Brookes Bell

Advanced Non-Destructive Testing Services

Electromagnetic Technologies for Surface Inspections

Eddy Current Array (ECA)

ECA is a natural extension of Eddy Current Testing (ECT) that improves on ECT technology by using multiplexed arrays of coils arranged in rows (instead of one or two coils). ECA can cover larger areas much faster and with greater sensitivity than ECT, using single scan passing to detect surface-breaking cracks as small as 0.5mm and sub-surface defects to a penetration depth of 6mm or more.

Benefits of ECA over single-element ECT

- Faster inspections
- Wider coverage
- Better defect detection, characterisation and monitoring
- Simpler ECA scan patterns, enabling easier and more accurate analysis
- Improved defect positioning and sizing due to encoding of inspection data
- Easier inspection of hard-to-reach areas and complex geometries
- Fully recordable, robust, data sets, enabling improved decision-making
- Post-inspection analysis capability
- 3D advanced imaging of defects
- Effective through coatings/paints

Applications

- Welding
- Corrosion in Plate, Pipe, Casting & Forgings
- Turbines
- Gears

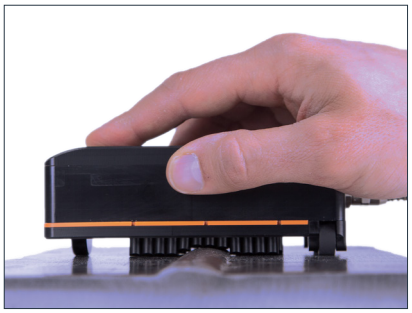
Typical Detection Capabilities of ECA

ECA probes improve on traditional NDT inspection methods such as magnetic particle testing (MT), liquid penetrant testing (PT) and single-element ECT with shorter inspection times, better flaw detection and complete inspection records.

	PT [1]	MT [2]	ECT	ECA/TECA™
Effective on coatings/paints	No	Yes	Yes	Yes
Computerized record keeping	No	No	Partial	Yes
3D/Advanced imaging	No	No	No	Yes
User dependence	High	High	High	Low
Speed	V Low	V Low	Low	V High
Cleaning	Yes	Yes	App spec	App spec
Post-inspection analysis	No	No	No	Yes
Chemicals/Consumables	Yes	Yes	No	No

Liquid penetrant (PT) [1] Magnetic particle (MT) [2]

Welds – Using Sharck Probe (TECA) and I-Flex Probe (ECA)



Rapidly detects and sizes harmful defects such as surface-breaking cracks in:

- Ferromagnetic and non-ferromagnetic weld materials
- Dirty, coated and abrasive surface conditions
- Various weld shapes (probes adapt to fit the weld crown)

Advantages

- No surface preparation required
- Causes no damage to paint or protective coatings
- Covers the head affected zone (HAZ), tie and cap in one pass
- Accurately positions, measures and sizes cracks up to 7mm

TECA™

Tangential Eddy Current Array (TECATM) is designed to inspect carbon steel welds using the latest advanced technology, the Sharck Probe by Eddyfi.

Corrosion in plate, pipe, casting & forgings

Multiplexing signals to achieve ECA improves the resolution of the inspection system, so it is extremely efficient at detecting corrosion on a wide range of materials including:

- Pitting Corrosion
- Fretting Corrosion
- Stress Corrosion Cracking
- Surface Corrosion

Turbines

Turbines are highly critical assets that are large, complex and costly to shut down. Safety and life extension programmes demand that turbines are inspected regularly. Brookes Bell's ECA surface solutions are designed to perform fast and accurate inspections of turbine components including:

- Dovetails
- Blades (leading edge, gas path, root)
- Generator slots
- Retaining rings
- Rotor bores
- Boreholes

Gears

Gears are critical components both onshore and offshore in a variety of equipment such as jack-up legs, crane slew bearings, girth gears, pinions, bull gears and drive trains.

Safety and life-cycle considerations require close monitoring of each gear for surface-breaking cracks caused by stress during operation.

Use of the ECA Gear Probe saves time and money over conventional inspection techniques due to:

- Single pass crack detection
- Greater sensitivity to small surface defects than Magnetic particle Testing (MT), Penetrant Testing (PT) and Ultrasonic Testing (UT) because of the way eddy currents propagate inside conductive materials, such as those used in gears
- Inspection data displayed as 2D and 3D C-scans – allowing easier identification/interpretation of defects
- Recordable data, enabling better reporting
- Better and more accurate analysis capability
- Detection capability of 0.5mm for surface-breaking cracks

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