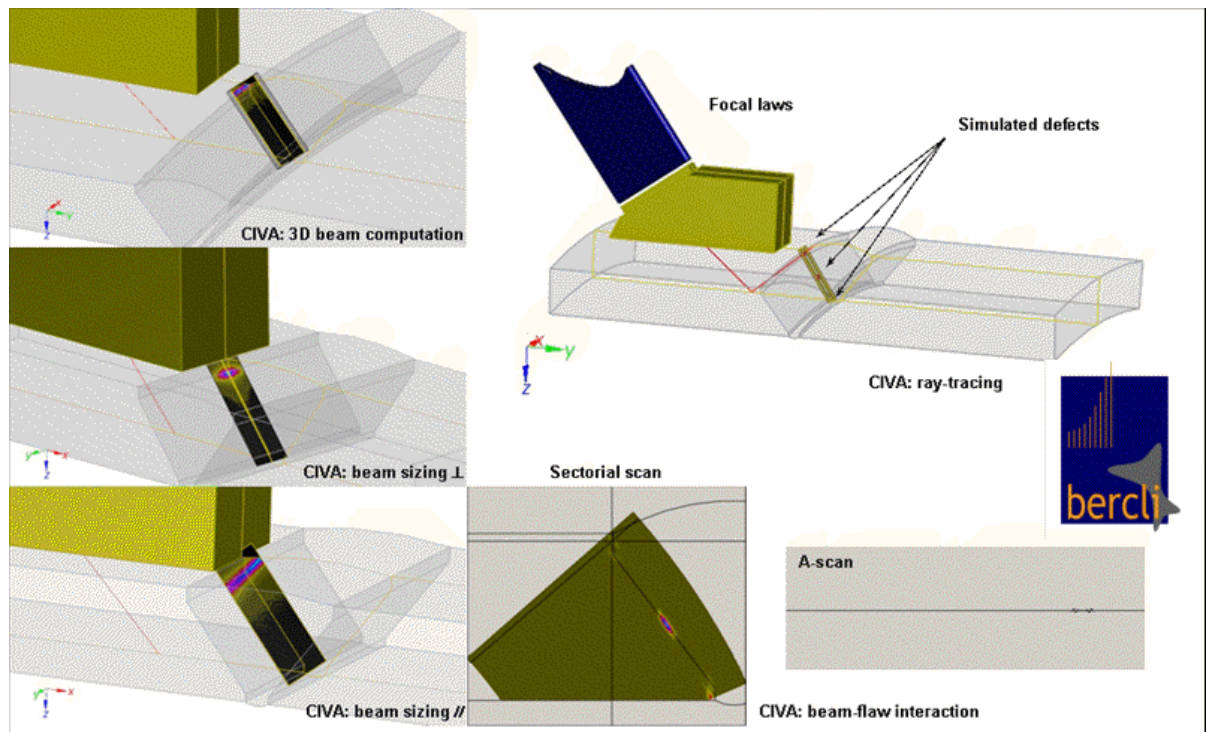


Weld inspection using phased arrays – Filling zone (1/2)

This excerpt is taken from a simulation study that aims to determine the best scanning plan for the inspection of the weld described in the figure below. The most common defect is a lack of fusion that typically occurs at the perimeter of the weld filling zone, at the interface with the surrounding material.

In this case, an existing probe will be used to perform the inspection, so the objective of the simulation study is to determine the optimal number of elements to be used simultaneously to form the acoustic beam. In the illustrated example, all 64 elements of the linear array are used together. The beam profile is evaluated using CIVA (see left side of the animation file). The focal spot resolution, as well as the loss of amplitude, can be quantified as a function of the depth. The simulation is performed iteratively until a satisfactory beam profile is obtained (good resolution and consistency in size for every targeted focal spot).





Weld inspection using phased arrays – Filling zone (2/2)

A sensitivity study can then be performed using the chosen probe configuration. Several defect locations, sizes and orientations can be entered to perform an exhaustive parametric study. Quantitative results are given in terms of the ratio of the signal amplitude for the test case and the amplitude obtained from a reference defect (usually a side-drilled hole in a calibration block of the same material). The simulation results are therefore expressed in relative terms. To calibrate the simulation results so that they can be directly compared to experimental data, measurements are performed on a calibration block containing the reference defect used in the modeling study. The simulation results can then be used to determine the sensitivity of the inspection procedure.