

# Thickness Measurement

## temate<sup>®</sup>/PowerUT<sup>®</sup> TG-IL Systems

### Equipment Highlights

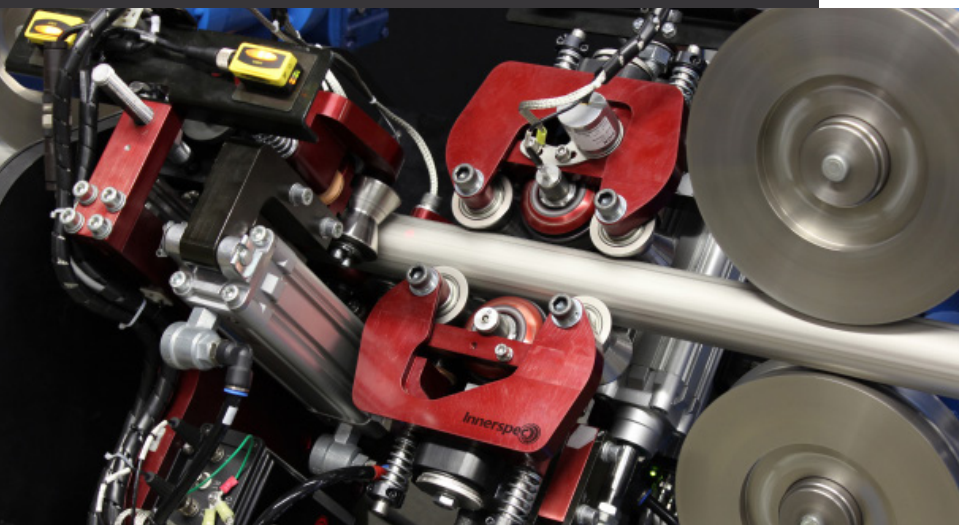
- Non-contact EMAT permits measurements at extreme temperatures at up to 5mm from the surface of the material
- EMAT not affected by surface conditions, can be used on very coarse, coated, oxidized or dirty surfaces
- Facilitates automation. Does not require the probe to be perfectly perpendicular to the part to perform the measurement.
- Couplant-free inspection to avoid contamination of sensitive materials and processes.
- Measures coarse grain materials including austenitic steels and most plastics and composites.
- Great accuracy (12.7  $\mu\text{m}$ ) with extremely high resolution (up to 1mm).

The TG-IL systems are designed for automated in-line thickness measurement of metallic and non-metallic materials using ultrasonic technology. The measurement is made by calculating the time it takes for an ultrasonic pulse that has been generated in the material to reflect back from an opposite wall or boundary. The systems can be used for thin strip, plates, billets, ingots, tubes or odd geometries for quality and process control. On seamless tube manufacture, multi-channel systems provide eccentricity and ovality at production temperatures and speed.

These systems use non-contact EMAT or dry-coupling methods to provide rapid non-destructive measurements without couplant. On temate systems, EMAT sensors can use electromagnets or permanent magnets depending on the type of material and the conditions of inspection. On PowerUT systems, proprietary dry-coupled piezoelectric transducers are combined with Innerspec's

high-power instrumentation to permit inspection of non-metallic or highly-resistive materials without the need for liquid couplant.

Both EMAT and Dry-Coupled systems are designed to perform in the harshest industrial environments, and can be added to any of our defect inspection systems. In-line and off-line applications currently used for automotive, aerospace, metal production, tube and pipe, and other specialty industries.



## temate®/PowerUT® TG-IL - Specifications

	temate®	PowerUT®
Technique	<ul style="list-style-type: none"> <li>Non-contact Electro Magnetic Acoustic Transducer (EMAT).</li> </ul>	<ul style="list-style-type: none"> <li>Dry-coupled, high-power piezoelectric transducer.</li> </ul>
Materials Inspected	<ul style="list-style-type: none"> <li>Ferromagnetic and non-ferromagnetic metals, including carbon steel, stainless steel, aluminum, copper and brass.</li> <li>Minimum thickness: 1mm (0.039") contact Innerspec for thinner material</li> <li>Surface temperature: from -30°C (-22°F) to 750°C (1,382°F)</li> </ul>	<ul style="list-style-type: none"> <li>Metallic and non-metallic materials including most plastics and composites.</li> <li>Minimum thickness: 1mm (0.039") contact Innerspec for thinner material</li> <li>Surface temperature: from -10°C (14°F) to 200°C (392°F)</li> </ul>
Measurement Accuracy and Resolution	<ul style="list-style-type: none"> <li>Accuracy: 12.7µm (0.0005")</li> <li>Resolution: Up to 3mm</li> </ul>	<ul style="list-style-type: none"> <li>Accuracy: 12.7µm (0.0005")</li> <li>Resolution: Up to 1mm</li> </ul>
Sensor Head Assembly	<ul style="list-style-type: none"> <li>Magnetic element and EMAT coil in a protective casing.</li> <li>Sensors for high-temperature applications may incorporate air and/or water cooling depending on temperature and exposure time.</li> <li>Designed for easy attachment to different mountings, and can incorporate air bearings or other systems to maintain adequate lift-off.</li> <li>Automatic temperature compensation for high-temperature applications.</li> </ul>	<ul style="list-style-type: none"> <li>Touch probe and wheel options for scanning applications.</li> <li>Non-marring rubber coupling.</li> <li>Designed for easy attachment to different mountings.</li> </ul>
Inspection Technique	<ul style="list-style-type: none"> <li>Pulse-echo sensor configuration produces and measures the time-of-flight (TOF) arrivals of ultrasound reflections.</li> <li>Thickness is derived by calculation: Thickness = Velocity of Sound x (TOF/2).</li> <li>Maximum sampling rate of 2000 samples per second for speeds of up to 2m/s.</li> </ul>	
Data Acquisition Electronics	<ul style="list-style-type: none"> <li>Environmentally controlled industrial enclosure; NEMA 12 and IP 55 per EN 60 529/10.91 protection rating, located up to 150 cabling feet (50 m) from sensor.</li> <li>Includes EMAT Transmit &amp; Receive electronics, magnet pulser, (for sensors with pulsed EMAT magnets) power supplies, computer, communication interfaces, monitor, keyboard and mouse</li> </ul>	
Software Features	<p>Real Time Acquisition &amp; Processing</p> <ul style="list-style-type: none"> <li>Uses fast FPGA-based signal acquisition and processing.</li> <li>Provides uninterrupted control and analysis of all time sensitive operations, including real-time display and disposition.</li> </ul> <p>Link &amp; Render</p> <ul style="list-style-type: none"> <li>Connects real-time acquisition &amp; processing with the user interface using standard communication protocols.</li> <li>Decouples acquisition from user interface for easy hardware upgrades, and rapid customization of user interface.</li> <li>Organizes and prepares data received from real time acquisition &amp; processing for representation in user interface.</li> </ul> <p>NDT-Web™ User Interface</p> <ul style="list-style-type: none"> <li>Provides display and user controls customized for the application using proprietary NDT-Web™ real-time web technology.</li> <li>Broadcasts its own Wi-Fi signal for simple access by any device using a regular browser and IP address (no client software needed). Alternatively, users can connect to the equipment using an external video monitor or ethernet port.</li> <li>Permits easy customization of user controls and display without affecting the operation of the equipment.</li> <li>Includes built-in features for web support and ordering of spare parts when connected to the internet.</li> </ul>	
Power & Environment Range	<ul style="list-style-type: none"> <li>115v AC to 220v AC (Electrical power and air requirements may vary depending on the integration).</li> <li>Operating temperature 0°C (32°F) to 40°C (105°F).</li> <li>Humidity non-condensing 5% to 95%.</li> </ul>	