



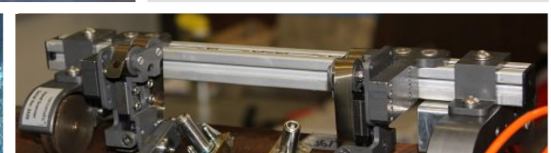
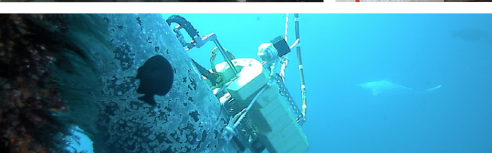
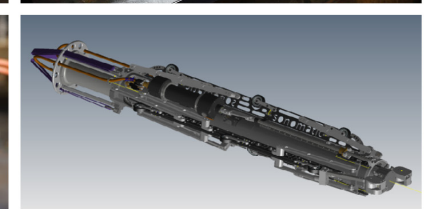
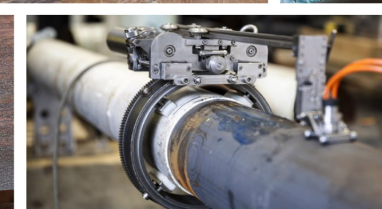
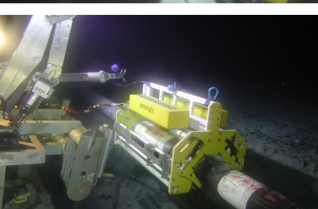
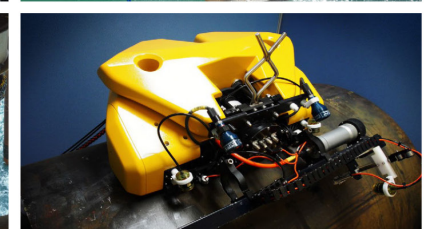
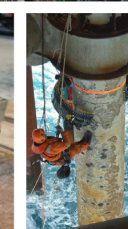
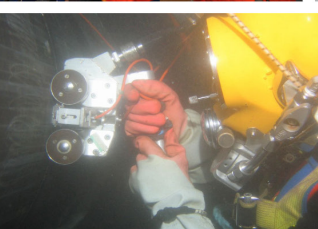
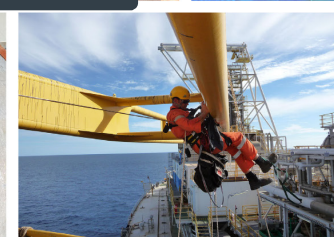
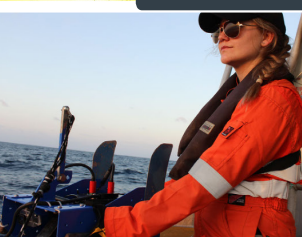
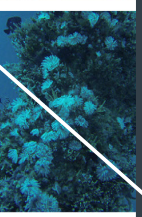
SONOMATIC

DATA SHEET

DRS INSPECTION THROUGH COATINGS

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 DRS Inspection through coatings.



DRS INSPECTION THROUGH COATINGS

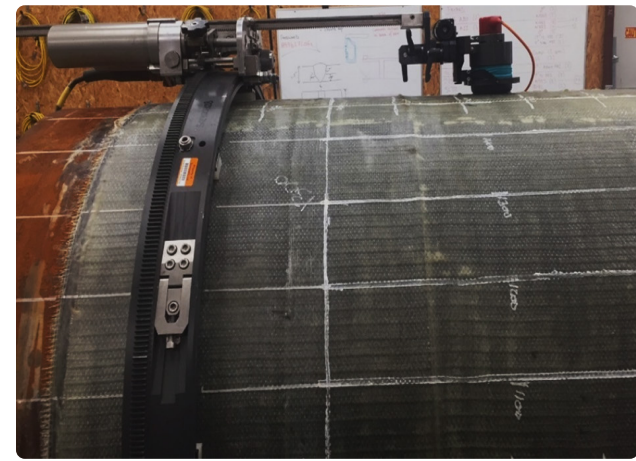
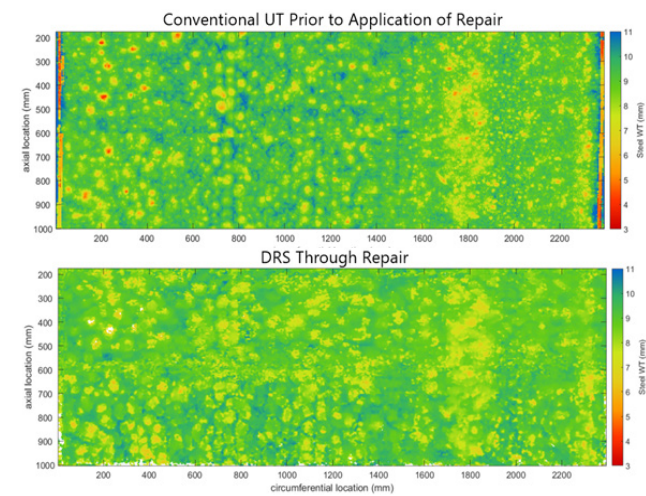
Dynamic Response Spectroscopy (DRS) is an innovative ultrasonic inspection technique developed by Sonomatic for corrosion mapping through challenging coatings, where conventional ultrasonic testing is ineffective. It also maps delaminations in coatings such as composite repairs and corrosion protection tapes. DRS is deployed on Sonomatic's range of field proven and customisable topside and subsea inspection tools.

DRS TECHNIQUE

A custom DRS probe excites the steel with a range of low ultrasonic frequencies that pass easily through challenging coatings. The steel responds, vibrating at natural frequencies related to the local thicknesses. Using advanced algorithms, these frequencies are extracted and used to determine the steel thickness profile. The probe travels over the coating, constructing a map of the underlying steel wall thickness.

Where delamination type flaws exist in the coating, the signals cannot travel into the steel. DRS detects these flaws by loss of response from the steel.

Below are maps of a corroded 30 inch pipe showing the UT results prior to application of a composite repair and the DRS results through the repair. DRS inspection can be used to monitor the corrosion and extend the life of the repair.



APPLICATIONS

DRS has been optimised for inspection through a range of coatings, including:

- ✔ Composite Repairs
- ✔ Intumescent Passive Fire Protection (PFP)
- ✔ Corrosion Protection Tapes (CPT)
- ✔ Polychloroprene (PCP) e.g. Neoprene®
- ✔ Coal Tar Enamel and Coal Tar Epoxy
- ✔ Multi-layer Polypropylene
- ✔ Injection Moulded Polypropylene (IMPP)
- ✔ Glass Syntactic Polyurethane (GSPU)
- ✔ Polypropylene (PP) & Polyethylene (PE) Shrink Wraps
- ✔ Application to other coatings is ongoing.

DEPLOYMENT

DRS is deployed on a range of field proven tools:

- ✔ Nautilus – topside and subsea inspection system
 - Diver deployed subsea
 - Diameters from 6" up to flat
- ✔ ROV-iT – subsea inspection system
 - ROV deployed
 - Depths to 2000 m (6500 ft)
 - Diameters from 6" to 30"
 - Horizontal and vertical deployment
- ✔ SPIRO – Internal Caisson Tool
 - Inspection of wet and dry regions

Sonomatic inspection systems are designed in-house and can be modified to suit project requirements.

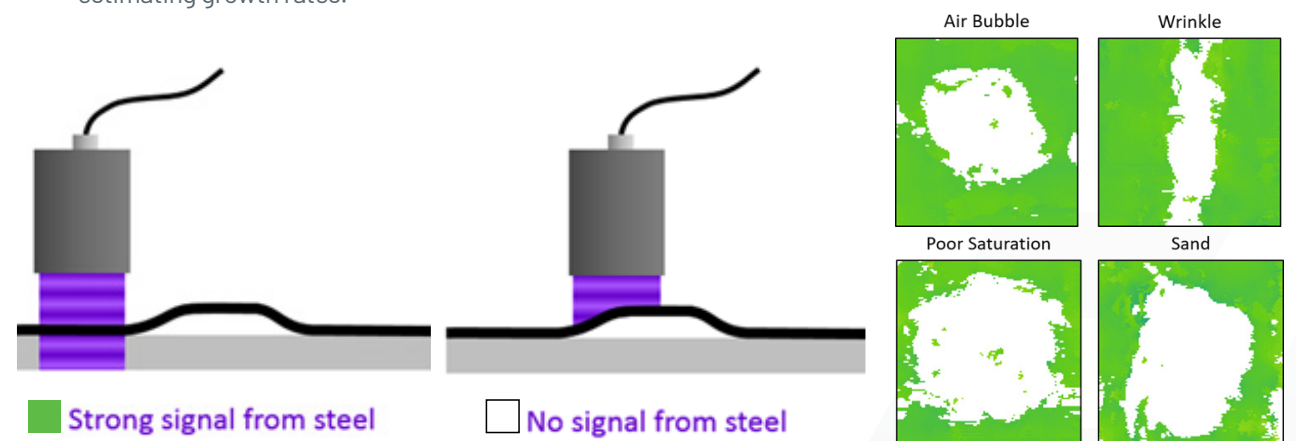


DRS MAPS

DRS thickness measurement accuracy is typically ± 0.5 mm (80% tolerance)

DRS maps are suitable for:

- ✔ Identifying flaws in coatings.
- ✔ Quantifying extent of steel wall loss.
- ✔ Determining if corrosion growth is active and estimating growth rates.
- ✔ Input to Fitness for Service assessment, including Level 3 using finite element analysis.
- ✔ Statistical analysis of limited coverage inspections.



QA AND HS&E

Sonomatic operate under an integrated QHSE management system and are committed to the highest quality and safety of service provision | ISO 9001: 2015: 00007140 | ISO 14001:2015:00037371 | ISO 45001:2018:00037372 | ISO 17020: 2012: 4276 | Achilles FPAL Verified: 076712 | SEQual 1988 | British Safety Council Member: S0388440 |



CONTACTS

EUROPE AND AFRICA

Graham Marshall

Subsea Project Manager
T: +44(0)1224 823 960
E: Graham.Marshall@sonomatic.com

Stuart Ley

Topside Project Manager
T: +44(0)1224 823 960
E: Stuart.Ley@sonomatic.com

Danielle Gunns

Project Delivery Manager (Warrington)
T: +44(0) 1925 414 000
E: Danielle.Gunns@sonomatic.com

John Lilley

Senior Technical Consultant
T: +44(0)1925 414 000
E: John.Lilley@sonomatic.com

Alison Craigon

Principal Research Scientist
T: +44(0)1224 823 960
E: Alison.Craigon@sonomatic.com

AUSTRALASIA

Jonathan Millen

Australia West Coast Project Manager
T: +61 415 850 346
E: Jon.Millen@sonomatic.com.au

Judd McCann

Australia East Coast Project Manager
T: +61 488 442 019
E: Judd.McCann@sonomatic.com.au

Zach McCann

South East Asia Regional Manager
T: +61 404 797 670
E: Zach.McCann@sonomatic.com.my

Alex Cesan

Australia & South East Asia General Manager
T: +61 498 442 666
E: Alex.Cesan@sonomatic.com.au

AMERICAS

Esteban Cesan

General Manager Americas
T: +1832 977 0303
E: Esteban.Cesan@sonomatic.com

MIDDLE EAST

Gordon Reid

Regional Manager
T: +971 26 580 708
E: Gordon.Reid@sonomatic.com



www.sonomatic.com



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