Non Destructive Testing Methods - How Eddy Current Ultrasonic Testing Works

by Jerry Atkinson

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Nondestructive testing (NDT), sometimes called nondestructive examination (NDE) or nondestructive inspection (NDI), is any method of materials testing whereby the material being tested is not damaged or destroyed. It is important in quality control as well as useful in research. It is also a key element in material inspection systems. Nondestructive testing, using ASNT standards, can be used to for bolt hole scanning, crack detection, flaw detection, pin hole detection, conductivity testing, thickness measurement, and corrosion detection. Two reliable nondestructive testing solutions are ultrasonic testing (UT) and eddy current testing.

How Eddy Current Testing Works

Eddy current inspection (ECI) or eddy current testing (ECT) is a type of electromagnetic testing; nondestructive testing (NDT) that relies on the principals of electromagnetism. Through electromagnetic induction, eddy currents are formed. When a periodically varying magnetic field intersects an electrical conductor, eddy currents are induced, according to Faradayâ€™s and Ohmâ€™s Laws. By inducing electrical currents in the material being inspected, the interaction between those currents and the material can be observed.

ET Applications

Eddy current testing (ET) can be used effectively in the field, in a laboratory, or in production to test for material defects such as cracks, laps and other flaws. ET It is mainly used for thin conductive nonferrous alloys such as stainless steel copper, brass, copper-nickel, and titanium.Eddy current inspection can detect defects such as cracks, laps, seams, voids, and inclusions. Nondestructive testing using eddy current technology is a method to detect minor flaws in safety-critical airplane, aerospace and automotive parts. It can also be used to detect conductivity and thickness, so that any areas of corrosion can be located.

A calibration standard can provide a reference for the calibration of an instrument or for the comparison of materials or components. EDM notches can be used for eddy current calibration standards.

How Ultrasonic Testing Works

Ultrasonic Testing (UT) employs high-frequency sound waves for flaw detection or conducts examinations and makes measurements. Ultrasonic inspection can be used for flaw detection/evaluation, dimensional measurements, and material characterization.

A typical UT inspection system is composed of a pulsar or receiver, a transducer, and a display. The pulsar-receiver produces high-voltage electrical pulses. It drives the UT transducer, which generates high-frequency ultrasonic energy. The sound energy propagates through the material in the form of waves. When there is a discontinuity (such as a crack) in the wave path, part of the energy will be reflected from the flaw surface and this is shown on a display screen.

Jerry Atkinson - About Author:
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