CIVA 11

The simulation platform for NDE

Keeping up the progress started with CIVA 10 and building upon your feedback, **CIVA 11** brings major advances that provide many new simulation possibilities to the users. This version also includes architecture and model improvements, leading to both higher performances and more precise computations. Finally, many efforts have been done to make the software much more user-friendly. Don't miss this new version which makes **CIVA 11 even more of the ultimate tool for NDT simulation**.

New capabilities: CIVA 10 introduced 3D CAD complex homogeneous component geometries in CIVA. With CIVA 11, **3D CAD heterogeneous specimens** are now available in CIVA UT and CIVA RT-CT, thus greatly expanding the potential applications of CIVA: Assembled structures, welds in complex components, cladded 3D geometries, accounting for change of acoustic properties due to heat-treatments, simulation with multiple objects allowing considering some **backscattering phenomena** in RT, etc. The limits are just your ideas!

In ET, a new axisymmetrical tool replaces the former Multiple Winding module and increases the capabilities as it allows simulating some defect response configurations in **tube transition zones** with its tube sheet (heat exchangers), or tubes with an irregular profile defined by a 2D CAD sketch. Regarding tubes, the electromagnetic field can now also be calculated and displayed in cylindrical geometries in the CIVA ET Field Computation module. Complex shape coils, automated flaw meshing… are just a few of the new features of CIVA ET.

In RT-CT, **image plate detectors are now available** bringing CIVA significantly into the world of **Digital Radiography!** Numerous new probes and sensors are also proposed to the UT and ET users: **EMAT probes** can now be simulated based on a coupling between CIVA UT and CIVA ET (non ferromagnetic materials). In UT, advanced **custom UT phased-array probes** joins the CIVA library, and come together with a new intuitive tool for phased array sequences definition. In ET, a set of new shapes of coils are now available (D-coil, spiral, meander, racetrack, etc.).

Introduced with CIVA 10 for ET and UT, it is now possible to compute **POD simulations in the RT module** in which some **automatic detectability criteria** have been implemented. The new ability to assess flaw detectability makes the simulation of RT even more useful.

Aiming at getting closer to acquisition systems, one major feature is the ability to define one or several **gates** in CIVA UT as you would do in a real system. CIVA is now compatible with acquisition files from **OMNISCAN® data files** (needs to contact Olympus to update your Olympus dongle), thus benefitting from CIVA's cutting edge viewing and post-processing on your Omniscan® data! These are really important steps which prepare the fields for future CIVA evolutions. In the same way, in the CT module, you can now import **CT acquisition files**, meaning that you can simulate and **try various 3D reconstructions on real data!**

Better performance and more precise: Continuous architecture and model improvements can keep account for more and more phenomena while improving accuracy and calculation times.

In the UT module, a major improvement is the implementation of a new model for computation of **specimen echoes**. This permits a **dramatic reduction of the computation time regarding specimen specular echoes** calculation which used to be very long with CIVA 10. This new model also allows computation of **interior specular interface echoes** (in multi-volumes or multi-layers configurations for instance). A new model for defect scattering, "KGTD", allows **calculating at once both specular and diffraction contributions** of a defect echo (while you had to do 2 separate calculations before). In **TOFD**, the **lateral waves computation have been enhanced** to better account for curved interface and shadowing effects and is available in more configurations. The "SOV" exact model has been extended to most of the volumetric flaws (spherical, cylindrical). Finally, a new model has been developed for the calculation of attenuation of noise due to the grain micro-structure. This new model is both more precise and easier to use as the existing one in CIVA 10.

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In ET, a specific model has been implemented to precisely account for **crack-like thin flaws**. Flaws can also be combined to simulate complex flaws or to add cracks at a bore hole. The ET supply system can also be accounted for in the model with the ability to introduce **cable electrical parameters** (by circuit coupling) and to define either a voltage source or a current source.

In RT, the Monte-Carlo has been improved to account for **pair creations**, leading to a better accuracy for high energies, especially for X-Ray accelerators. With the new digital detector model, the model also accounts for the effects of a reinforced screen.

All these improvements come along with a **massive parallelization** of the code on CPUs **allowing users to compute much more in much less time!** Additionally, **calculation times are now predicted** at the beginning of the simulation which should help the user to gain a lot of efficiency when organizing his/her simulation studies.

Even if CIVA still runs on 32 bit computers, it is now definitely advised to move to 64 bit machines to fully benefit from these improvements. This new version can work with the new OS Windows 8 (and is still compatible with Windows 7 and XP)

More User-Friendly: Good software has to be not only powerful but also easy to use. After a big change in CIVA 10, some important efforts are still done in order to make CIVA 11 even more user-friendly.

In CIVA UT, some classical work pieces can now be created automatically in a parametric way such as many **weld profiles** (V, X, J bevels, etc.): you will save a lot of time! Another new tool available in CIVA UT is the capability to automatically find the best location and the best steering angle for a UT probe depending on a given flaw: It can be a really useful feature to help preparing inspection plan! The Signal, Phased-array, and Simulation Settings **panels have been redesigned for an easier use. Analysis features** have been strongly enhanced: **identification of wave modes** on scan views in UT defect response, a tool expected for years by most of the users! Calibration can now be performed and modified in post-processing. Other tools have been created such as a mouse-click distance measurement on images or Depth and Time-of-Flight Cscans, specimen views with volume rendering … tools for TOFD analysis (calibration for depth measurement, hyperbolic cursors).

In CIVA ET, the **mesh of the flaws** is now proposed in an **automated** way, which will simplify a lot the use of this module. The ET analysis environment interface has also been greatly improved and completed with new tools. Still in ET, **lift-off signal curves** are now available directly, a very useful feature that was missing before! **Frequency response curves** can also be simulated.

In RT, the user can now **target an optical density** to quickly find out the relevant exposure time as an output.

POD and parametric variation features have been enhanced with a new way of defining uncertainties and variations. The POD page has also been redesigned to offer more features like direct data selection and graphical statistical tests.

Finally, **CIVA ATHENA2D module is integrated in the same environment** for an easier interoperability with CIVA UT.