CODA Application Brochure

Residual Stress Measurement

Equipment Highlights

Internal residual stress measurement on plates, train wheels, pipelines and thick structures using proprietary EMAT pulser technology, sensors, scanners and positioners.

Meets EN 13979-1:2023, EN 13262:2021, and VPI 09
Supported by the main railroad ECMs.

Great Repeatability
Repeatability of ±5 MPa, in compliance with standard requirements.

Custom Stress Measurement Software
Tailor-made software for residual stress measurement in MPa or psi.

No-contact EMAT Technique
Dry inspection, no couplant is required.

Automatic Reporting
Built-in reports with residual stress measurement, graphs, snapshots, and other data.

EMAT Technology

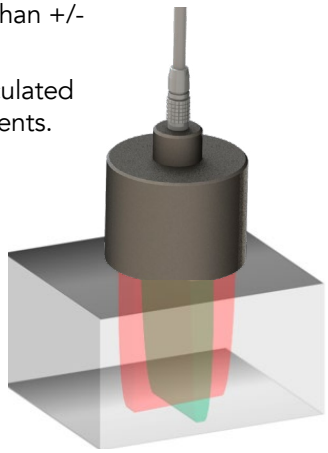
EMAT, or Electro Magnetic Acoustic Transducer, is an Ultrasonic Testing (UT) technique that generates the sound in the part inspected instead of the transducer.

The technology can generate unique wave modes for accurate stress measurement.

Methodology

A dual EMAT sensor generates two orthogonally polarized shear horizontal ultrasonic beams.

- The system measures Time-of-Flight (TOF) in both radial and circumferential directions.
- Time-Of-Flight measurement accuracy equal or better than +/- 0.0002" (0.005 mm).
- Birefringence value is calculated based on TOF measurements.
- Internal stress is directly correlated with birefringence.



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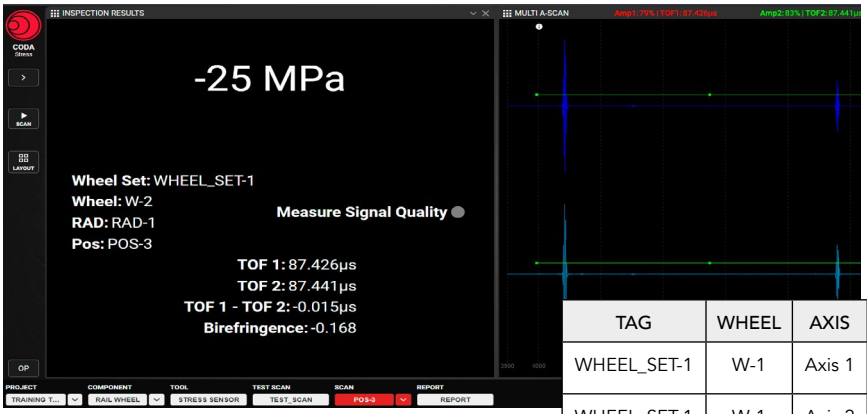
Instrumentation

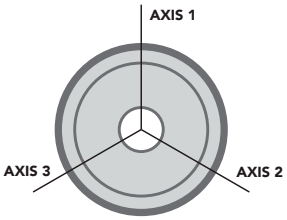
CODA is the first and only compact high-power UT flaw detector capable of working with both EMAT and piezoelectric sensors using Innerspec's patented pulser technology.

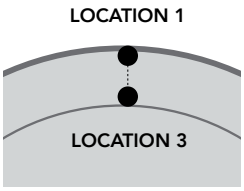
The portability of the equipment allows the user to determine residual stress in wheels already in service, mounted in axles or vehicles, quickly and effectively.

The semi-automatic scanner positions and moves the EMAT transducer through the wheel's rim, obtaining stress profiles at precise locations.

Automatic Reporting Tools







TAG	WHEEL	AXIS	POSITION	TOF 1	TOF 2	BIREFRINGENCE	STRESS
WHEEL_SET-1	W-1	Axis 1	Location-1	87.430	87.444	-0.159	-23.823
WHEEL_SET-1	W-1	Axis 2	Location-3	87.430	87.443	-0.143	-21.511
WHEEL_SET-1	W-2	Axis 3	Location-2	87.426	87.441	-0.168	-25.265

CODA SM – Technical Specifications		
Ultrasonic Channels	1 - EMAT	1 - PIEZO
Bandwidth	1500 kHz to 10 MHz	100kHz to 10 MHz
Mode of Operation	Pulse-Echo/Pitch-Catch	
Units	Stress Measurements in MPa and psi	
Repeatability	±5 MPa	
Dimensions	8.8"(W) x 7.2"(D) x 2.6"(H) 223 mm(W) x 182 mm(D) x 70 mm(H)	
Dual Channel Multiplexer	Yes	
Weight	3.49lb/1.58kg (2.97 lb/1.35kg without battery)	
Accesories	Semi-automated scanner for train wheels	
Rechargeable Battery	Li-Ion 14.4V, 49Wh, <10A@ 6.8Ah; up to 5 hours	
Software	Tailor made residual stress software	
Communication	Wi-Fi 2x802.11ac/ax dual band USB 3.0, Ethernet	
Norms & Standards	Meets EN 13979-1:2023, EN 13262:2021, and VPI 09	

COMPLIANT WITH VPI