

# CIVA

## NDE 2015

*The simulation platform for NDE*

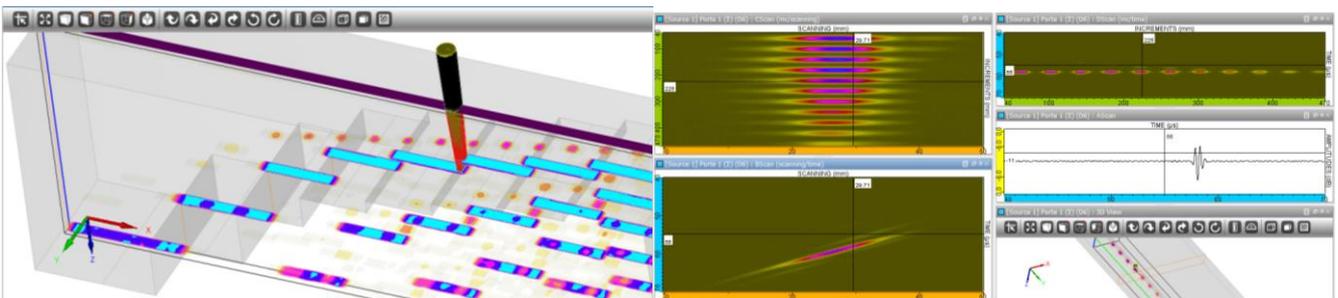
## CIVA UT Analysis tool

### Introduction

The CIVA UT Analysis module's main objectives are to display acquisition DATA in an easy and understandable way, to extract advanced information in an efficient way, to put this data into a dynamic report and to avoid repeatable and time consuming manipulations.

### Basic... But necessary tools

Data is displayed as **classical UT data** (A-Scan, echodynamic curves) or more **advanced images** (B-Scan, C-Scan, S-Scan, E-Scan, etc.). Images in the **specimen frame** can also be displayed (Front, top, side sections or full views) and the data can be exported in the 3D view with the specimen as 2D images or directly as 3D with the **“one click 3D view”**. Note that images can be built from amplitude, depth or time of flight.



**Zooming** is easy and fast. From the active zoom, an extraction can be performed that creates a **new Dataset**.

The **Color map** can be adjusted. A **double cursor** is available along with all classical tools for images (**mirrors**, rotation, copy and paste, distance measurements...).

Acquisition **gates** can be added, adjusted in time (reduced) and even **synchronized** (on specific echoes) to recreate a new data set.

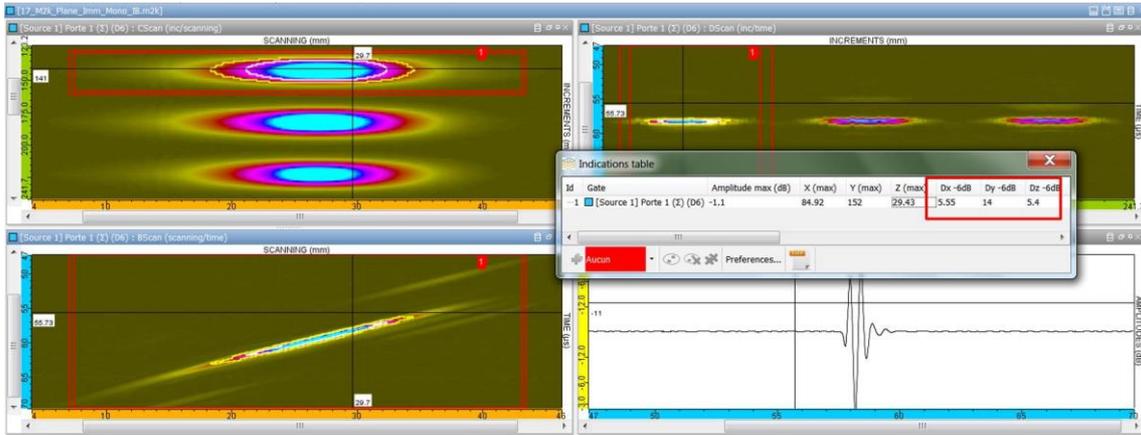
A new and very useful feature is the **amplitude histogram**, which is created in one click for a selected ROI. It represents the number of points having the same amplitude for all amplitudes in the ROI.

If you have some mechanical play in your system, you can easily improve your acquisition data with the **Hysteresis correction**.

A **Ray tracer** is available with a direct link to the time cursor so that you can easily identify complex echoes. The Ray Tracer is the one from CIVA UT, with all its possibilities included.

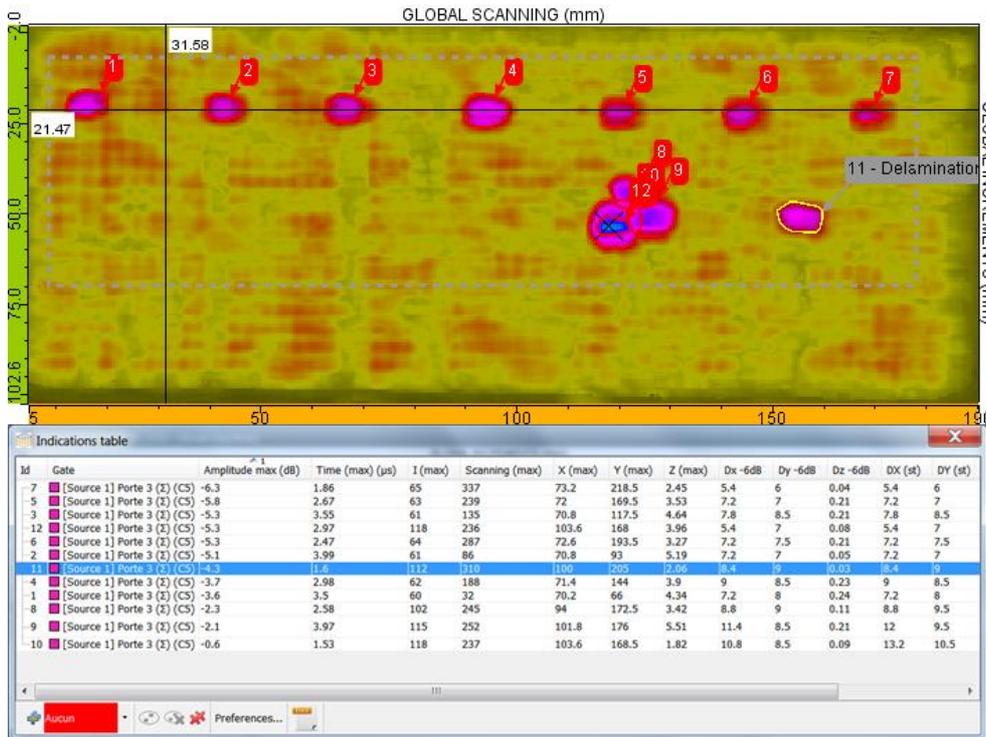
### Advanced tools: the one-click advantage

The objective to easily and quickly extract interesting information has been reached, through first, the selection of a region of interest (ROI), then through **one-click tools** such as “-**xdB contour**” or **Segmentation**. Note that Segmentation makes groups automatically represented in the 3D display.



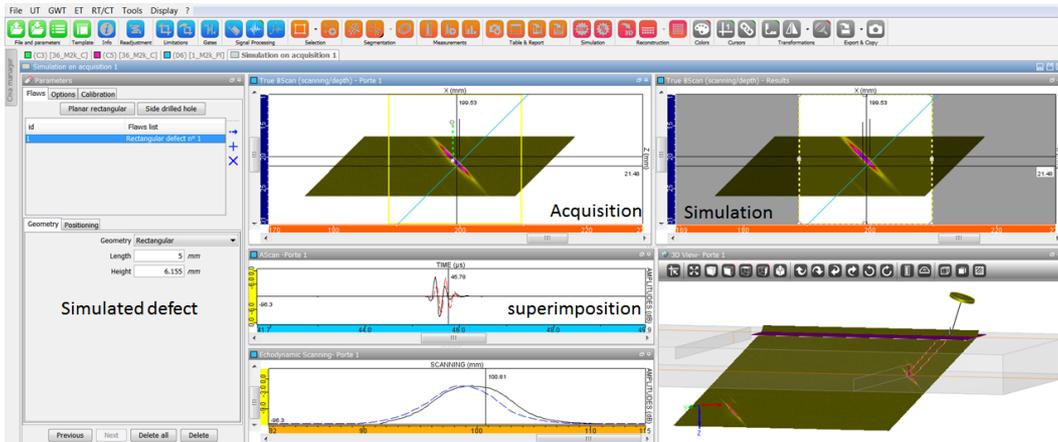
Relevant information (amplitude, position, size...) is included in an **indication table** in one click: **images**, distances, type of indication or other comments can be added. Multiple indications can be grouped as one indication. Columns of this indication table can be selected, sorted among a long list of available data.

This indication table can be **exported in CSV format** or an **HTML report** can be generated in one click.



In parallel, to help with the diagnosis, multiple functionalities are available: a wide range of **signal processing methods**, some are classical (filters, etc.), others are more sophisticated (wavelets transforms, deconvolution methods, Split Spectrum).

The stand-alone version of CIVA UT Analysis module also proposes **simulation in a ROI**, based on the diagnosis you want to try (planar defect).



If you use the latest techniques like **TFM** (total focusing method), you can make appropriate **reconstructions** and even redraw the surface of your specimen in one click.

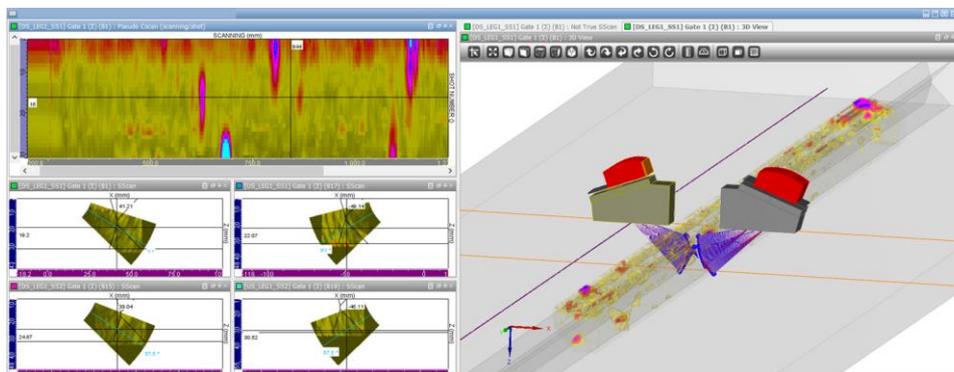
A **data eraser** facilitates multiple points selection with the exclusion of a global region. This can be very useful and efficient and remains safe as a new data set is created and the original one remains unchanged.

**Calibration** can be adjusted as a post processing. A **DAC correction** can also be made on the Data.

### Make your work environment more efficient

You can **customize** your use of CIVA UT Analysis to drastically reduce repeatable actions, to have a convenient environment, and to integrate part of your different analysis procedures.

If you perform multi-salvo inspections (or multi probes in the same data file), CIVA now offers the possibility to work on these salvos with links between cursors and to modify the settings of each transducer position and the reference position (origin) of the specimen.



**Layouts** are still available that let you place the images where you want, with the size and the contents you define. Give a name to each layout and recall it when you need.

In the preferences, “user **profiles**” with different names can be created. In these profiles, **three default thresholds** can be defined for “contour at  $-x$ dB”, the **contents of the report** (contents and order of each column) can be adjusted, and the **type of defects** (names for indications such as cracks, volumetric, corner echo, geometrical echoes...) can also be created. Each of these profiles can be loaded at any moment.

Last, but not least, part of your work can be defined as a **template**. This means that you can give a name to some of the actions you currently do (for example add a gate, synchronize it, open a new tab, make a limitation in it...) and this operation will be **completely automatic** when you recall it for a similar file: avoid errors, save time and put your efforts on the real work of analysis!

## Delay laws calculator

CIVA UT Analysis lets the user compute the delay laws and sequences of delay laws for standard and advanced phased-array techniques:

- Common or independent definitions for transmitting and receiving elements
- **Electronic scanning**, simple or advanced (e.g. variable aperture at transmission or reception)
- **Full Matrix Capture**

**Delay laws** can be computed for specimens of arbitrary geometry (canonical or complex) and materials (homogeneous or heterogeneous materials, isotropic and anisotropic) from the simplest to the most advanced configuration:

- **Sectorial scanning**
- Focusing on one or several arbitrary points
- **Electronic scanning**
- Application of non-uniform amplitude laws (influence of non-homogeneous element responses, beam apodization)
- Application of dynamic delay laws (in case of complex geometries, delay laws can be computed independently for each probe position along the scanning axis)

**Discover more about the UT ANALYSIS module at:**

<http://www.extende.com/ultrasonic-testing-analysis-with-civa>

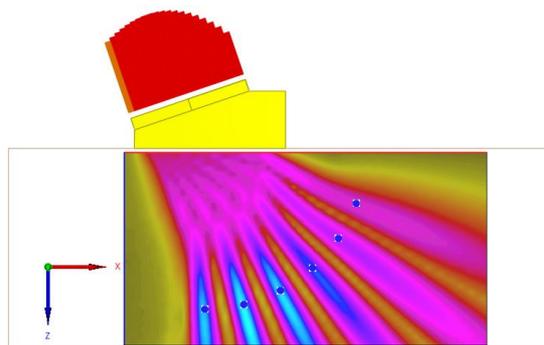
## Beam Calculation and Delay laws export (optional)

It is possible to include in your CIVA UT analysis package, the beam computation module coming from the leading simulation software CIVA.

The beam can be displayed in the specimen as an amplitude color coded image or as an iso-amplitude surface. Local orientation of the beam and wave fronts can be displayed (and saved as animated files, AVI format).

For applications with a Phased-array probe, a variety of transducers are available:

- Annular, **1D Linear**, **2D matrix**, 2D sectorial or elliptical patterns
- Encircled or Encircling curved arrays for tube inspection
- Flexible phased-array probe (in contact with parametric or CAD specimen, linear or matrix pattern)
- **Custom phased-array** (manual or random arrangement of elements)



*Beam with multiple shots PA probe*

For phased-array probes operating in multiple shots mode (e.g. sectorial scan), both the single beam and cumulated beam can be displayed.

With the Beam Computation module of CIVA UT, the delay laws calculator also let the possibility to export this information in \*.raw and \*.pte ASCII files. It includes both delay laws and index point's data.

**Discover more about the UT module at:**

<http://www.extende.com/ultrasonic-testing-with-civa>

**CIVA 2015 - UT ANALYSIS MODULE**  
**Features list**

**Basic features**

Classical images (A-Scan, B-Scan, C-Scan, D-Scan...)
PA Images (S-Scan, E-Scan...)
2D scan images superimposed onto the 3D part
Specimen reconstruction (from simple to 3D CAD specimen)
Amplitude measurement & Calibration
Distance measurement (3D)
TOFD Calibration
Report in HTML or export in CSV
Zooming & Image tools (mirrors, rotation, flip, export...)
Delay laws calculator (includes management of electronic scanning)
Display in amplitude, depth or time of flight

**Advanced features**

Reconstruction with material and geometrical influence
Hysteresis correction
3D evolved ray tracer with time of flight connection
Layout definition and back-up
DATA Eraser
Complete traceability of actions modifying Data
Acquisition gates addition, modification and synchronization
One-click amplitude histogram with mean values, max...
"-x dB" automatic contour (Also added in report)
Signal processing (filters to wavelets or split spectrum...)
DAC corrections

**Cutting edge features**

One-click segmentation with 3D representation
One-click 3D full DATA export
UT Simulation on defects in a ROI
Templates for most processing with naming and back-up
Customization of report column, environment, thresholds...
TFM reconstructions
Surface reconstruction

**Optional features**

UT Beam simulation
Delay Laws export

Accepted format	M2M systems, Gekko, Olympus Data (need Library)
Language	Available in English and French