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Eddy Current Testing | Eddy Current Inspection

Eddy Current Testing, also known as Eddy Current Inspection, is a non-destructive testing (NDT) method that utilizes the principle of electromagnetic induction to detect anomalies in metal objects.

An eddy current probe consists of a coil powered by an alternating current. The alternating current through the coil generates an alternating magnetic field around the coil. When this alternating magnetic field is placed in the vicinity of a metal object, alternating electrical currents are induced in the metal object. These currents are called "eddy currents", hence the name eddy current testing. The flow of eddy currents through the metal object is influenced by several factors, such as the presence of cracks, pits, or other anomalies in the object. Through a few intermediate steps, the extent to which the flow of eddy currents is influenced can be measured and visualized on a laptop connected to the eddy current equipment. By comparing these signals (indications) with the signals obtained from a reference piece (a metal object with artificial defects of known dimensions, like notches with a certain depth or holes with a certain diameter), the indications can be "translated" to a corresponding defect type and/or size.

THE Applus+ SOLUTION

Eddy Current Testing has various applications:

In weld inspections, it can be used to detect cracks in the weld cap, weld toe, or heat-affected zone. Because the eddy currents are not affected by the presence of a non-metallic coating, a paint layer or other coating doesn't have to be removed prior to the inspection.

Eddy Current Testing can also be used for detecting cracking in other metal objects, such as pipes, tanks, and structures like bridges.

A widely used application of Eddy Current Testing is the inspection of heat exchanger tubes. With an internal bobbin coil probe, heat exchanger tubes can be examined at a relatively high speed. Although the tubes are examined with an internal probe, defects on both the inside and outside of the tube can be detected. Defects, such as internal and external pits, wall loss, or baffle wear, can be detected and sized. Defect indications are assessed immediately on-site and entered into the reporting software. As a result, we can typically provide a report with test results immediately after the inspection is completed. Although conventional Eddy Current Testing on heat exchanger tubes can only be applied to tubes of material that is non-magnetizable (for instance brass, titanium, most stainless steels), Applus+ can also provide eddy current based alternatives for tubes made of magnetizable materials like carbon steel and duplex steel: Remote Field Testing (RFT) and Eddy Current with magnetic saturation.

Another option for examination of heat exchanger tubes (both non-magnetizable and magnetizable tube materials) is our ultrasonic IRIS inspection.

Other Eddy Current-based NDT methods Applus+ provides include:

- Remote Field Testing: inspection of ferromagnetic heat exchanger tubes
- (Partial) Saturation Eddy Current: inspection of ferromagnetic heat exchanger tubes, including finfan tubes
- Incotest: detection of corrosion under insulation
- ACFM: detection and sizing of surface-breaking fatigue cracking
- SLOFEC: tank floor and pipeline scanning

Target customers

Eddy Current tube inspection can be deployed in any sector that uses heat exchangers, including the petrochemical, power generation, pharmaceutical, industrial air conditioning, commercial heating unit, and food industries.

Key customer benefits

Benefits of Eddy Current Testing on heat exchanger tubes include high inspection speed and immediate test results, detection and sizing of internal and external defects, and the ability to detect both gradual wall thinning and localized flaws in one scan. Most important benefit of Eddy Current Testing on welds is that the coating doesn't have to be removed.