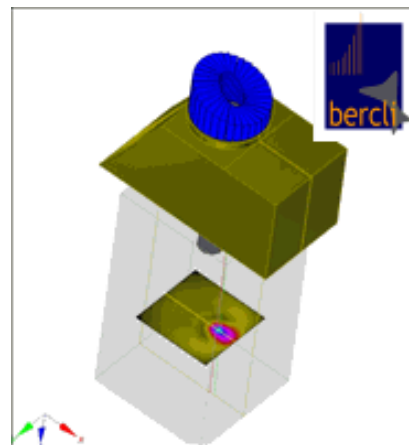
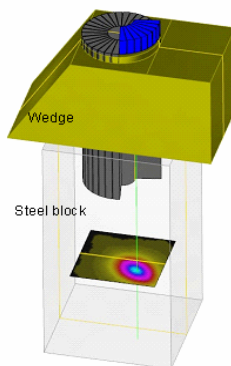
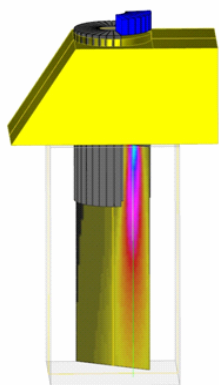


Fastener-hole inspection in pulse-echo mode

The goal of the work was to determine the resolution possible using a “daisy” probe used for the inspection of fastener holes. The concept is to place the probe on top of the test specimen to look for cracks that tend to radiate out from the fastener holes. Using CIVA, several inspection strategies (varying the number of elements used and their delay laws) were investigated (see Figures below).

The client specified the required resolution, and also imposed constraints on the size and cost of the probe, which limited the number of elements that could be used in the probe design. The simulation results allowed the tradeoffs among cost, size and performance to be evaluated, along with the characteristics of the radiated beam.

Beam simulation when all elements of the probe are fired in parallel. A horizontal slice of the radiated acoustic beam centered at 20mm depth is illustrated.



Beam simulation using 8 elements at a time. In this case a multiplexed configuration is used to perform electronic scanning by sequentially firing groups of 8 elements. The beam profile and a horizontal slice of the radiated acoustic beam at a depth of 20mm are illustrated (left- and right-hand pictures, respectively).