CIVA N·D·E

Simulation Software for Non-Destructive Testing

Application Example N°14

Optimize rail and wheelset NDT inspections

Background

As a professional in the railways sector, you face complex inspection issues.

- In the case of **rail track** inspections, you face **high productivity constraints**. Looking for a faster and more automated method, to reduce the need for a manual inspection, you also try to improve your **sizing** abilities.
- Also, in the case of **wheel, or wheelsets**, some **accessibility constraints** may occur. To avoid disassembling, you need to look for an easier alternative inspection method.
- You also have to prove or reinforce the **reliability** of your in-service inspections as their results will have an important impact on the maintenance operations (change, repair, keep as it is, etc.).
- Finally, you need to **convince your customers** of the accuracy of your diagnosis.

Benefits

One of the advantages of CIVA simulation is to **launch many trials** that will help you in **choosing the optimized method and technique** (probe, angle, etc.). Giving you easily a comparison between different alternatives, such optimization will help to **define faster or more robust inspection techniques** (more results with less probes, less scanning, easier analysis, etc.).

Developed in partnership with the CEA, CIVA integrates the latest developments to give you the opportunity to **try innovative techniques** for your applications (Phased array, EMAT, GWT, TOFD). Set up new inspection methods thanks to CIVA and **confirm your choices.**

When having to define the inspection cycles based on the damage tolerance curve, you need to know the smallest defect that you can detect with a sufficient Probability Of Detection (POD). CIVA will assist you to **reduce dramatically the number of experimental trials** in evaluating by simulation the influential parameters, and calculating their impact on the POD curve.

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Case study

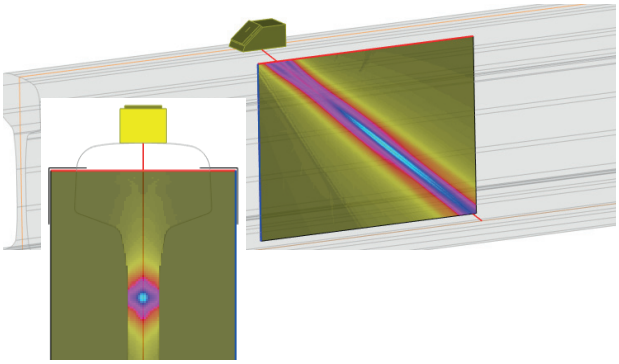
Predict defect responses at different locations

THE CHALLENGE

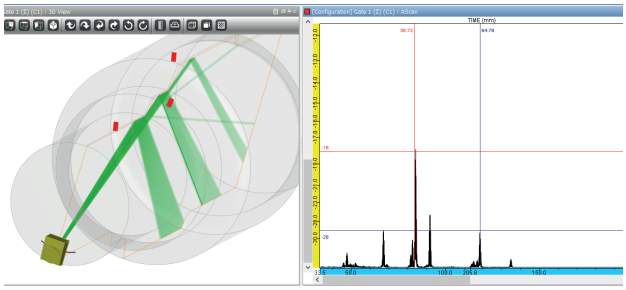
First of all, a beam computation can be very useful to check the **sensitivity zone** of your probe and the **access to the inspection zone** that can be difficult in case of a complex geometry**.** In CIVA, you can launch a beam calculation and characterization in any plane.

After that, in the inspection simulation module, you can predict the defect detectability and compare sensitivity through the depth to find the right methods and prepare your inspection.

When defining an inspection method, the challenge is to optimize performances to speed-up the inspection but also to do that while greatly reducing the number of trials and mock-ups. CIVA simulation can help you to achieve both.



Beam computation in a rail component.

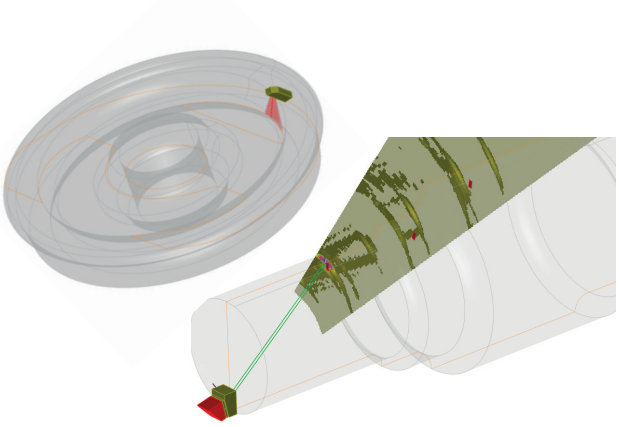


Rotating probe from the axle end. The three defects simulated will help estimate sensitivity for different defect locations and/or sizes.

CIVA'S CONTRIBUTION

For example, CIVA can simulate efficiently realistic and various NDT configurations:

- Draw or import the CAD profile of the rail, the axle or the wheel components.
- Insert many types of defects: various shapes, orientation and locations.
- Evaluate and compare different NDT methods in the same software and the same interface: UT, ET, GWT, RT.
- Compare conventional to advanced methods (e.g. phased-array, Eddy Current Arrays, TOFDT, etc.) to evaluate before investing in such innovative technologies.
- Study the impact of influential parameters (technical justifications, POD studies, etc.).



CAD files imported into CIVA. Wheel including a conventional UT probe and wheelset incluging a phased array probe.

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