EMAT Technology Platform

itRobotics' patent pending EMAT technology platform is at the core of its multiple NDT systems and methods for the inspection of metallic infrastructure across a wide range of industries. All itRobotics' EMAT systems may be configured for either fixed installation or robotic operation. Of special note is that itRobotics' EMAT technologies may be deployed without any contact with or any modification to the test object, including its surface. Specific features of itRobotics' technologies include:

- Utilization of a wide variety of elastic (ultrasonic) wave modes

  All itRobotics' EMAT test configurations are based on Lorentz Force EMATs (LF-EMATs). In contrast to EMATs based on magnetostriction (MS-EMATs), no special materials, such as those exhibiting magnetostriction, coatings or surface conditions are required or used. itRobotics' experience is that, under many test conditions, using LF-EMATs increases inspection reliability while broadening the range of circumstances for which EMATs may be considered. In addition, the patent pending itRobotics' EMAT structures may be configured to excite and receive a wide variety of bulk and guided elastic wave modes.

  itRobotics EMAT inspection methods may be configured to excite different elastic wave modes in a rapid sequential manner so as to achieve the effect of simultaneous inspection of the same material volume using more than one wave mode. These evaluations may extract different "pieces" of information from the different wave modes, the same "piece" of information using different characteristics of the same wave mode or a combination thereof. Such an approach increases inspection reliability by reducing false-positive indications while simultaneously making it less likely to miss significant indications.
  After initial discussions of your complete inspection requirements, itRobotics may consider an appropriate capability demonstration.

- Rapid sequencing of different wave modes to achieve, in effect, simultaneous mode generation

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  In addition to extracting specific features of the material anomalies interrogated by the wave mode(s), an inspection may be configured to determine geometrical features of

the object being evaluated; such features include pipe circumference, pipe or plate wall thickness averaged over some predetermined distance, plate width, location of welds or joints. Using our rapid sequential inspection and evaluation operating mode, in many measurement setups, these operations may all be performed in "practical real time." Using this geometrical information, many inspection scenarios may be adjusted in real time to reflect the changing features of the test object.

After initial discussions of your complete inspection requirements, itRobotics may consider an appropriate capability demonstration.

- High detection sensitivity for near wall, far wall, surface and subsurface defects of any orientation

  A majority of itRobotics' EMAT technologies may be implemented in systems that can achieve scan speeds up to 1 meter/sec while maintaining sensitivity to small defects in locations such as in proximity to the "near" or "far" walls, on the surface, within the material volume or near and on the material boundaries.
  After initial discussions of your complete inspection requirements, itRobotics may consider an appropriate capability demonstration.

- Accurate real-time measurements of geometric features of test objects

  In addition to extracting specific features of the material anomalies interrogated by the wave mode(s), an inspection may be configured to determine geometrical features of the object being evaluated; such features include pipe circumference, pipe or plate wall thickness averaged over some predetermined distance, plate width, location of welds or joints. Using our rapid sequential inspection and evaluation operating mode, in many measurement setups, these operations may all be performed in "practical real time." Using this geometrical information, many inspection scenarios may be adjusted in real time to reflect the changing features of the test object.
  After initial discussions of your complete inspection requirements, itRobotics may consider an appropriate capability demonstration.

- Adaptive inspections based on varying features of the test object

  In addition to extracting specific features of the material anomalies interrogated by the wave mode(s), an inspection may be configured to determine geometrical features of the object being evaluated; such features include pipe circumference, pipe or plate wall thickness averaged over some predetermined distance, plate width, location of welds or joints. Using our rapid sequential inspection and evaluation operating mode, in many measurement setups, these operations may all be performed in "practical real time." Using this geometrical information, many inspection scenarios may be adjusted in real time to reflect the changing features of the test object.
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consider an appropriate capability demonstration.

- State of the art weld inspection

  Weld inspection is a special case of detecting material anomalies where the general location of a potential anomaly is known. itRobotic' EMAT systems and configurations normally accommodate one or more R-EMATs placed in locations fixed with respect to the T-EMAT or fixed with respect to the test object. An inspection scenario may involve the T-EMAT being scanned and the R-EMAT(s) fixed, the R-EMAT(s) being scanned and the T-EMAT fixed or a T-EMAT and R-EMAT assembly being scanned as a unit. These combinations may be deployed for ANY EMAT inspection but may be particularly useful for weld inspection.
  After initial discussions of your complete inspection requirements, itRobotics may consider an appropriate capability demonstration.

- Scanning speeds of up to 1 meter/sec while maintaining sensitivity to small defects. The inspections non-intrusive with no coatings or special surface conditioning of any kind.

  A majority of itRobotics' EMAT technologies may be implemented in systems that can achieve scan speeds up to 1 meter/sec while maintaining sensitivity to small defects in locations such as in proximity to the "near" or "far" walls, on the surface, within the material volume or near and on the material boundaries.
  It is worth emphasizing that itRobotics' EMAT technologies are implemented without any modifications to the test object, including its surface. The ONLY requirement of the test object is that it be conducting; generally, a conductivity in excess of 1% IACS (that of a Ti-6Al-4V alloy) is adequate for frequencies under 500 kHz.
  After initial discussions of your complete inspection requirements, itRobotics may consider an appropriate capability demonstration.

- Measurement of applied stress in metallic test objects

  Elastic wave methods have been explored widely as a means of monitoring *changes* in stress and, with less success, for determining the stress magnitude within metallic objects. Elastic wave methods have been used successfully for determining material texture. itRobotics is equipped to apply its patent pending EMAT technology to such problems.
  After initial discussions of your complete inspection requirements, itRobotics may consider an appropriate capability demonstration.

- Reliable packaging for rugged and hazardous inspection environments

  There is an increasing need for the application of NDE/NDT within challenging

environments. Sometimes, test equipment is required to operate reliably and within calibration at temperatures ranging from -40C to +50C and beyond. itRobotics' EMAT technologies and equipment is designed to perform "as advertised" within this temperature range. In addition, itRobotics' EMAT systems may be supplied to meet a wide range of other environmental specifications to permit operation in wet and/or dusty environments and, if needed, even totally submerged in several meters of water (such as IP65).

After initial discussions of your complete inspection requirements, itRobotics may consider an appropriate capability demonstration.