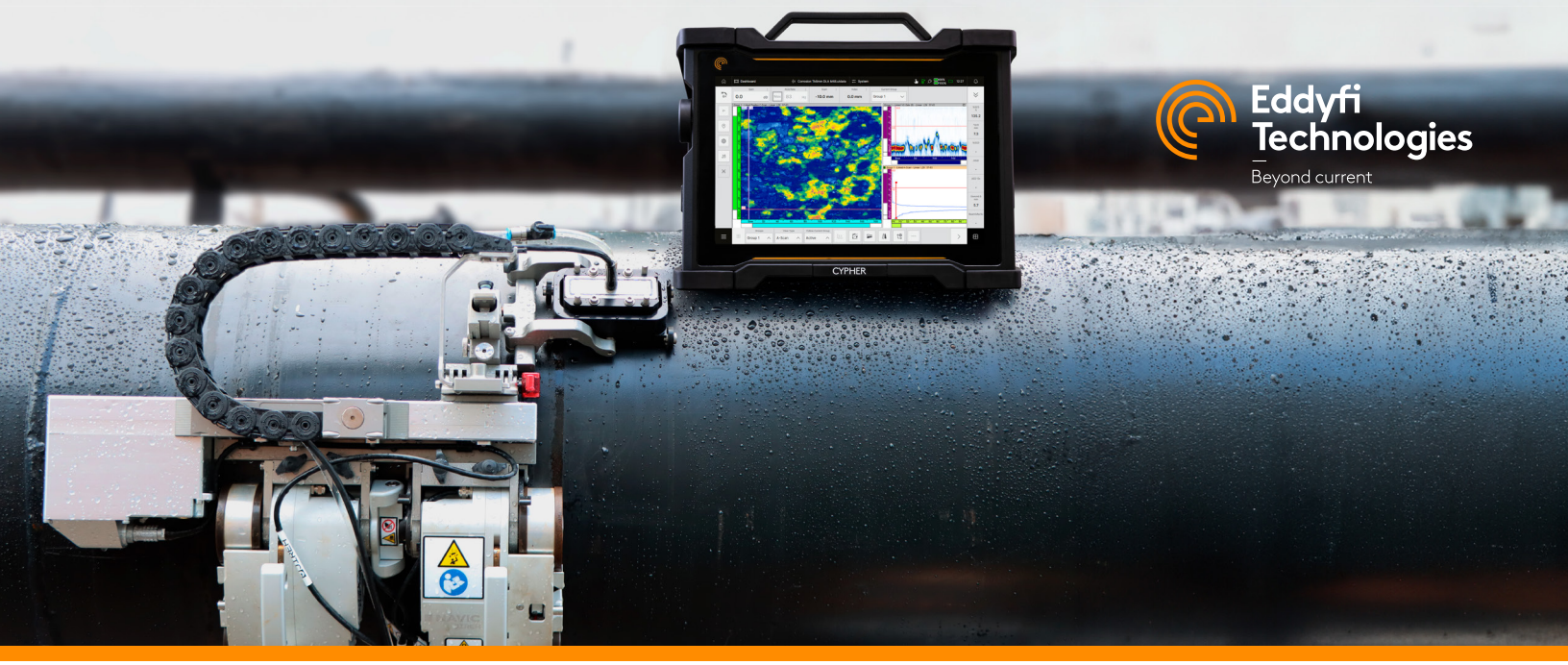


Applications
Brochure

NON-INTRUSIVE INSPECTION (NII)

Holistic inspection approach using advanced ultrasonic systems

Everything you need for a confident integrity assessment.

Solution driven packages to cover the growing demand for non-intrusive inspection (NII) and provide full coverage of pressure systems and components.

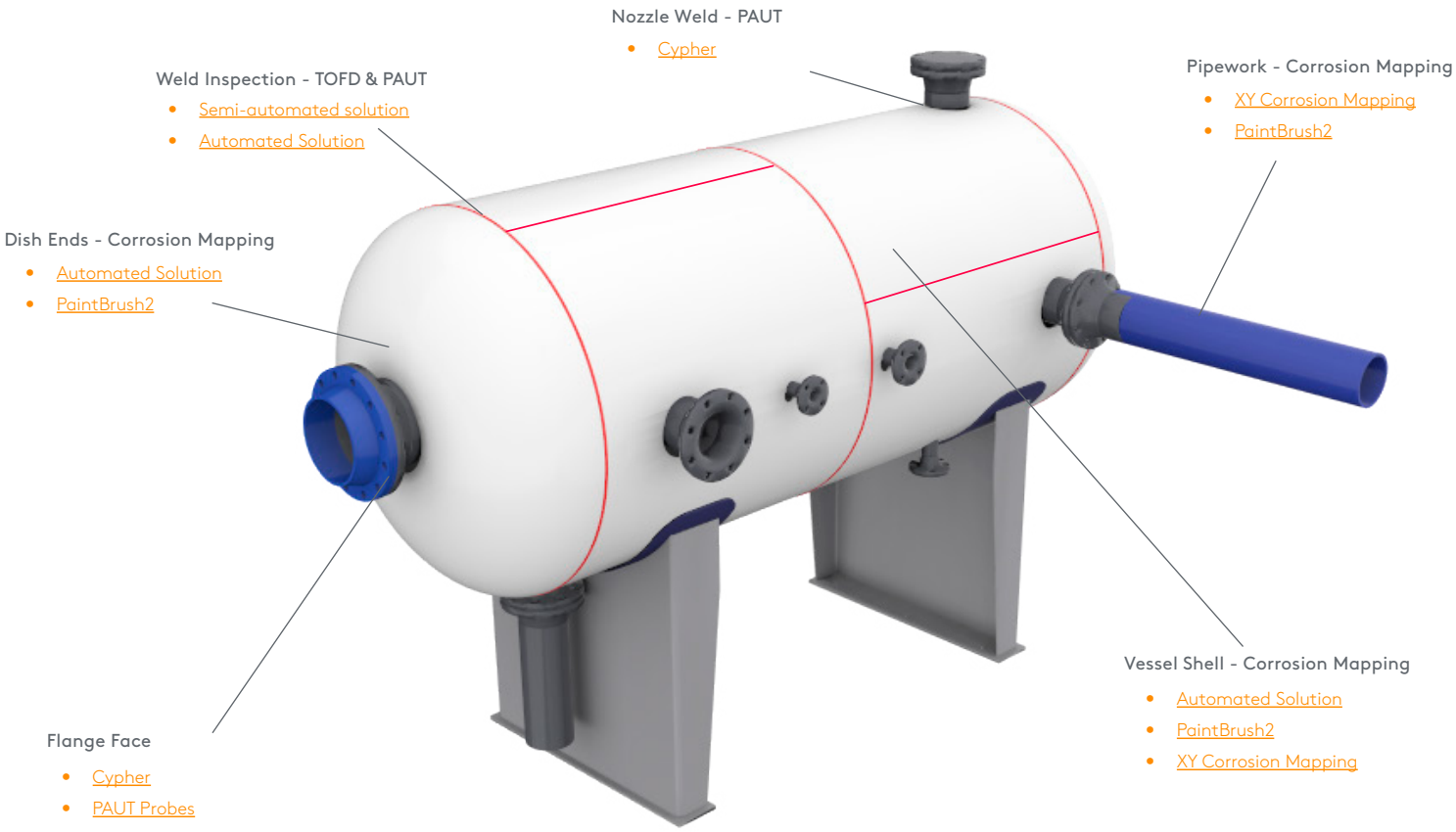
COMBINING TECHNOLOGIES FOR COMPLETE INSPECTION

Historically, periodic inspection of pressure systems has involved vessel entry and visual assessment. The very nature of Internal Visual Inspection (IVI) requires plant shutdown, extensive cleaning programs, and confined space work environments. This combination is time consuming, costly, and introduces safety concerns for operators.

Recent developments in Non-Destructive Testing (NDT) technology has introduced a range of inspection tools and scanning equipment that can reliably test pressure system components without the requirement for plant shutdown. Carefully combining the use of specifically designed inspection methodologies, it is now possible to provide close to 100% coverage on commonly designed pressure systems. This integrity strategy is NII.

ADVANCED NDT TECHNIQUES

- Corrosion mapping (automated/semi-automated)
- Weld root erosion/corrosion
- Flange face corrosion
- Nozzle weld inspection
- Surface crack assessment
- Manual phased array



WELD ROOT EROSION

Time of Flight Diffraction (TOFD) is an advanced ultrasonic inspection method that is used primarily for weld inspection. Weld root erosion or corrosion usually occurs below the area of the weld cap, therefore direct inspection using ultrasonic 0° techniques is not possible without weld cap removal. TOFD uses a probe on either side of the weld cap and is recognized as the most reliable method for detection and sizing of weld root erosion or corrosion.

- Accurate probe separation control.
- Magnetic wheels with braking system.
- Modular design for one-sided access (flange and elbow welds).



Figure 1: Weld inspection of pipework utilizing Nav2 and Cypher.

CORROSION MAPPING

Ultrasonic corrosion mapping is a non-intrusive inspection technique that maps material thickness using Ultrasonics. Variations in material thickness due to corrosion can be identified and graphically portrayed as an easy to interpret 3D data set.

- Automated mapping of shell: Nav2 Crawler
- Restricted areas and dome ends: PaintBrush2
- Vessel shell and associated pipework: Semi-automated scanners



Figure 2: Corrosion mapping with Nav2 crawler and Cypher.

FLANGE FACE CORROSION

With timely advances in Phased Array Ultrasonic Testing (PAUT) technology it is now possible to replace expensive visual inspection of flange face corrosion with an in-service non-invasive approach. This technique is endorsed by industry and detailed in Recommended Practice (HOIS(11)R7 Issue 2).

- No surface preparation required.
- No need to split the flange joint.
- Instantaneous and fully quantitative results.

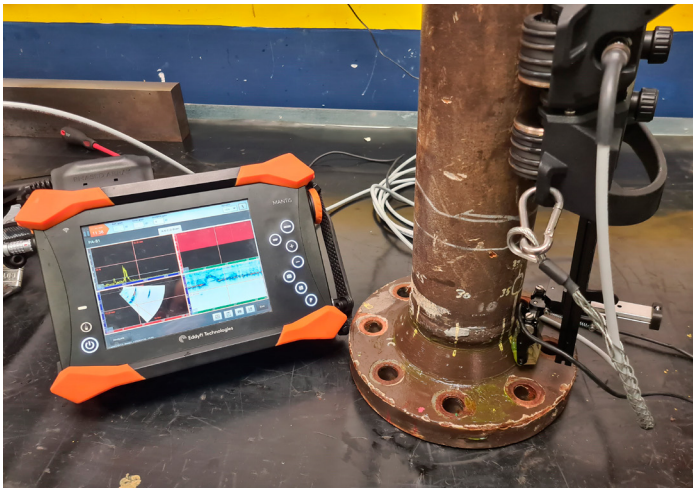


Figure 3: Flange face corrosion assessment with automated scanner and Mantis.

MANUAL PHASED ARRAY

All pressure vessel and piping systems are different. Although there are systems to cover most components and surface conditions, there are often complex areas requiring manual assessment and dedicated probes. Eddyfi Technologies on-board software, setups can be created to inspection these complex areas:

- Nozzle and branch welds
- Bolt inspection
- Fatigue cracking assessment



Figure 4: PAUT probe 2D Matrix Array mouted in nozzle scanner

PRODUCTS

CYPHER®

An advanced multi-technology instrument with UT, PAUT, TOFD, and TFM. Designed for the most advanced inspections.

More information on Cypher



Figure 5: Cypher inspection instrument.

MANTIS™

A robust and lightweight instrument offering UT, PAUT, TOFD and TFM through the streamlined user interface called CaptureTM. Ideal for high-resolution corrosion mapping & general weld Inspection.

More information on Mantis



Figure 6: Mantis inspection instrument.

AUTOMATED SOLUTION

Eddyfi Technologies' automated corrosion mapping solution offers high-speed, precision scanning for corrosion inspections for both ferrous and non-ferrous environments.

The non-intrusive technique is typically utilized on the external surface of a test component, providing a 2D map representing the condition and visually highlighting variations in material thickness due to material loss, graphically portrayed as an easy to interpret picture.

Designed for versatility, the system supports multiple ultrasonic techniques, including Conventional UT, PAUT and TFM, ensuring comprehensive data acquisition for corrosion mapping inspection applications. Ideal for large-scale structures, it provides efficient, accurate, and repeatable results, making it an excellent choice for demanding industries such as oil and gas, power generation, and manufacturing.

More information on Automated Solution



Figure 7: PAUT corrosion mapping with Nav2 and Mantis.

PAINTBRUSH2

The perfect tool for corrosion mapping of complex geometries including curved surfaces, pipelines, and restricted access areas. Capable of scanning surfaces up to 150C / 302F.

More information on PaintBrush2



Figure 8: PaintBrush2

SEMI-AUTOMATED SOLUTION

This highly adaptable weld inspection system for ferrous materials supports up to four Phased Array (PA) and/or Time of Flight Diffraction (TOFD) probes. Designed with versatile, precision-adjustable toolposts, the scanner ensures exceptional probe placement accuracy across multiple configurations. Its adjustable spring load minimizes setup adjustments, making it ideal for any weld inspection requirement.

More information on Semi-automated Solution

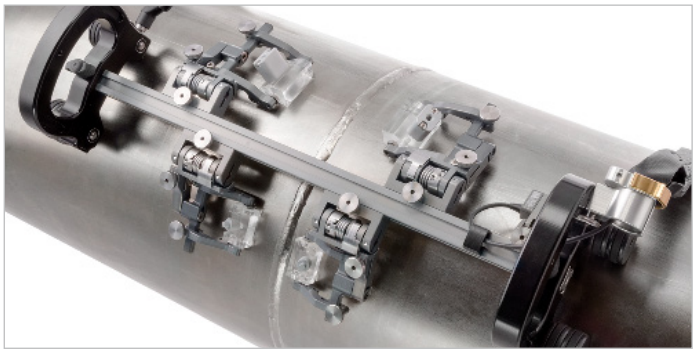


Figure 9: Semi-automated carbon steel weld inspection.

Selecting the correct equipment and technology is vital to a successful Non-Intrusive Inspection campaign. Combining the Mantis or Cypher with the PaintBrush2 and STIX scanner range, scanner, operators can complete 90% of a vessel and associated pipework inspection.

- There are significant advantages to performing an NII inspection over an Internal Visual Inspection (IVI), such as:
- Removing the risks associated with confined space access which can be hazardous and may also require upgraded protective equipment and systems such as lighting and a breathing apparatus.
- Eliminating the requirement to break containment/ isolation/drainage and purge the vessels under evaluation.
- Reducing shutdown/turnaround times, NII can be carried out before a shutdown event allowing the turnaround to be restricted to repair/maintenance work. This also allows for advanced planning.
- Minimizing disturbance to the vessel which may create new anomalies.
- Allowing the inspection to be performed as soon as an issue has been identified.
- Identifying metallurgical defects that would not be identified during an IVI.
- Calculating remaining plant life of operational equipment by engineers via periodic NII inspections.

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