CIVA 2016: A powerful tool for simulation and analysis results

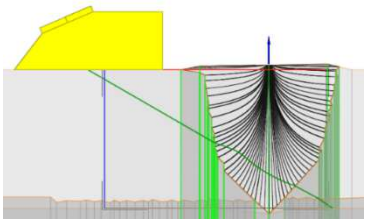
The simulation and analysis platform for NDE

CIVA can simulate the most common inspection methods used in the industry, plus new and innovative technologies.

CIVA 2016 brings new developments to meet your needs and a lot of optimizations of models and performance.

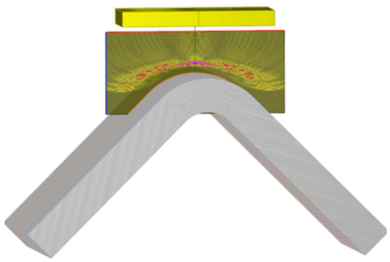
Discover and use these new features and enhancements to optimize your simulation studies or analysis of experimental results!

Modeling **complex welds** (made of Austenitic steel for example) is now more precise through the use of a **continuously variable model** which allows you to take into account not only the acoustic properties of the material, but also the orientation of the dendrites in the weld bead in a continuous way.



Weld modeled with the continuously variable model: the ultrasonic beam is deflected by contact with dendritic zones.

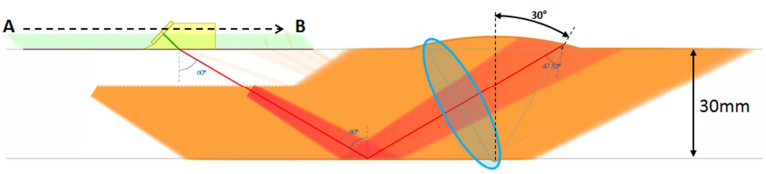
A composite option combining different features specific to **composite structures** is now included in CIVA. It lets the user easily define bended composites, stiffeners and stacks of composite plies. New phenomena and types of defects such as structural noise, epoxy layers between fiber layers and ply waviness can now be taken into account with the emergence of an add-on model based on a **coupling of Semi-Analytical calculations and 2D Finite Differences methods** developed by Airbus Group Innovations. This module also provides the visualization of beam/defect interaction snapshots within the composite structure.



Beam radiated according to the SAUL algorithm on a composite specimen

For phased−array probes, the **SAUL** (Surface Adaptive ultrasounds) **algorithm**, which enables an iterative adaptation of an incident wave at the surface of a complex geometry part, is now available in CIVA UT.

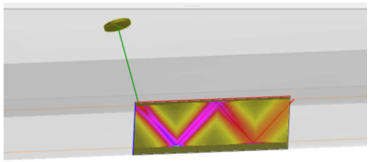
The ray tracing has been greatly optimized to visualize the **zone coverage for the whole scan plan**, the divergence of the field and also the angles of the different skips.



V-weld inspection with a conventional 60° shear waves probe – geometrical zone coverage.

A new model to **avoid the "planar wave" approximation** for the "beam - defect" interaction has been implemented in CIVA UT. This allows you to simulate more accurately the response of defects located in the near field zone, but also when the ultrasonic beam is diverging as observed with TOFD probes.

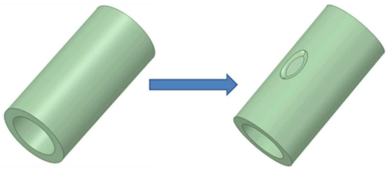
In the previous versions of CIVA only direct and one reflection on the backwall was available in the beam computation module. **Multiple skip reflections** can now be accounted for in the **beam computation module**. This new version also allows the user to compute L, T waves, or both, to specify manually the list of modes to be computed (to take account for mode conversion or not, and define the number of specimen boundary reflections) by loading a .text file with the different modes to be modelled (several skips, internal reflections, mode conversions between layers…).



Multiple skip reflections can now be accounted for in the beam computation module

CIVA 2016 now gives the possibility to simulate **Phased-Array EMAT probes** with computation of delay laws.

CIVA 2016 offers the option to account for geometric deformations in the simulation with the option named "Depression" which locally modifies the surface of a specimen.

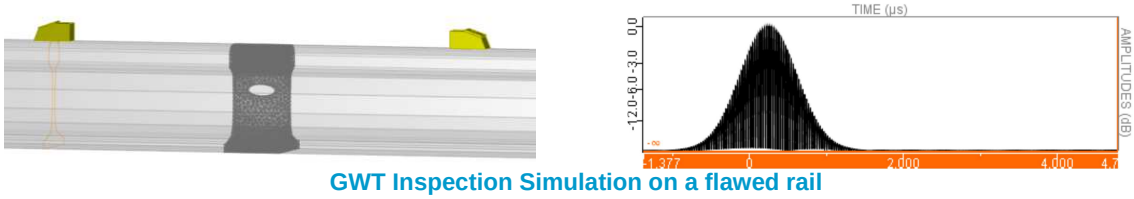


Visualization of the depression on a specimen

The "Analysis" module has been enriched with new tools such as the **procedure automation** (presetting of the analysis operators with a semi-automatic application of these and improvement of automatic actions on data), the arrival of **merged views** (mix of data acquired by different transducers in the same file) and **reconstructed views with multiple skips**. It is now also possible to add filters on indication tables and to create customized profiles to facilitate procedure application, reduction of repetitive tasks and management of multiple customers, standards and codes.

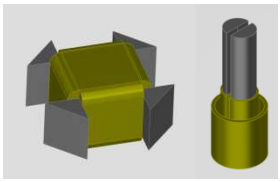
Please, remember that CIVA Analysis allows you to read data acquired with M2M®, GEKKO®, Omniscan® (RDT, OPD, OUD) systems, but you can also read the data acquired by other systems through the application of a development kit including a plugin for data reading!

The computation algorithms of the **Inspection Simulation** module for GWT have been improved in order to consider flaws on **2D CAD profiles** (for example railway tracks).



GWT Inspection Simulation on a flawed rail

More complex probes have enriched the CIVA ET probes database, such as the "**+Point like**", the "**Rototest like**" which will be defined with their Ferrite Core, or the "**X-probe like**".



"+Point like" and "Rototest like" probes.

In addition, the design of **Eddy Current arrays** has been enhanced with a new interface dedicated to this purpose.

The **fretting wear** defects (typical of the wear in outer wall of the tubular heat exchanger due to friction of the outer elements) can now be modeled.

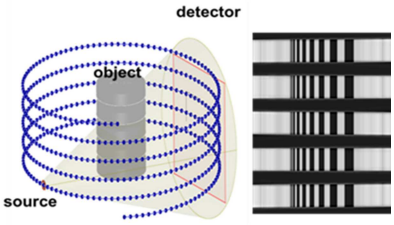
Finally, with the development of heterogeneous 2D CAD parts in the axisymmetric 2D module of CIVA ET, you will be able to model the inspection of steam generator tubes with support spacer plates or localized deposits.

To realize inspections of thick components, a library of spectra for high-energies sources (**linear accelerators and betatrons**) has been added in CIVA RT and CT.

The filtering options for the source and detector have been modified to let you model multiple filter layers and a filter positioned behind the detector.
In addition, thanks to a new option available in CIVA 2016, you can now take into account the radioactivity from a specimen to be inspected and evaluate the impact of back-scattering radiation on the quality of your radiographs!

Advanced detectability criteria are also available to help the user in analyzing the resulting images and providing information regarding the detectability of a given flaw.

In the computed tomographic module, you can now simulate **helical displacement** to overcome the artifacts observed on long objects for circular displacements.

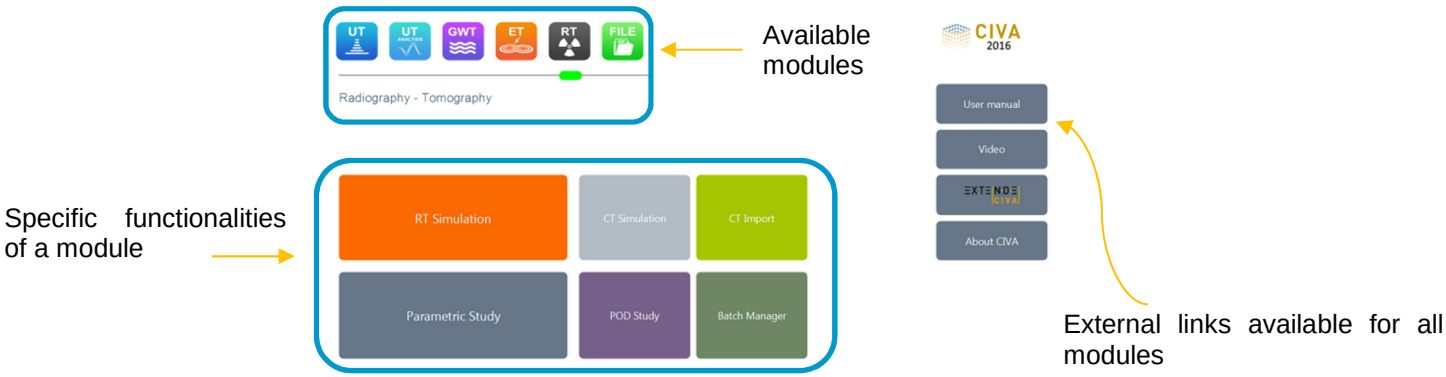


3D view and result of reconstruction using FDK algorithm of tomographic phantoms for a helical displacement.

The analysis bar, already existing in CIVA UT, will now be available for all modules, with tools specific to each module. Thus, you will find all the tools necessary for your analysis in the same place and in a single click!

Analysis bars available for CT and ET modules.

The CIVA GUI has been reinvented to be more pleasant and convenient to use. All features related to the modules you want to use will be combined in a single window. The navigation within CIVA menus has also been enhanced.



New CIVA GUI to access to the different functionalities.

Performance optimization and bug corrections

Many developments have been made to expand the capabilities of CIVA. Many efforts have also been made to reduce the time of calculations, including the parallelization of some calculation processes in the CPU and GPU; but also corrections of the malfunctions brought to our attention during the past year. You will be personally informed of the correction of bugs which you reported to us, at the moment of the delivery of this version.

We hope you enjoy this new version and its many improvements. Of course, we are pleased to continue collecting your feedback on CIVA. Your input drives what features will be added and improvements made to CIVA in the future!

Please find a complete description of CIVA 2016 on our website: www.extende.com