

# **InspeCT - A New Computed Tomography System for NDT of Subsea Pipelines**

**Irene Pettigrew<sup>1</sup>, Ashley Barker<sup>2</sup>, Anthony O'Brien<sup>2</sup>, Alex Cesan<sup>1</sup>**

<sup>1</sup>Advanced NDT, Sonomatic Ltd., Australia, <sup>1</sup>R&D, Petritek, Australia

With under half of the world's oil and gas pipelines assigned as unpiggable, an alternative inspection solution is necessary where in-line inspection (ILI) is not possible. In addition, ILI verification is required on regions of interest on piggable pipelines. The alternative non-destructive testing (NDT) practice to ILI is inspection from the outer diameter of the pipeline. Close proximity to the pipeline is a requirement for ultrasonic testing and electromagnetic technologies meaning that common thick coating materials including concrete weight coat and polyurethane will require removal as well as any remnant marine growth for these solutions to be deployed. It is therefore imperative that the correct location and span for coating removal is identified to verify the ILI results. Two important reasons to inspect without the removal of the coating are to avoid a costly and lengthy campaign of removal and re-instatement of coating particularly when the coating and pipeline has no degradation, and secondly, reducing the risks associated with exposing the pipeline to new integrity threats from the first activity including pipe damage, anomalies with the coating application and corrosion under coating. Using Computed Tomography (CT) for 3D spatial analysis is a well-established technique primarily used in the fields of medical imaging and precision defect analysis of materials such as aircraft alloys. Despite wide use in these industries, CT technology is not a commonly deployed technique for asset integrity within the Oil and Gas sector. This paper discusses the redesign of the traditional CT approach to optimize scanning for high-density target volumes by implementing a ground-up approach to all hardware and mathematics. The advanced algorithms used in the InspeCT technology enables a novel technique for image reconstruction; allowing for cleaner images than are possible using traditional CT whilst using less data and hence smaller radioactive sources. Case studies are provided where InspeCT technology eliminates the requirement to remove protective pipeline coatings to evaluate common pipeline integrity challenges including corrosion under insulation/coating, internal pitting and corrosion, degradation of internal linings and corrosion resistant alloys, and detection and sizing of internal build-up of deposits and scale.