



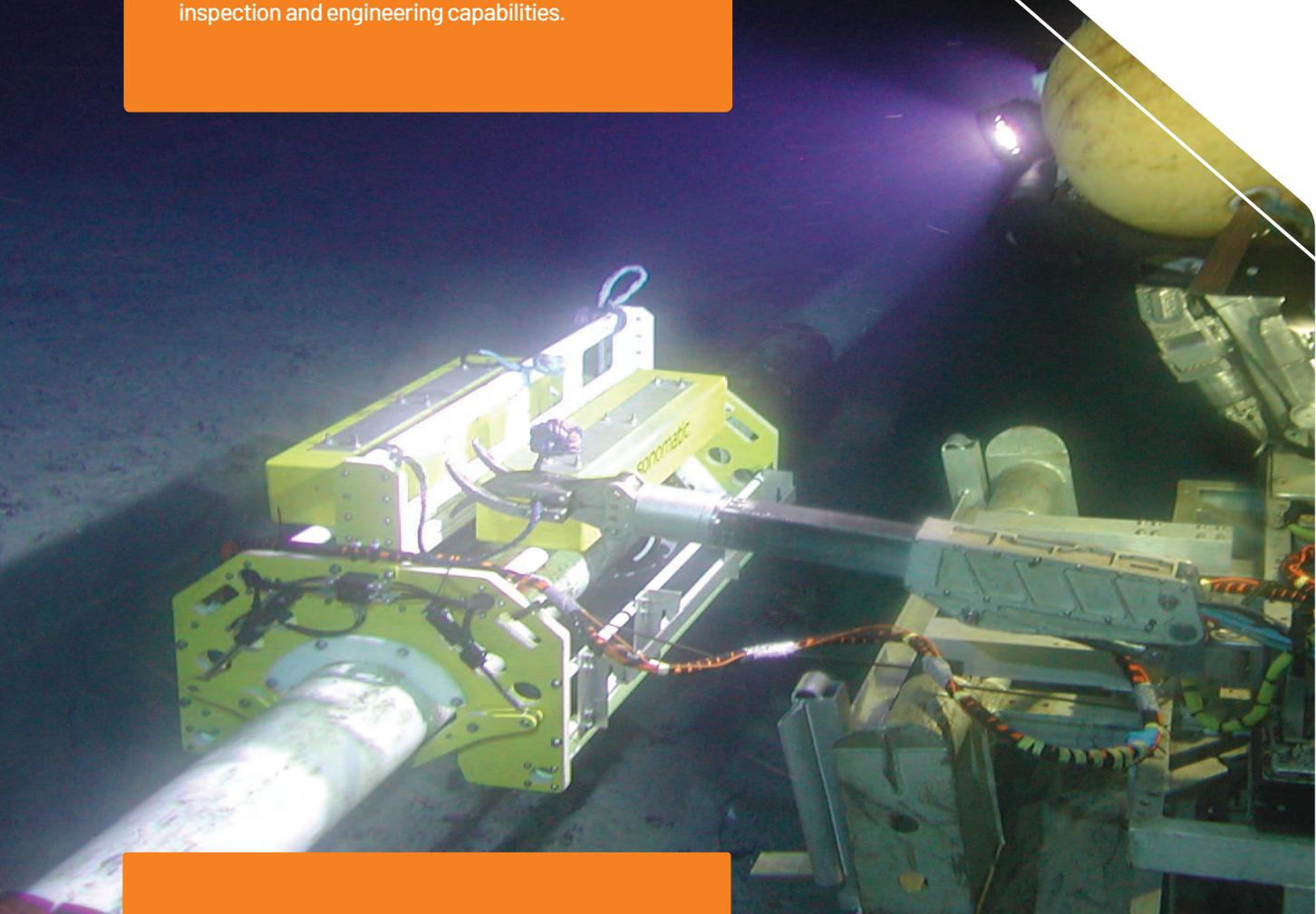
SONOMATIC

CAPABILITY STATEMENT

SONOMATIC SUBSEA

THE PURPOSE

This document is composed to assist our clients and the supply chain to understand our group operating structure along with a high-level understanding of the benefits, services and specialist packages associated with our inspection and engineering capabilities.



WHO WE ARE



The CWL Group is an international consortium of companies that delivers a comprehensive range of asset integrity, inspection, maintenance and specialist access services across a wide range of industries and sectors.



Sonomatic is a subsidiary of the CWL group specialising in NDT inspection design, development and application combined with integrity engineering capabilities, and have been servicing many industry sectors since the 1980s.

Sonomatic brings innovation and bespoke inspection solutions to the market through in-house development of equipment, software and robotics, to reside as the global market leader for ROV-deployed subsea inspection and Non- Intrusive Inspection (NII) technologies.

Sonomatic is committed to providing accurate proactive inspection and engineering solutions that enable Clients to manage the integrity of newly constructed and maturing assets, while making informed and cost-effective decisions crucial to the life extension and safety of asset life.

GLOBAL FOOTPRINT



WHAT WE DO

Sonomatic provide integrity engineering and NDT services at every stage of a project's life cycle. NDT subject matter experts assess each scope of work individually to ensure that the inspection solution(s) will meet the desired deliverables. If a unique solution is required, our R&D department can design and manufacture inspection technologies and scanners that will exactly meet our client goals. Our integrity service offerings provide industry leading inspection & engineering evaluations of the inspection data to enable recommendations for repeatable inspection programmes.

SUBSEA



ONSHORE/ TOPSIDE



RESEARCH & DEVELOPMENT



INTEGRITY SERVICES



SUBSEA

Our primary inspection philosophy is that design and execution may require one or more solution depending on the expected defect mechanism, distribution, severity, location and what information is necessary to make an assessment of the condition of the asset.

Our portfolio of NDT technologies can provide qualitative (screening/discovery) and quantitative (sizing) information to meet those inspection deliverables. These can be applied on piggable pipelines in lieu of in-line inspection (ILI) and/or for ILI verification and on unpiggable pipelines and structural components. It is common practice to use a strategic approach to maximise productivity on a subsea campaign by using the discovery technologies to prove the absence of damage, and where any features of interest are located and require critical sizing, then these can be assessed using quantitative methods.

Sonomatic support the development of inspection technologies, specialising in the design and manufacture of a large range of custom-built ROV-deployed and diver deployed scanners that can be mounted via magnetization or hydraulic clamping to the component.

INSPECTION TOOLS

MAG-ROVER



MAG-ST



MINI-MAG



MAG-NAUTILUS



MAG-CRAWLER



RAPTOR 2



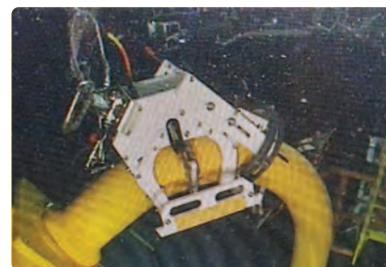
ROV-IT



NAUTILUS

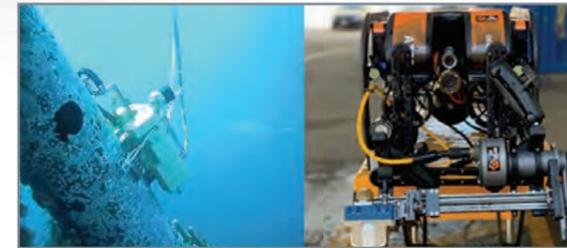


BEND SCANNER



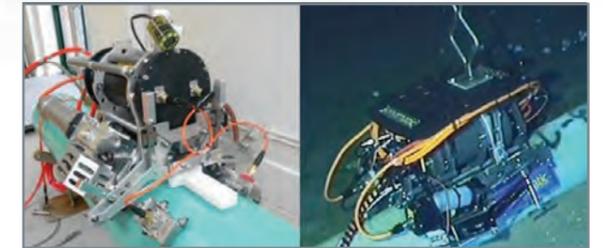
CASE STUDIES

KEY SONOMATIC SUCCESS STORIES



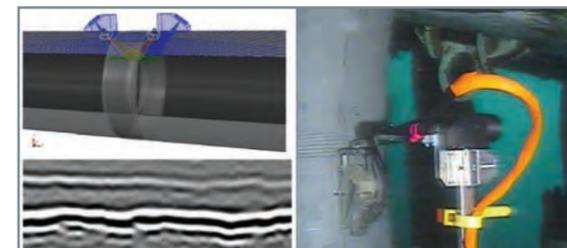
ASSET DEPLOYED ADVANCED NDT

Sonomatic was contracted to deploy ACFM and Ultrasonic Corrosion Mapping on critical risers. A detailed feasibility study identified Sonomatic's Mag-Nautilus deployed by Geo-Oceans' vLBV suitable for the work. A multi-disciplined ROV and Advanced NDT team were mobilized to the facility for the work. All deployment was successfully carried out directly from the facility deck. ACFM and ultrasonic corrosion mapping was completed with no requirement for a DP vessel or divers, providing a safer approach with significant cost savings versus previous approaches.



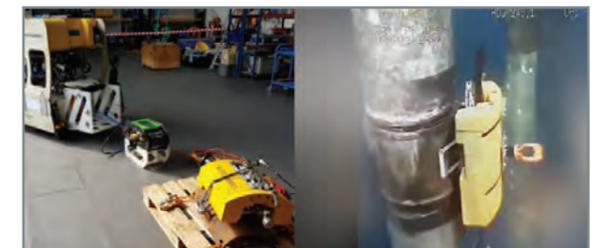
EXTERNAL SCREENING OF SUBSEA PIPELINES

A client operated numerous subsea pipelines that were not designed for in-line inspection and required an assessment of their condition. The inspection to assess their condition had to be performed using externally applied tools with rapid scanning capability. Sonomatic designed and developed a bespoke magnetic wheeled, steerable scanner that is deployable by an ROV for the inspection which was able to deploy EMAT and Multiskip. From the top of the pipe the techniques were able to inspect the full circumference of the pipe in one pass. An average of 320 metres was scanned per day with over ten kilometres of pipe scanned.



ROV & DIVER DEPLOYED PHASED ARRAY ULTRASONIC TESTING & TOFD TESTING

Sonomatic was engaged for a critical inspection of spider buoy welds to enable life extension. The requirement was inspection of dissimilar heavy wall duplex and super duplex girth welds with material thickness up to 57 mm thick with a high POD for small flaws. The inspection included TOFD, ACFM and use of advanced PAUT data capture, with the capacity for plain wave imaging, total focusing method and full matrix capture. Blind validations were successfully carried out and all welds were successfully scanned. This successful inspection justified the life extension of the I-Tubes.



CHALLENGING ACCESS

A client required inspection on various conductors located within concrete cells at the base of the structure with limited access. This required an advanced ultrasonic tool to be deployed by an opening that was 625 mm in deep waters. Access was simulated to assess that a MAG-Nautilus tool could be deployed via an LBV ROV through the small opening available. In total 624 connectors were inspected and all equipment successfully retrieved.

SONOMATIC SUBSEA TECHNIQUES

EMAT TECHNOLOGY

EMAT technology is performed from top-of-line and has the capacity to detect internal and external corrosion on subsea pipelines with NWT <15 mm with coating thickness up to 4 mm.

The technique does not require direct coupling as the input and received signals are generated by electromagnetic responses. This screening technique provides details of the lateral extent of corrosion with banding to indicate the through-wall severity level.

SATURATION EDDY CURRENT FAST SCREENING (SEF)

SEF is also an electromagnetic technique performed on top-of-line and used for localised corrosion detection of the internal and external surfaces of subsea pipelines. SEF inspection is a comparative NDT method meaning that all results obtained during the inspection are compared and evaluated against results from the calibration scan. SEF provides qualitative through wall sizing information with results sentenced in four sizing ranges 0-19%, 20-39%, 40-49%, >50%. Once an actual SEF defect indication in the area inspected is verified and confirmed with ultrasonic testing, the actual measurement can then be used to adjust the final calibration to aid the accuracy of the analysis.

PULSED EDDY CURRENT (PEC)

PEC is a comparative technique whereby advanced processing of the eddy current signal decay and comparison with a reference signal, allows for the determination of the average wall thickness (AWT). This fast screening method allows for the assessment of the general condition of structural steel and is best suited for general corrosion type defects in subsea pipelines. The major benefit of PEC is its ability to inspect through challenging coatings and marine growth.

MULTISKIP

Multiskip is an ultrasonic rapid screening technique for corrosion and erosion detection on subsea pipelines $\geq 4"$ diameter. It uses two transducers mounted on wedges in a pitch-catch to send angled shear wave beams through the pipe wall by skipping multiple times off the ID and OD surfaces. The system is capable of high speed, high resolution data collection. For corrosion, loss of signal amplitude, reduction in signal arrival times and changes to signal shape are used to provide qualitative and quantitative information.

GUIDED WAVE TESTING (GWT)

GWT is primarily a screening method used only to establish if there are any corrosion issues that need further investigation. Long lengths of difficult to access pipe can be examined from a single location with minimal preparation and while the process is on-line. GWT systems use low frequency guided ultrasonic waves that propagate along the pipe wall and is designed for rapid screening of long lengths of pipe to detect external or internal corrosion.

TIME OF FLIGHT DIFFRACTION (TOFD)

TOFD is an industry norm for pipeline weld inspection. This ultrasonic technique is the best method for defect detection and accurately sizing & monitoring the through-wall height of weld defects.

PHASED ARRAY UT (PAUT)

PAUT is an advanced method of UT that uses a multi-element probe in pitch-catch or pulse-echo mode for applications including weld inspection, corrosion detection and corrosion monitoring. The three main advantages of PAUT systems over standard UT methods are speed, simplicity, and more comprehensive results.

ULTRASONIC TESTING (CORROSION MAPPING)

Ultrasonic corrosion mapping involves scanning the pipeline to determine the minimum remaining thickness for each position and can be achieved using conventional UT probe or a PAUT probe. The systems deployed produce comprehensive, high quality data that can be displayed in different views to easily identify and/or verify any areas of concern. Sonomatic Inspection Management Software (SIMS) is used to generate 2D and 3D thickness map composites to improve efficiency in data management during the collection phase, and assists in semi-autonomous data analysis and reporting.

DYNAMIC RESPONSE SPECTROSCOPY (DRS)

DRS is a proprietary technology developed by Sonomatic using frequency-based ultrasonic wall thickness measurements. It is a corrosion mapping technique that applies a broad range of low ultrasonic frequencies (<1 MHz) to penetrate challenging coatings such as composite repairs, PE and Neoprene, and excites the natural frequencies of vibration of the underlying steel. The DRS probe raster scans over an area of interest and collects response signals. Advanced signal processing algorithms have been developed to extract the vibration frequencies and map the steel wall thickness profile.

COMPUTED TOMOGRAPHY - INSPECT™

INSPECT™ is Sonomatic's proprietary subsea computed tomography system designed to eliminate the requirement to remove protective pipeline coatings, specifically concrete weight coating, to evaluate common pipeline integrity challenges including corrosion under insulation/coating, internal pitting & corrosion, degradation of internal linings & corrosion resistant alloys, and detection & sizing of internal build-up of deposits and scale

ALTERNATING CURRENT FIELD MEASUREMENT (ACFM)

ACFM is an electromagnetic technique for detection and sizing of surface-breaking indications.

It works on all metals, does not require direct contact and works through various thickness of coatings. ACFM can accurately detect and size linear indications both length and depth. It is also easier to use on complex geometries such as nodes and nozzles.



CWL GROUP PARTNERS

GEO OCEANS

Geo Oceans is a specialist provider of ROV inspection services and has developed asset deployed ROV technology to provide clients with reliable, safe and cost-effective alternatives to traditional manned inspection, commercial diving or work-class ROV inspection services. Geo Oceans regularly use this cutting-edge technology to complete facility deployed subsea surveys, asset inspections and ocean mapping throughout the globe for many of the largest oil and gas operators.

Geo Oceans works closely with CWL group partner, Sonomatic, to implement advanced NDT inspection solutions. Being able to draw on their thirty years of industry experience is an invaluable resource, allowing us to create bespoke NDT tools for our ROV.

Geo Oceans also works closely with Vertech to provide clients with industry-leading turnkey class inspection services on assets under Lloyds Register, Bureau Veritas, ABS and DNV GL classification society guidelines.



BLUE OCEAN MARINE SERVICES

Blue Ocean Marine Services are experts in the planning and execution of offshore surveys, using a wide range of technologies including autonomous survey vehicles. With unrivaled experience in the deployment and management of unmanned survey platforms, we are uniquely positioned to deliver highly practical and cost-effective results. Our systems are lightweight and easily portable, allowing our teams to mobilise in a matter of hours. Once on site our vehicles can be deployed directly from shore or the side of a vessel, eliminating the need for support vessels.

Our Autonomous Unmanned Vehicles (AUVs) are equipped with the very latest sensors, scanners and sampling systems, allowing our team to complete highly detailed site appraisals, subsea inspections and regulatory compliance scopes. Our AUVs can also play a vital role in emergency response efforts such as an oil spill or natural disaster by gathering survey data that can assist emergency response crews.



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