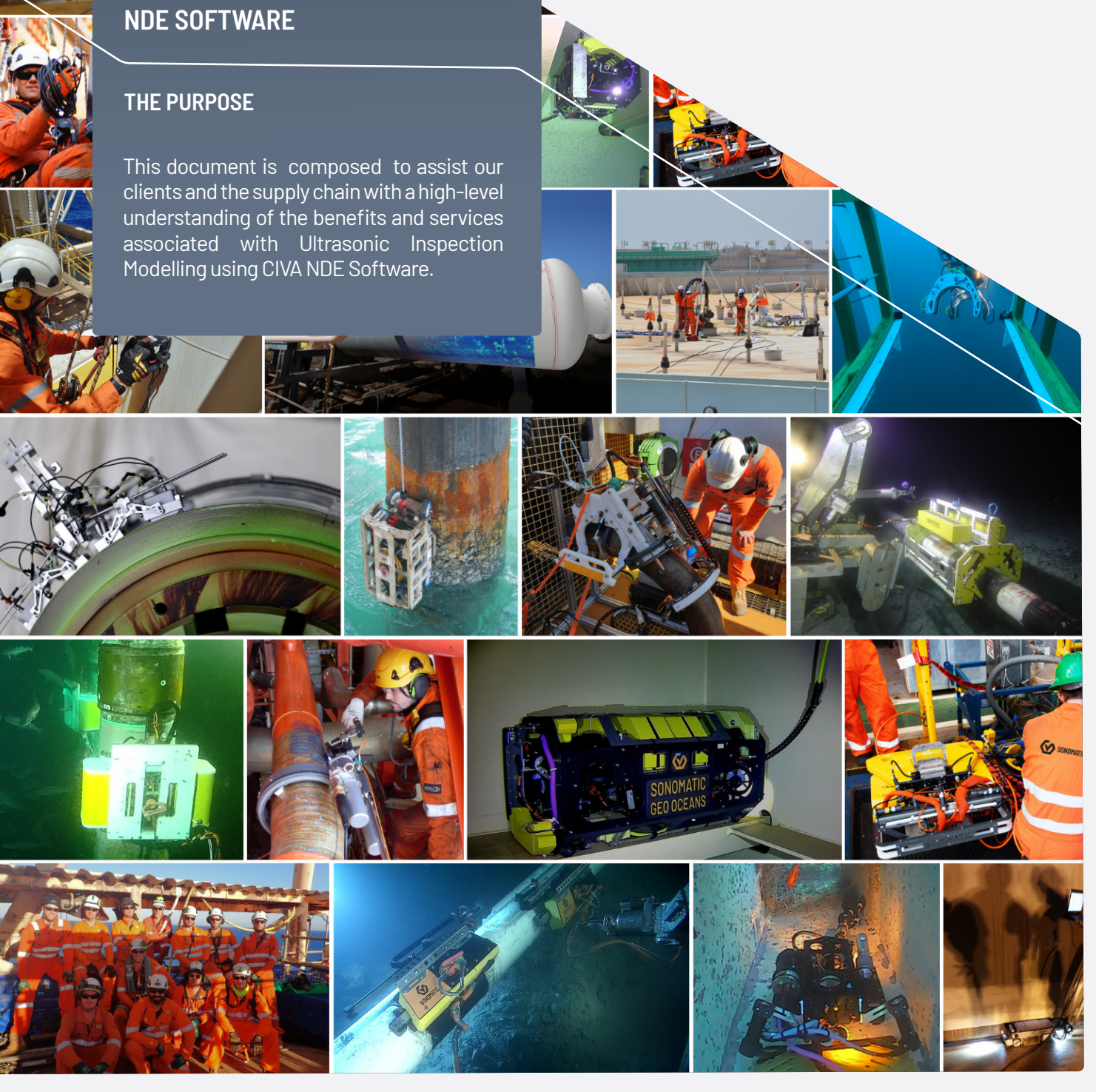
DATA SHEET

ULTRASONIC INSPECTION MODELLING USING CIVA NDE SOFTWARE

SONOMATIC

THE PURPOSE

This document is composed to assist our clients and the supply chain with a high-level understanding of the benefits and services associated with Ultrasonic Inspection Modelling using CIVA NDE Software.

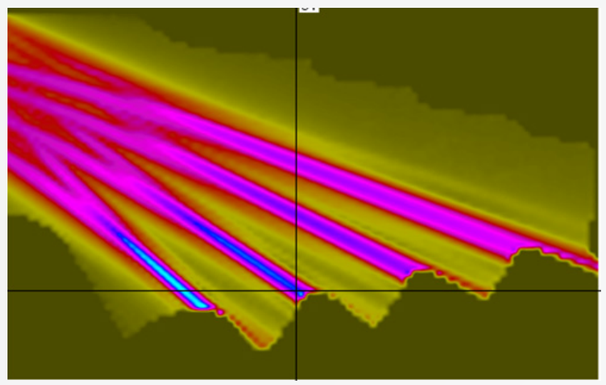


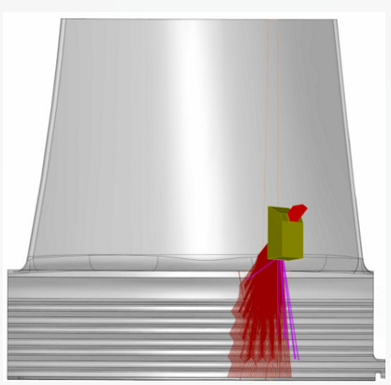
ULTRASONIC INSPECTION MODELLING USING CIVA NDE SOFTWARE

Ultrasonic inspection is widely used in the nuclear, energy and oil and gas sectors to determine the condition of equipment. In general, the objective is to identify and, if possible, quantify any degradation or defects that have the potential to threaten the integrity of the equipment. There is an increasing emphasis on determining the performance of an inspection campaign. This has typically been addressed in the past by validation trials on test pieces with built-in defects. However, the costs of such an approach are normally high and lengthy timescales can be involved.

Ultrasonic modelling is an attractive alternative to validation trails that allows rapid and accurate assessment of the performance of an inspection. It also facilitates optimisation of the approach to inspection through the evaluation of different parameters.

Sonomatic use CIVA NDE ultrasonic modelling software. The software was originally developed in the French nuclear industry and is now used extensively in a range of major industries including power generation, aerospace, and oil and gas. CIVA is widely viewed as setting the standard for ultrasonic modelling and has been extensively validated. The software allows evaluation of ultrasonic beam properties and interactions with a range of defects. Inspection situations can be simulated by specification of the component's geometry and material properties, the probe characteristics, the inspection approach and the defect type and location. The output from CIVA is available in a variety of forms including the typical a, b, c and d scans that would be obtained from an ultrasonic inspection.





APPLICATION

Sonomatic's application of the CIVA NDE software covers the following areas:

- **Development and evaluation of inspection approaches for specific applications.**

  This typically covers complex geometries where beam paths/profiles would be difficult to assess accurately without detailed analysis.

- **Demonstration of the capability of an inspection with respect to detection of specified defect sizes and locations.**

  Modelling can be used to provide the assurance that the inspection has a sufficiently high probability of detection for defects of concern (e.g. at limiting sizes as defined by an engineering criticality assessment).

- **Assessment of the sensitivity of inspection performance to system variables.**

  Modelling provides an understanding of those variables, e.g. probe skewing, misalignment, probe position, to which detection capability is particularly sensitive. This knowledge is then used in ensuring the required level of control when carrying out the inspection and in defining the potential limitations of the inspection.

- **Assessment of areas covered by the inspection.**

  Beam modelling is used to identify the extent of internal coverage for a given probe.

- **Development of delay laws for phased array inspection.**

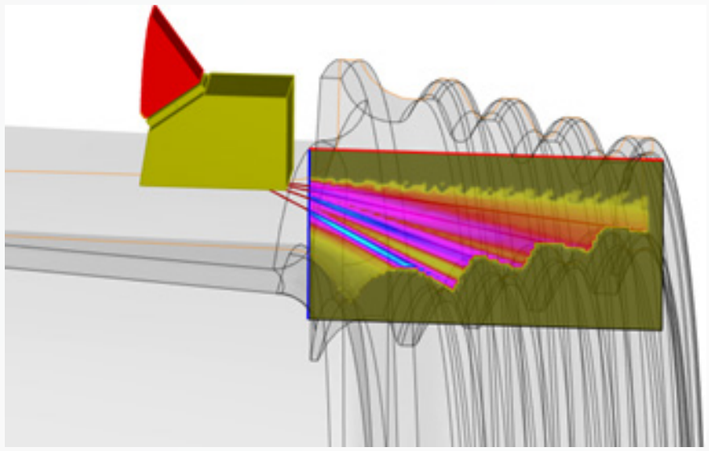
  Modelling is used to optimise phased array inspection of specific geometries and defect types.

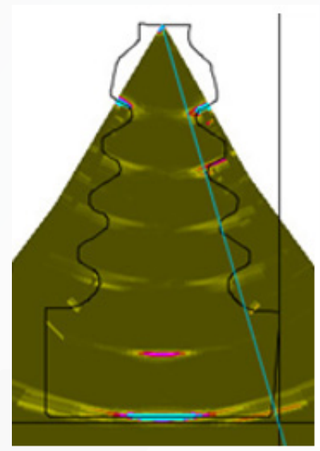
SUMMARY

Analysis can be carried out on a wide range of geometries, from simple parametrically defined plate and pipe models, through to complex nozzles and 3D CAD defined components. Existing 2D and 3D CAD models can be imported for subsequent analysis.

The software caters for a range of defect types including planar flaws (rectangular, circular or CAD defined), side-drilled holes, flat-bottom holes, hemispherical-bottom holes, spheres and 3D CAD defined shapes.

A range of ultrasonic inspection approaches can be modelled including single-probe compression and shear-wave pulse-echo, twin probe "pitch-catch" arrangements, twin probe time of flight diffraction and phased array inspection.





QA AND HS&E

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