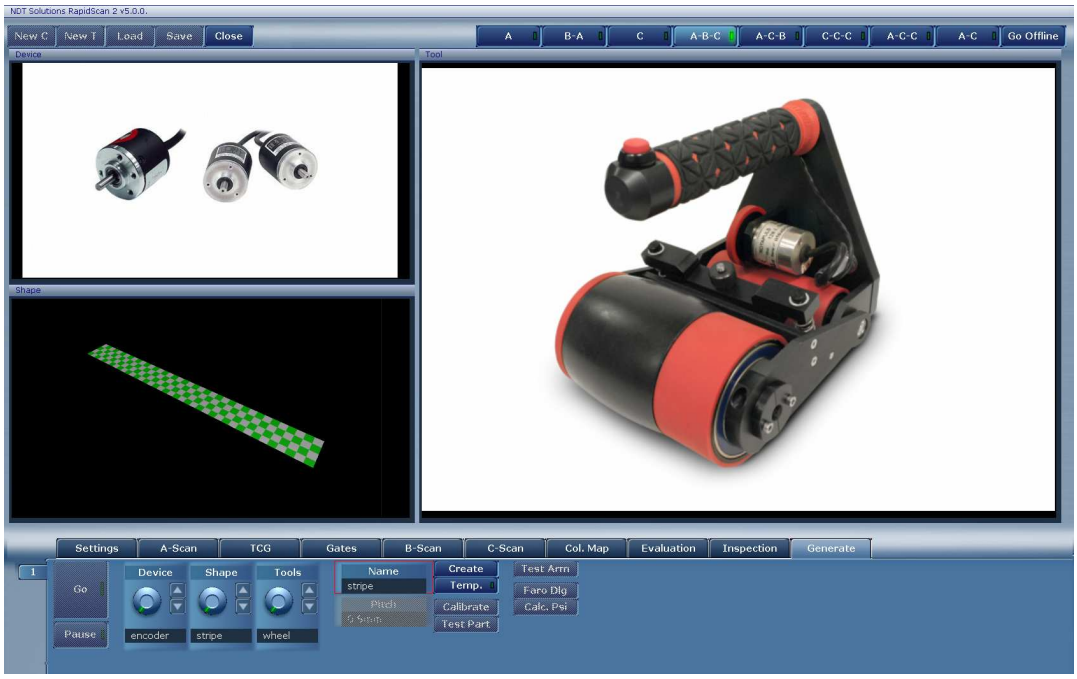

Figure 15: Generate Menu

Ensure **`Device`** is set to **`encoder`**, **`Shape`** is set the **`stripe`**, **`Tool`** is set to **`wheel`**. Enter a name for the inspection in the **`Name`** box. Hit the **`Create`** button.

Probe and Scan Setup

The settings for the probe and ultrasonic hardware now need to be initialised.

Array Settings

Select the **Settings** menu, then choose sub-menu two by clicking on the number **2** below and to the left, see Figure 16.

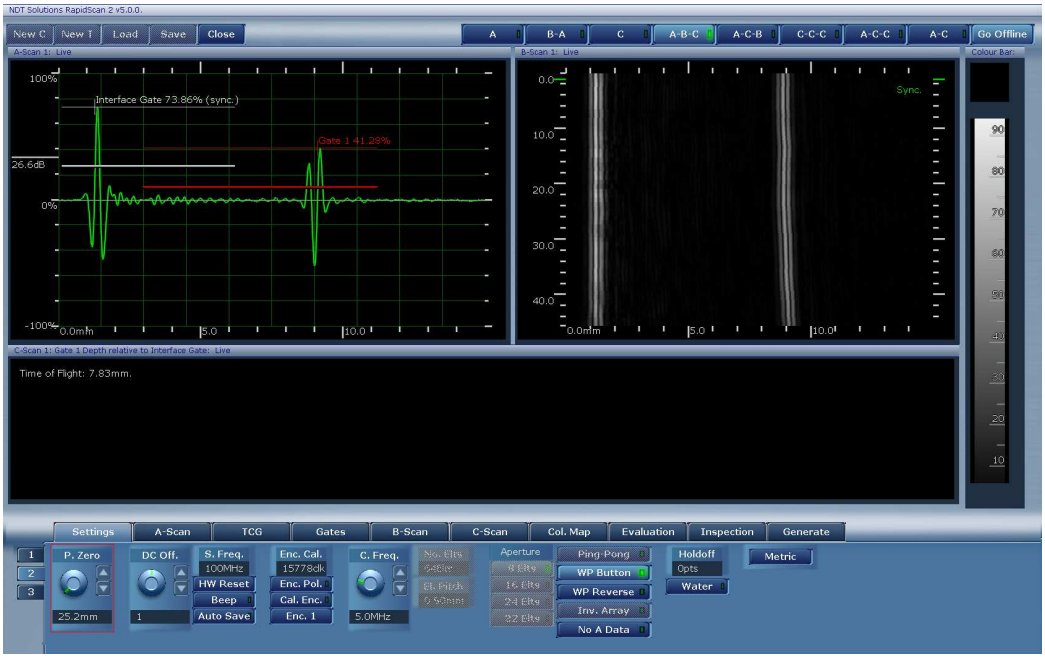

Figure 16: Settings Sub-Menu 2

Press the wheel-probe onto the part firmly as it would be held during scanning. Adjust the **P.Zero** (probe zero) control so that the interface echo is entirely within the A-scan and begins approximately 1mm from the start of the trace, see Figure 16.

P.Zero should be approximately:

Wheelprobe: 25mm

Sliding array or miniature bubbler: 10mm

Adjust **C.Freq.** (probe array frequency) to match the probe (typically 2.25MHz , 5MHz, 11.5MHz.)

Material Settings

Select the **A-Scan** menu, see Figure 17.

Figure 17: A-Scan Menu

Set the **Gain** dial so that the interface echo is approximately 80% of FSH (full-screen height.)

Set **Mat.Vel.** (material velocity) to match component; typically 2900m/s for composite, 5920 for steel.

Set **Range** to component thickness plus 30-50% (e.g. 11-12mm for an 8 mm sample)

Set **PRF** to 10khz for samples under 5-10mm, 5kHz for anything thicker.

The A-scan shown in Figure 17 demonstrates RapidScan 2 configured with these settings.

Time-Corrected Gain Settings

If the amplitude of the backwall echo is significantly lower than the interface, then TCG may be applied to increase the gain according to depth into the sample.

Select the **TCG** menu, see Figure 18.

Select the **Log.** and **Interface** buttons.

Adjust the **Gradient** dial until the backwall echo is a similar height to the interface echo as in Figure 18.

Figure 18: TCG Menu

Gate Settings

Select the **Gates** menu.

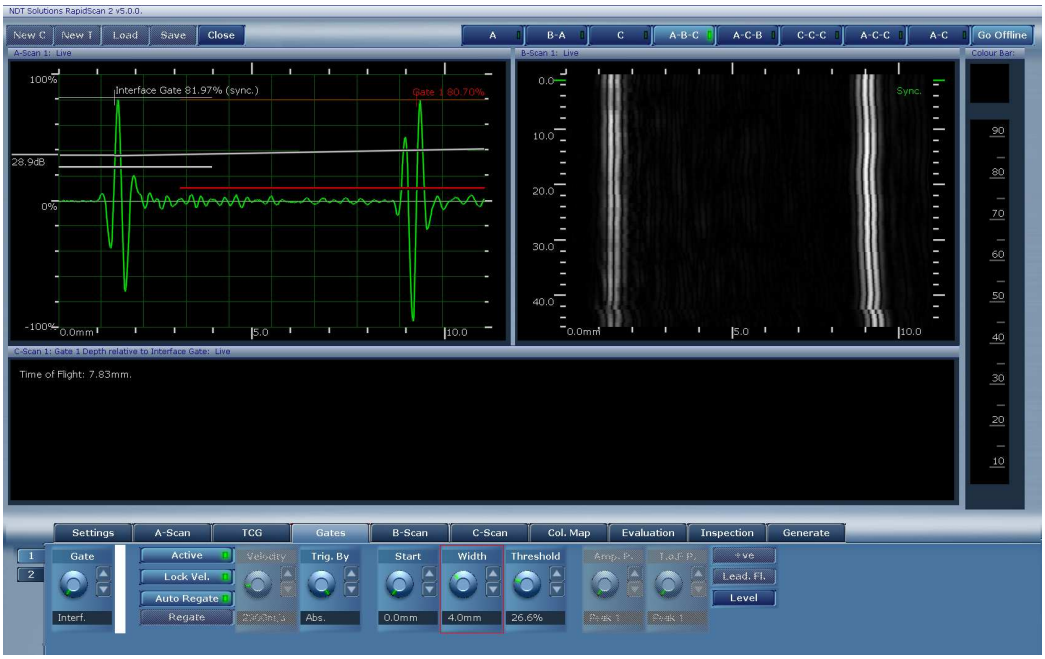

Figure 19: Gates Sub-Menu 1

Interface Gate

Select the **Interf.** gate on the **Gate** control (white gate.) See Figure 19.

Check that **Active**, **Lock Vel.** and **Auto Regate** buttons are activated.

Set **Start**, **Width** and **Threshold** dial controls so that the interface gate covers the entire interface echo cleanly (above low level artefacts.)

The mouse can also be used to position the gate; drag the beginning of the gate drawn on the A-scan left or right to set the **Start**, drag the end left or right to set the **Width** and drag the middle up or down to set the **Threshold**.

Measurement Gate

Select **Gate 1** (red gate) using the mouse or dial control.

Set **Trig-by** dial to **Interf.**

Set **Start** to beyond the end of the interface echo. The interface and gate 1 are allowed to overlap.

Set **Width** long enough to break backwall echo and extend beyond almost to the length of the A-scan.

Set **Threshold** to about 5% FSH (full-screen height.) See Figure 19.

Setting the View Layout

Select the **C-C-C** view on the top of the screen to view multiple C-scans during scanning or select **A-B-C** view to see a single C-scan as well as the A and B-scans during scanning.

Select the **C-Scan** menu., see Figure 20.

Select **C-1**, and set **Gate No.** to **Gate 1**, select **Amp.** and set **Rel. To** to **Abs**.

Select **C-2**, and set **Gate No.** to **Gate 1**, select **ToF.** and set **Rel. To** to **Interface**.

Select **C-3**, and set **Gate No.** to **Interface**, select **Amp.** and set **Rel. To** to **Abs.**

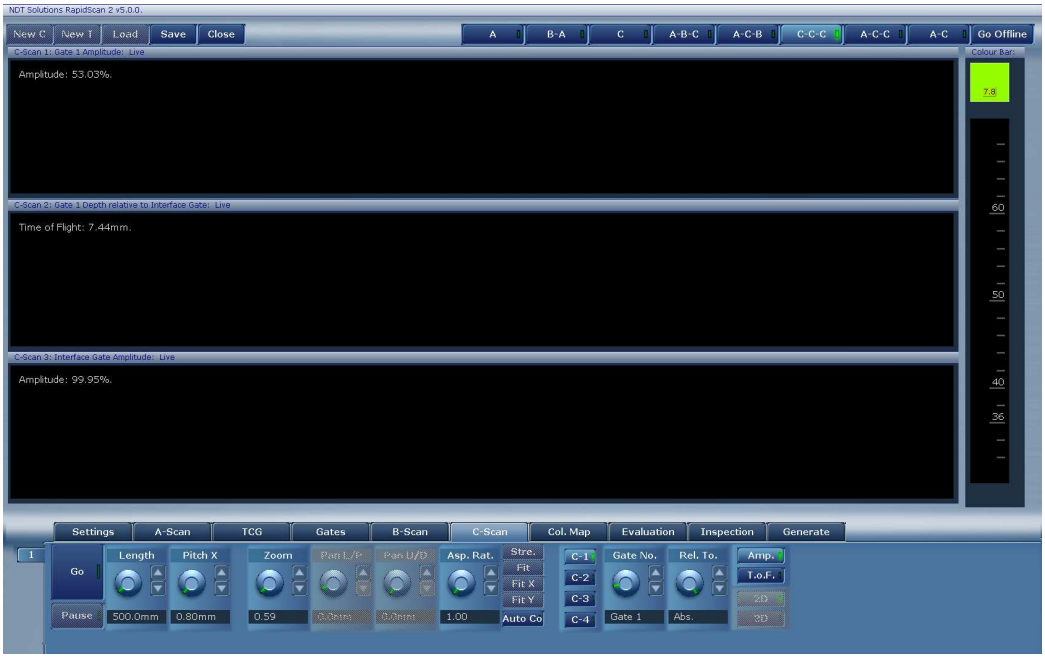

Figure 20: C-C-C View (before scan)

Performing a C Scan

Ensure that the area of the sample to be scanned has a thin film of water applied using the water spray bottle provided.

Recording and Evaluating Scan Data

Hit the **Go** button and provide firm pressure downwards and forwards to the wheel probe to scan the sample.

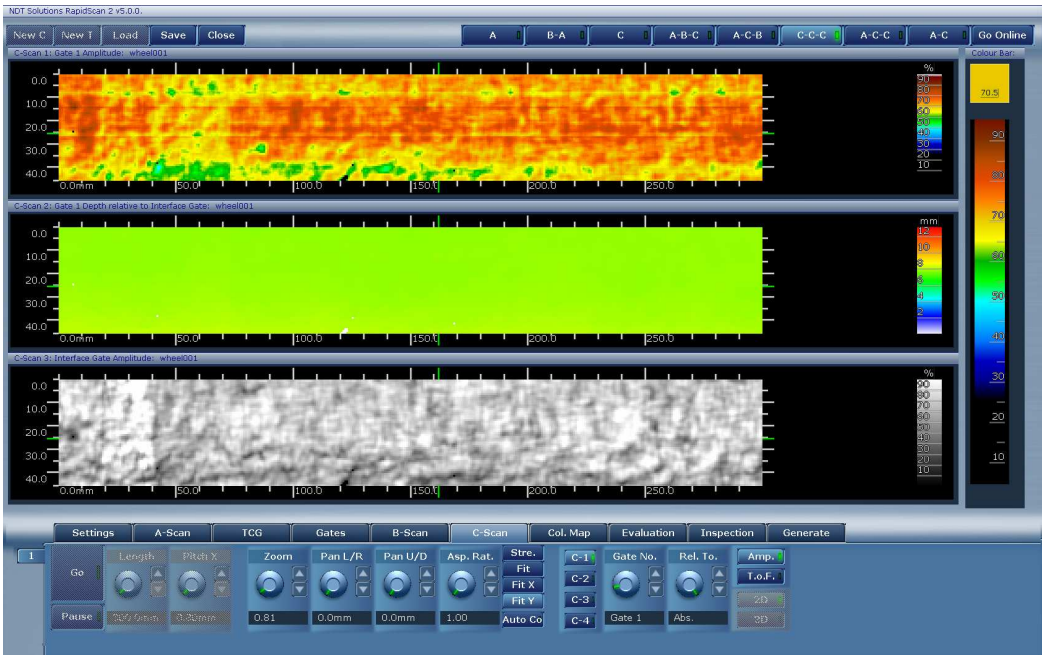

Figure 21: C-C-C View (after scan)

Depending on the view layout and sample chosen, the result of the scan will look similar to Figure 21 or Figure 22.

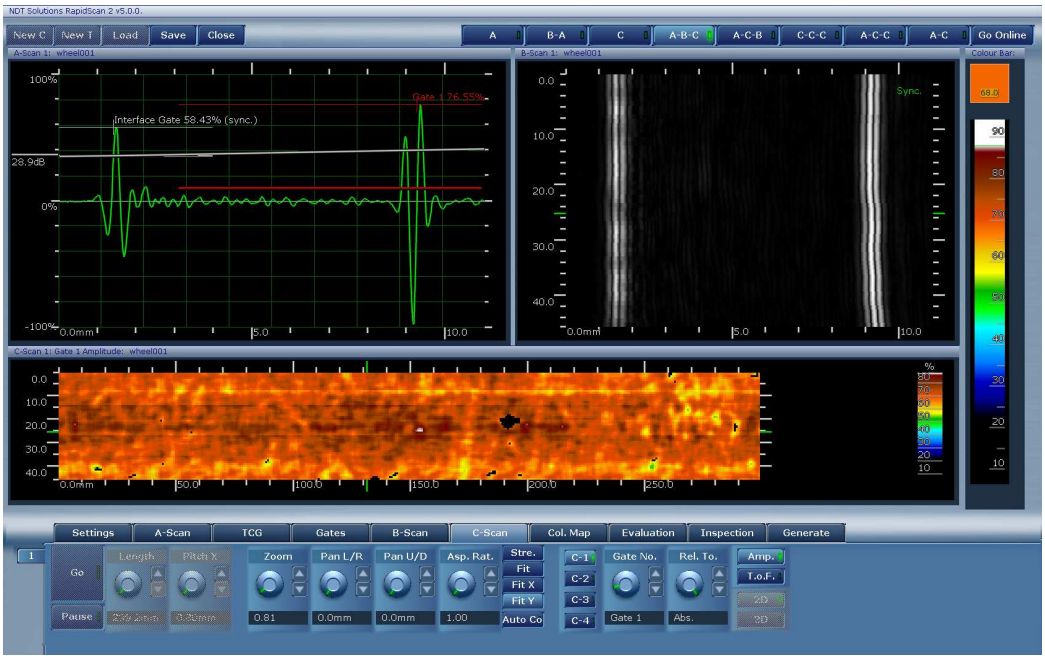

Figure 22: A-B-C View (after scan)

Select **A - B - C** view and drag the mouse cursor on the C-scan using the right button to evaluation A-scans and B-scans at different positions on the sample.

Setting up the Scan Colour-Map

Select **C-2** to view the depth C-scan, note the range of the colour-map may not be configured to match the depth of the sample.

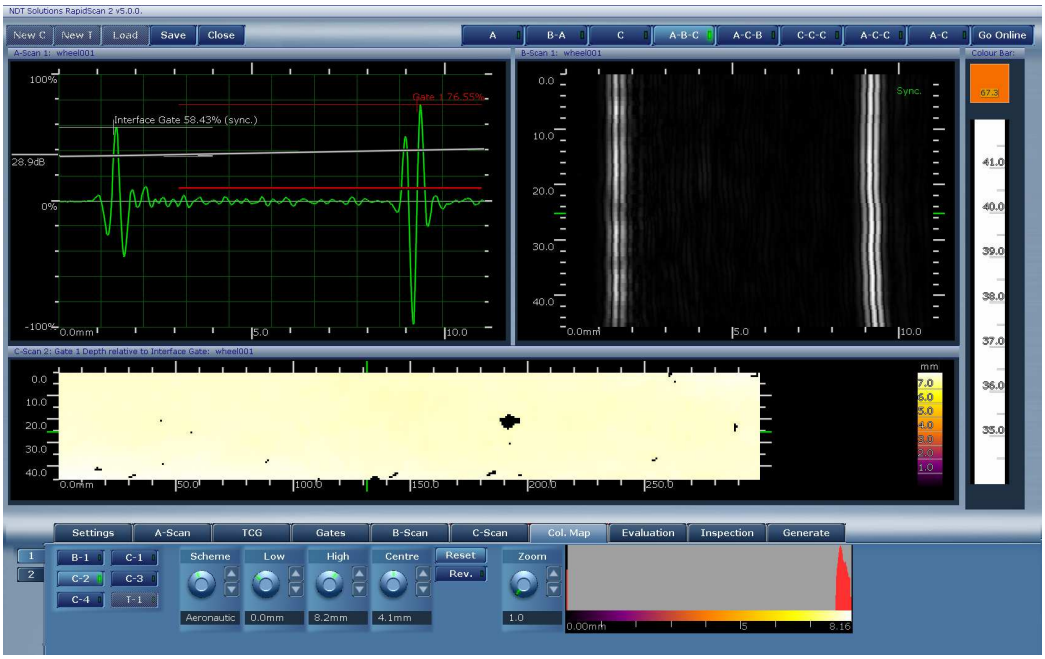

Figure 23: A-B-C Depth View (before colour-map adjustment)

Click **Col-Map** menu. Select **C-2** and change the **Low** value to match the data collected, see Figure 23.

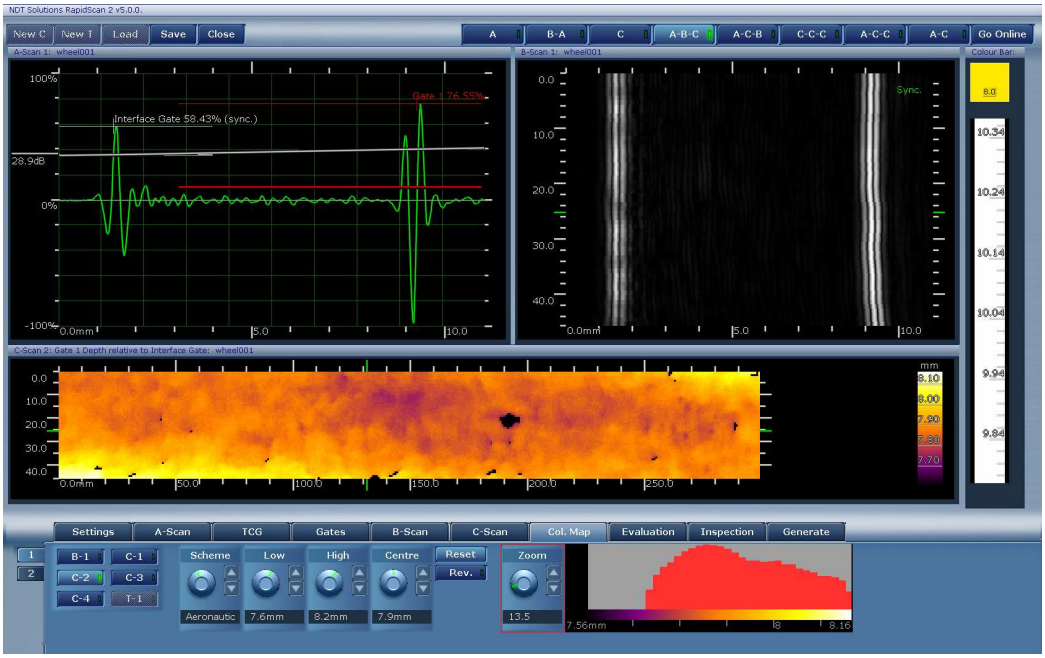

Figure 24: A-B-C Depth View (after colour-map adjustment)

Saving Image Data

Select an A-scan, click on the A-scan window and hit Ctrl-I to save an image of the current A-scan.

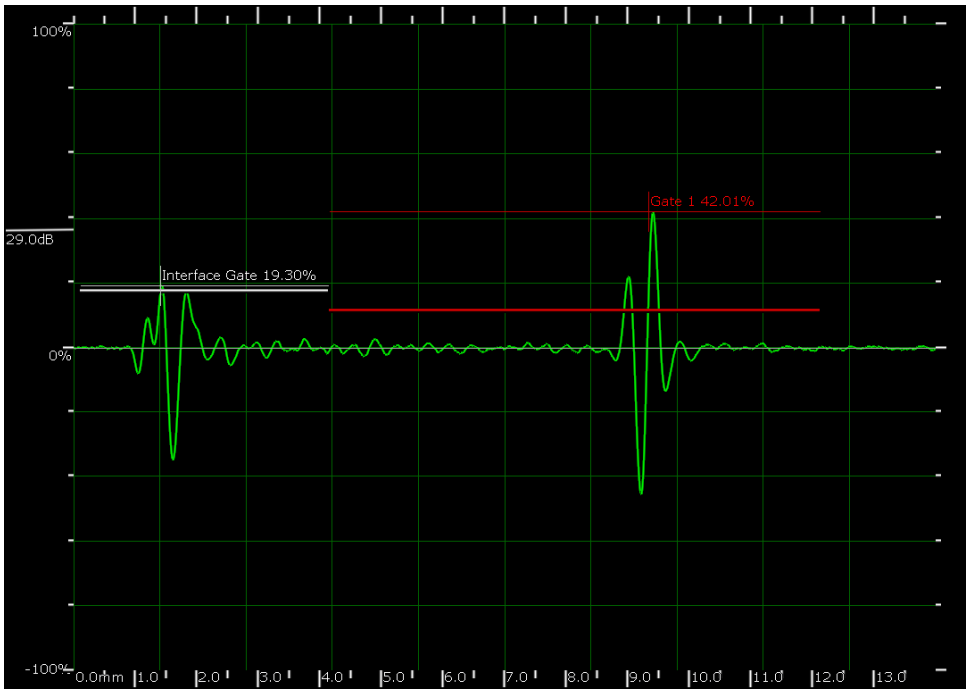

Figure 25: A-Scan Image File from Ctrl-I

Select a B-scan, click on the B-scan window and hit Ctrl-I to save an image of the current B-scan.

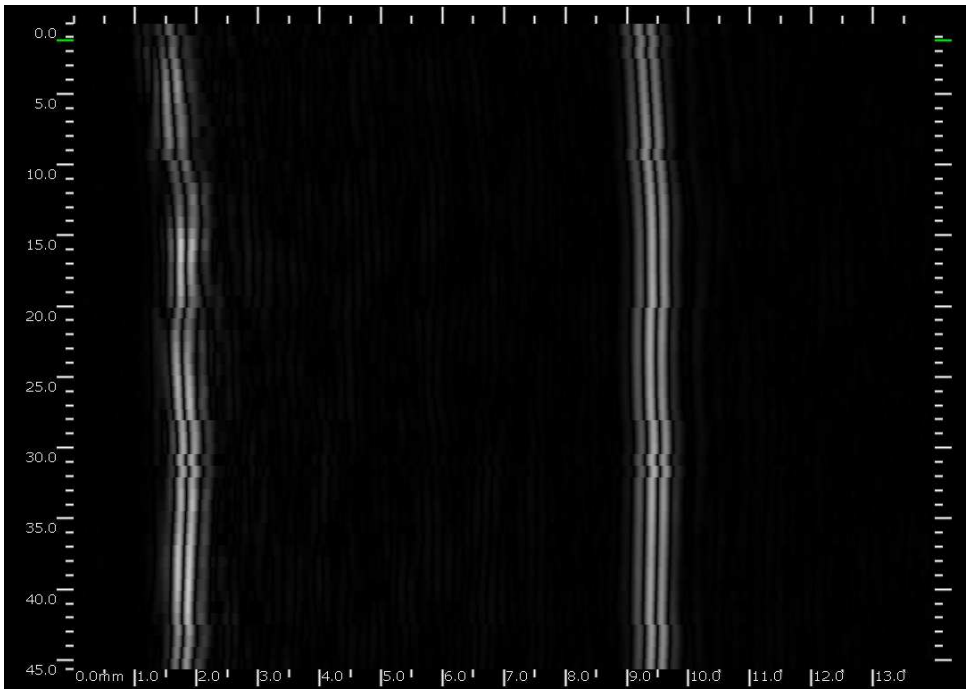

Figure 26: B-Scan Image File from Ctrl-I

Select a C-scan, click on the C-scan window and hit Ctrl-Shift-I to save an image of the current C-scan with scale and defect drawings, scaled to 1-1 physical size.

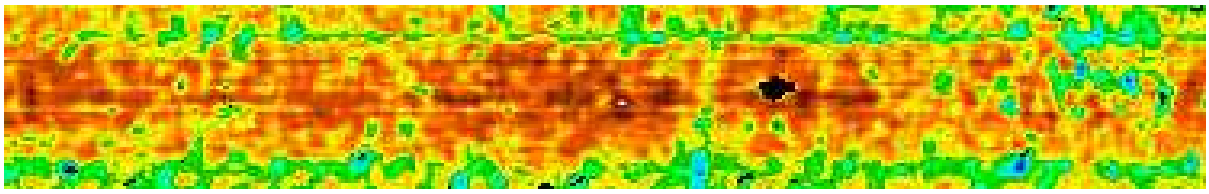

Figure 27: C-Scan Image File from Ctrl-Shift-I

Select a C-scan, click on the C-scan window and hit Ctrl -I to save an image of the current C-scan without scale and defect drawings, with 1-1 pixel-samples.

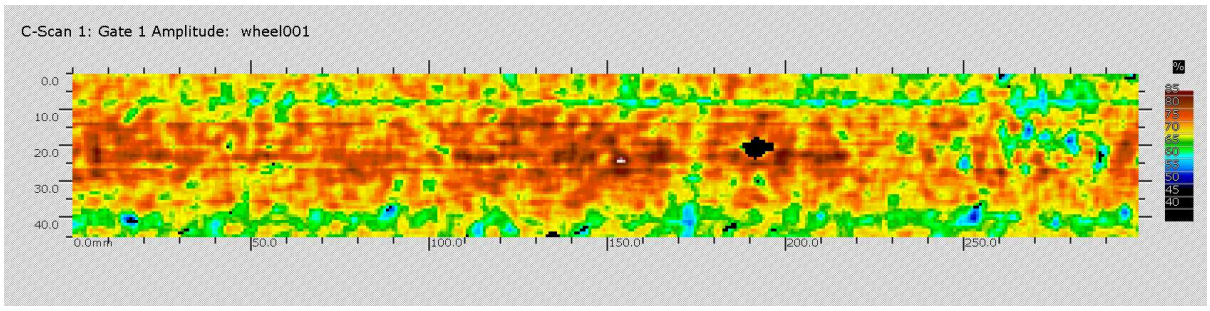

Figure 28: C-Scan Image File from Ctrl-I

Evaluating Distances and Areas

Select **`Evaluation`** menu.

Select **`Linear`** and click and drag on the C-scan to measure a distance.

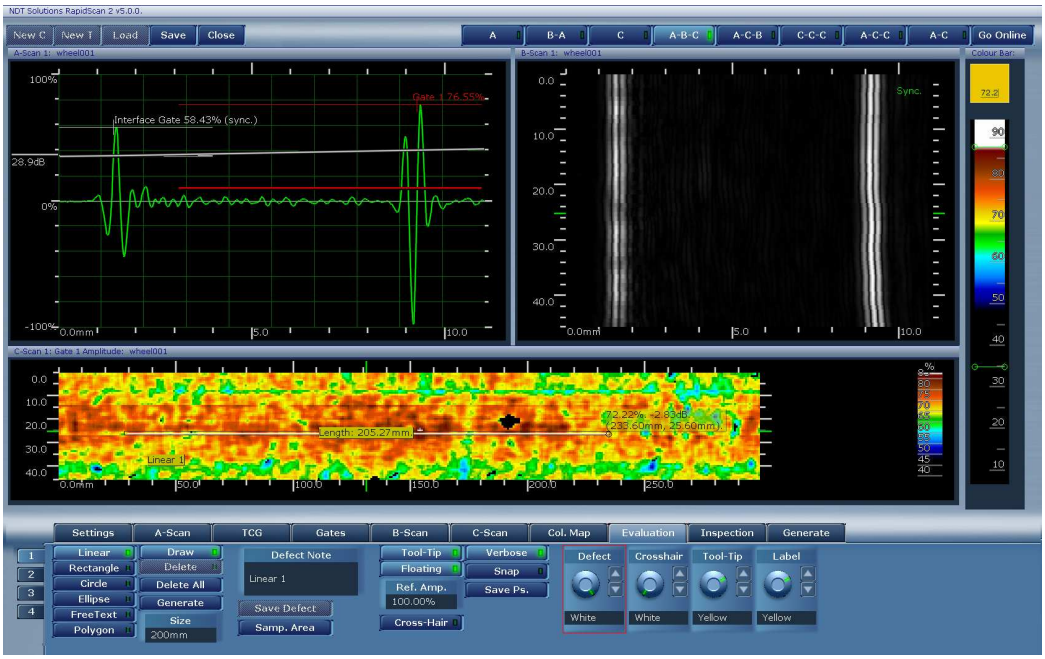

Figure 29: Evaluating Distances using Linear Tool

Select **`Rectangle`** and click and drag on the C-scan to measure an area.

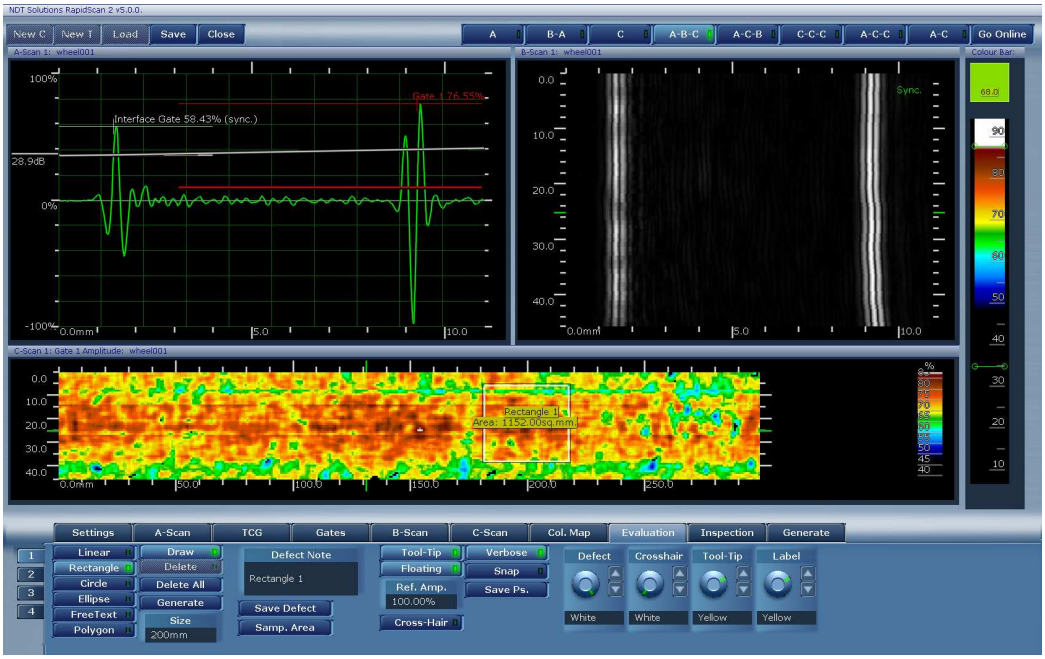

Figure 30: Evaluating Areas using Rectangle Tool

Saving Scan Data

Select **Save** and provide a filename to save the scan data.

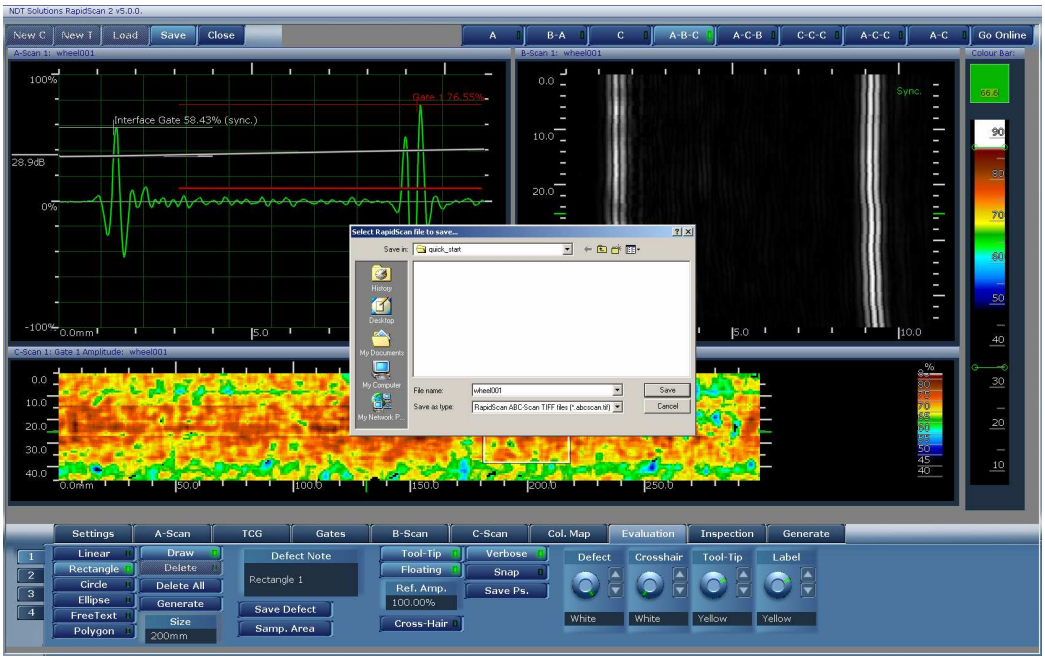

Figure 31: Saving Scan Data

The scan data can be re-loaded at a later date by running the RapidScan software and clicking **Load** on the start screen and selecting the file.