



Name of the Technology: Electro-Magnetic Acoustic Transducer (EMAT) based Instrument for Non-Contact Ultrasonic Non-Destructive Testing (NDT)

Summary:

Electromagnetic Acoustic Transducer (EMAT) is the best suggested way to test electrically conducting metal structures for flaw, cracks and presence of residual stresses. It has various advantages over conventional piezoelectric approach of NDT. 3.2MHz EMAT and associated instrumentation needed for excitation of EMAT along with its receiver has been indigenously developed in the laboratory at CSIR- National Physical Laboratory. The system has novelties and unique design for which has been applied for patent at CSIR. It has facility to select the number of cycles in tone burst and the burst repetition rate. The technology is now ready for commercialization with the help of interested industry. Following are the list of parameters of the developed system

Product specifications:

- 3.2 MHz permanent magnet type radially polarized EMAT
- EMAT with adjustable sensitivity
- Unique tone -burst generator design with programmable PRR and number of cycles
- PRR: 100 to 1KHz in steps of 100 Hz
- Cycles in a burst: 1 to 10 Cycles selectable
- Burst output power: 4kW may be increased further on requirement.



EMAT



Excitation System



Applications:

1. Flaw and crack detection in electrically conducting metallic structures
2. Thickness measurement
3. Material characterization
4. Residual Stress detection
5. Bonded structure lamination detection
6. Plate lamination defect inspection
7. Various weld inspection in tubes and pipes
8. Pipeline in-service inspection
9. Railroad and wheel inspection
10. Detection of inhomogeneous (variable density) structures

Advantages over Conventional NDT:

- ❖ No contact between material and EMAT
- ❖ Can be used for testing of hot surfaces
- ❖ Surface preparation not required
- ❖ Couplant not required
- ❖ Fast real-time scanning of test surface is possible
- ❖ Same test location can be inspected for long time



❖ **Readiness level of the Technology:**

| Idea | Concept Definition | Proof of Concept | Prototype | Lab Validation | Technology Development | Technology Demonstration | Technology Integrated | Market Launch |
|------|--------------------|------------------|-----------|----------------|------------------------|--------------------------|-----------------------|---------------|
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Related Patent:

Patent No: CSIR Application **Ref No- 0169NF2016**

Country: **USA and INDIA**

Publication Date: Yet Not Published

Grant Date: Not Applicable

Year of Introduction: 2016

Broad Area/Category: Electronics & Instrumentation

User Industries:

- 1) All the manufacturing industries where cracks, flaws or homogeneity in the metallic structure are important. Examples: Automobile, Aerospace, steel, rails, pipe etc
- 2) Inspection service providers working for Govt or private
- 3) User end for periodic maintenance and inspection
- 4) Others such as universities and research laboratories

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