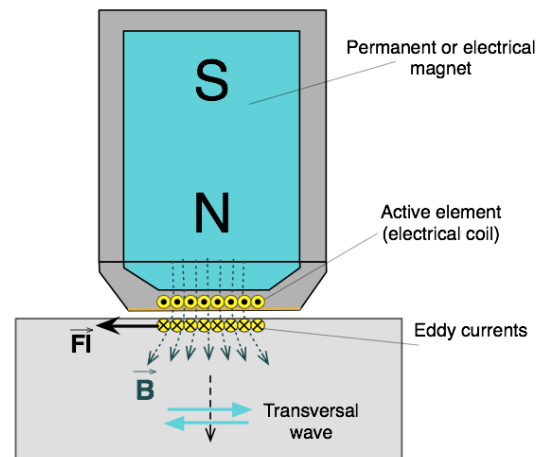




EMA TECHNOLOGY INTRODUCTION

EMAT is the abbreviation for Electromagnetic Acoustic Transducer. An EMAT is a non-destructive ultrasonic testing device which has overcome many of the issues faced by the more conventional piezo probe.

An EMAT transducer consists of a case with a socket, an induction coil, a protective cover, a magnetic flux concentrator and a permanent magnet. Alternate current feeds the induction coil, causing electromagnetic oscillations which, in turn, induce eddy currents on the surface of the test object. Eddy current interferes with the permanent magnetic field, creating ultrasonic waves directly on the surface of the test object. These waves propagate in the test object, reflecting and deflecting from the walls back to the EMAT coil. The picture created by the ultrasonic activity shows up flaws and defects within the test object.



Advantages

Main advantage of EMA is an ability to generate and receive ultrasonic waves without couplant, so, no water or any other couplant is needed for ultrasonic examination. It gives an ability to perform ultrasonic examination in wide temperature range (-50 °C to +650 °C), through non-metal coating or hardly reduce requirements to initial surface quality.

As the ultrasound source is the surface of the test object itself, tilting the probe or changing the gap between the coil and plate do not affect the direction in which the ultrasonic waves are generated.

An EMAT is able to transmit and receive transversal ultrasonic (shear) waves. The wave allows much higher resolution than the longitudinal waves produced by piezo probes.

Main disadvantage of EMAT is a low value of double electro-acoustic transforming coefficient. The disadvantage can be compensated by using high voltage initial pulse generators and strong algorithms of signal processing.

