



**CIVA**  
N·D·E | 11

Simulation Software for Non-Destructive Testing

## Application Example N°3

# Design and selection of a probe/source

## Background

When **designing** an ultrasonic, eddy-current or radiographic **inspection, the choice** of transducer/sensor/source is fundamental.

Experience may inform the decision, but careful analysis is usually required to ensure that requirements are met and that the probes (or sources) **do not end up unused** on the shelf.

A wrong choice is **costly**, and greatly increases the development and implementation **time**.

## Benefits

Using CIVA to design a new inspection procedure, you can:

- **Choose** from a **virtual catalog** of ultrasonic transducers, eddy-current sensors and X-ray sources and easily confirm the design.
- **Design** a new sensor or probe, or change the parameters of your X-ray source, without investing time or money on unusable prototypes.
- Improve and test the **reliability of your choice** through **simulation**.
- Invest wisely by **optimizing** the probe/source for the application.

Thus, you **reduce the cost, time and risk** of design, testing and implementation.

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# Design and selection of a probe/source

## Case study

### Design the most appropriate sensor

#### THE PROBLEM

When designing an inspection, an **accurate description of the material** properties is essential.

For the weld discussed here, taking account of the material heterogeneity and anisotropy inside **the weld allows computation of ultrasonic propagation**, which **depends on the position** of the probe with respect to the weld.

**Performance can therefore be optimized** by determining the most advantageous probe design and measurement position.

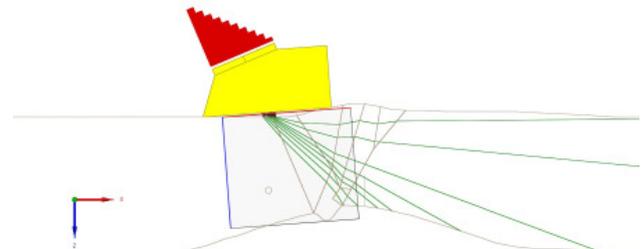
#### CIVA'S CONTRIBUTION

CIVA simulation allows you to **check and validate the inspection before** investing in probes and mockups.

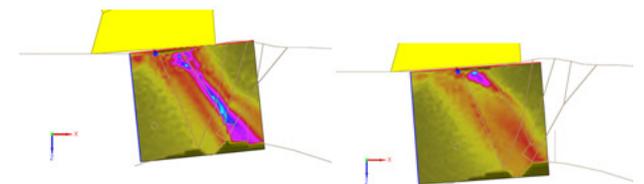
Before launching experiments, CIVA helps you to make the most appropriate initial probe selection.

At all stages of design and implementation, you can avoid significant expense and time delays.

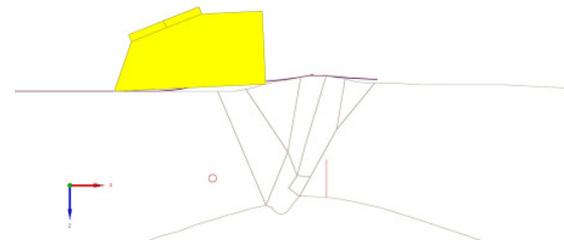
**Result:** less mockups, less testing, less risks of inadequate probes, improved reliability.



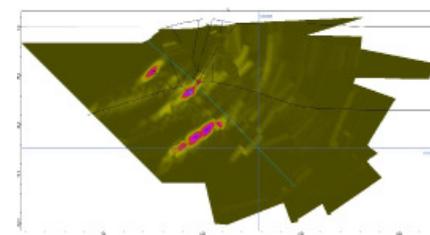
Influence of material properties in the weld on ray tracing at a specific position.



Calculation of the ultrasonic field for two probe positions.



Defects embedded in the weld.



Simulated B-scan (corrected for geometry) for L and S waves. This figure shows that the selected probe did not detect the defect (notch) located on the backwall after the weld.

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