OCEANEERING®

oceaneering.com

Conventional Non-Destructive Testing

Detect and evaluate flaws

Non-destructive testing (NDT) is the branch of engineering concerned with methods of detecting and evaluating flaws in materials. NDT produces no deleterious effects on the material or structure under test and assists with guaranteeing safe operation, quality control, and assessing plant life.

Flaws may present as cracks or inclusions in welds and castings or variations in structural properties—all of which have the potential to lead to loss of strength or failure in service.

FEATURES

Verification of integrity and reliability of assets

Assures compliance to regulatory requirements

Mitigates costly process safety risks

09.08.2017

Conventional Non-Destructive Testing

Frequently used NDT methods

Radiography Testing (RT)

Detects and evaluates wall loss and weld defects

Radiography uses gamma rays or X-rays to produce an image of an object on film or on a digital detector. Images are analyzed to detect wall loss, size pipes and plate, and to identify defects in welds, forgings, and castings during the manufacturing process. The source of radiation is selected to suit project requirements. Radiography enables in-house or mobile inspections, the creation of a permanent inspection record, and provides the client with data used to determine the suitability of inspected components prior to additional work progressing.

Ultrasonic Testing (UT)

Evaluates external flaws, wall thickness, and detection of internal flaws

Ultrasonic testing uses high-frequency sound waves to measure material thickness and detect surface and sub-surface flaws. It is often used to locate manufacturing defects in welds and castings, complete corrosion and erosion monitoring, and support large-scale corrosion mapping.

UT is a portable and quantitative inspection method offering flexible inspection variations including straight beam, angle beam, phased array, and Time of Flight Diffraction (TOFD). Its success requires a clean surface so that couplant can be applied between the probe and the surface to enable the required sound transmission.

Magnetic Particle Testing (MT)

Detects surface and near-surface cracks in ferrous material

Magnetic particle testing is a cost-effective method used to identify surface and near-surface flaws in ferrous materials. This testing method can be used while an asset is in service to determine its conformity to required standards. Operators can effectively identify required repairs and prevent costly failures and shutdown time.

MT requires the application of a magnetic field using a permanent magnet or electromagnet in the area of the inspection. Following magnetization, the inspection area is covered with a ferrous oxide particle detection medium, that is either dry or suspended in a liquid. Flaws distort the magnetic field, causing local magnetic flux leakage that attracts the detection medium and indicating the presence of a flaw.

Liquid Penetrant Testing (PT)

Detects surface-breaking cracks and defects

Penetrant Testing is a cost-effective method used to detect surface breaking flaws including cracks, cold laps, and porosity. PT inspection can identify critical defects in many clean and non-porous ferrous and non-ferrous materials prior to loss of containment and prevent costly repairs. Dye penetrant is applied to the material or structure being tested and is drawn into surface breaking flaws by capillary action. Excess penetrant on the surface is removed and a developer is applied. The developer draws the penetrant from the flaw and produces a surface indication. The technique can be applied to many ferrous and non-ferrous materials that are clean and non-porous.

Electromagnetic Testing (ET)

Detects surface and near-surface cracks in coated, electrically conducting material

Electromagnetic testing, also known as eddy-current testing, is used to detect small, surface breaking defects through paint and some coatings in electrically conducting materials. Applications for ET include crack detection, metal sorting, and inspection of tube, bar, and welds.

A coil carrying an AC current is placed on the inspection surface and generates circulating eddy currents close to the specimen's surface, affecting the current in the coil by mutual induction. Flaws and material variations affect the strength of the eddy currents and produce electrical changes in the excitation coil.

Visual Testing (VT)

General Visual Inspection (GVI) and Close Visual Inspection (CVI)

Visual inspection of assets is inherent in the previously outlined NDT testing methods. Physical damage, corrosion, and surface cracks are examples of anomalies that are commonly identified during visual inspection.

Critical to successful application of this method are factors including the calibration and quality of the image-capturing method, the inspector's knowledge of the assets and their operating conditions, anomaly identification criteria, understanding of the defects, and proper documentation.