

## The Lab at Brookes Bell

The Lab at Brookes Bell's Non-Invasive Inspection Service provides full material evaluation to assess the structural integrity and safety of a vessel and also offers significant cost savings to vessel owners and operators

### *the challenge*

Non-destructive testing (NDT) is essential for various industries, particularly those involving critical infrastructure like ships and offshore vessels. It is also crucial for the safety of these types of structures as it allows for the early detection of potential flaws and structural weaknesses without causing any damage. Regular inspections help ensure that materials are free of defects, such as cracks or corrosion, which can compromise the integrity of the vessel. By maintaining the safety and reliability of these structures, NDT plays a vital role in preventing accidents, protecting lives, and ensuring compliance with regulatory standards.

NDT encompasses several techniques such as ultrasonic testing, radiographic testing, magnetic particle testing and electromagnetics, all aimed at identifying material defects without compromising the integrity of the structure. Understanding the specifics of each method, their applications, and the regulations governing them can enhance safety measures and operational efficiency.

Regulations governing NDT practices in maritime industries are primarily set by international organisations and national authorities. The International Maritime Organization (IMO) provides guidelines for the safety of ships and offshore structures, which include provisions for regular inspections. Additionally, classification societies, such as Lloyd's Register, DNV, and Bureau Veritas, establish standards for NDT practices that shipowners must adhere to for vessel certification. Compliance with these regulations ensures the integrity and safety of maritime operations, protecting both human life and the environment.

### *the innovation*

The Lab at Brookes Bell's non-invasive Corrosion Inspection Service – CMAP.

For over half a decade, The Lab at Brookes Bell has been developing and testing its comprehensive corrosion mapping service, known as CMAP, across all manner of inspection scenarios for the maritime sector.

At its core, The Lab's non-invasive CMAP technology has been developed to offer full material evaluation to assess the structural integrity and safety of a vessel and also offer significant cost savings to vessel owners and operators. The system is used to identify and understand the extent and severity of corrosion onboard a vessel while it remains in operation and without the need to remove the existing coatings. It enables owners to accurately understand the required repairs ahead of time before the effects of corrosion become too severe or result in significant lay-up time, resulting in improved cost management decisions for services and repair plans, as well as reduced downtime of the vessel. By using CMAP analytical data, vessel owners have the confidence to know their vessel remains in compliance with Lloyds Register.

The Lab's CMAP service consists of a highly refined Pulsed Current Array (PECA) inspection technique, the results of which are modelled using Brookes Bell's 3D data visualisation software and linked to a visual dashboard that creates a CMAP overview that highlights the condition of the vessel's steel, remaining wall thickness and material loss. For clients, CMAP provides comprehensive and easy-to-interpret data that enables them to make quicker and more accurate decisions and have a greater understanding of repair materials and repair time all resulting in significant cost savings.



The Lab at Brookes Bell team using CMAP technology to scan a vessel's deck

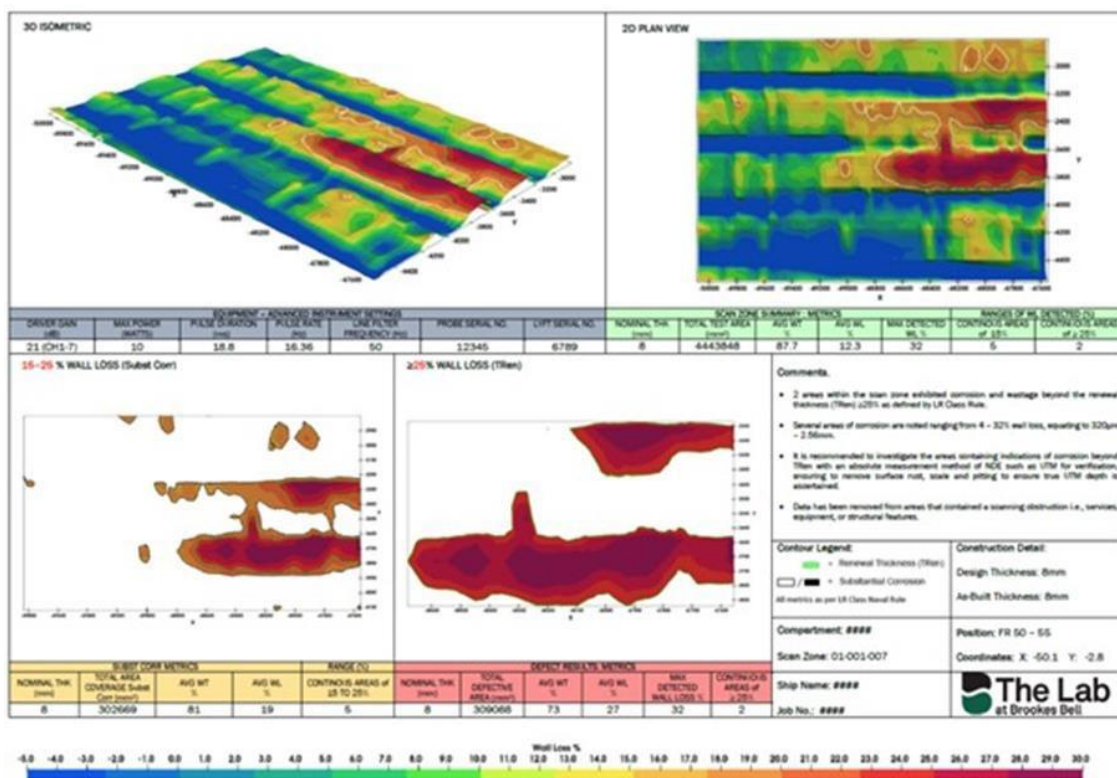
#### *how it was implemented*

PECA has been successfully deployed in offshore environments with ISO, ASME & API accreditations, and now the scanning technology has been improved upon and refined by The Lab for the marine sector. The method is proven to be an accurate tool, highlighting the condition of the steel, the remaining wall thickness/ material loss without having to prepare surfaces. To improve the usefulness of the scanning technology The Lab developed an in-house marine analysis and modelling software (CMAP).

In 2023, The Lab at Brookes Bell received official accreditation from the British Royal Navy's Warship Technical Authority (WTA) and classification society Lloyd's Register for its CMAP service.

The technology was tested and honed on the Royal Navy's Type T23 frigate vessels, landing platform docks, and several Ro-Pax ferries and superyachts in the commercial sector. This wide range of vessel types exhibit a range of corrosion that is typically seen around the world and enabled The Lab to develop a more comprehensive understanding of corrosion methods and how to use CMAP more effectively. CMAP has now been rolled out across the entire Royal Navy fleet.

The PECA technology developed by The Lab is the most thorough corrosion mapping and detection solution on the market due to its ability to assess through a myriad of surfaces, coatings and coverings, such as SynDeck, Camrex and hull fairing compounds, wooden teak and composite coverings, ceramics, antifouling and other cementitious screed and underlays. It is also effective on steel surfaces and can penetrate steel through paint coatings.



A sample report showing areas of corrosion

result

CMAP reports are particularly important for vessel owners and operators, as well as those involved in the management and maintenance of vessels. Corrosion on a vessel can often

compromise structural integrity and consequentially cause safety issues, which can culminate in expensive repairs, personal injuries and loss of earnings due to vessel downtime. The collective global cost of corrosion to shipowners is estimated to be as high as \$80 billion according to The Association for Materials Protection and Performance (AMPP).

By utilising CMAP technology and having a comprehensive understanding of corrosion issues affecting a vessel that may require immediate attention and forecasting repair costs prior to the vessel entering dry dock, ship owners and operators can make more informed decisions about the required repairs for their vessel and engage with stakeholders to provide cost-effective repair solutions ahead of time.

An example of how CMAP can provide cost benefits, for a typical superyacht, replacing teak decking on a selected area of the yacht could cost more than £150,000. This does not take into consideration additional costs from the shipyard for removing the teak and any other associated costs. Opposed to this is the cost for our technology to scan the same area of deck through the teak (therefore negating the need to remove it in areas where corrosion is not present) which would cost approximately £20,000 – equating to an estimated saving of over 86%. This provides considerable cost and time savings and reduces wastage from the unnecessary removal of teak deck.

#### *conclusion*

The Lab at Brookes Bell's CMAP technology is used by vessel owners to identify onboard corrosion and make more informed and quicker decisions for repairs, resulting in significant cost savings and reduced downtime. This tool translates data into visual and actionable findings so owners have a better understanding of issues affecting their vessel including the full safety of the vessel and its crew.

The early identification of corrosion benefits ship owners and operators in many ways: Identifying areas of potential failure allows crew and passengers to remain safe as they can be quickly cordoned off or repaired; Identifying areas of corrosion without removing decks, coverings or coatings allows for scanning to be done while the vessel or structure is still in service; Understanding the extent of corrosion allows for more cost-effective repairs or refits without the need for unnecessarily long downtimes or overordering of steel plates and other components.

With The Lab at Brookes Bell creating, developing, testing and implementing this unique approach to corrosion mapping, Brookes Bell has shown real innovation – helping to provide a quick and cost-effective method of ship and offshore vessel maintenance and providing a safer environment for both crew and passengers.

LINK: <https://thelab.brookesbell.com/>

