

What is NDT?

NDT stands for non-destructive testing. In other words it is a way of testing without destroying. This means that the component- the casting, weld or forging, can continue to be used and that the non destructive testing method has done no harm.

In today's world where new materials are being developed, older materials and bonding methods are being subjected to higher pressures and loads, NDT ensures that materials can continue to operate to their highest capacity with the assurance that they will not fail within predetermined time limits.

NDT can be used to ensure the quality right from raw material stage through fabrication and processing to pre-service and in-service inspection.

Apart from ensuring the structural integrity, quality and reliability of components and plants, today NDT finds extensive applications for condition monitoring, residual life assessment, energy audit, etc.

There are many NDT techniques/methods used, depending on four main criteria:

- Material Type
- Defect Type
- Defect Size
- Defect Location

Common NDT Methods

Volumetric Examination Method

Ultrasonic Testing -UT

Ultrasonic inspection uses high frequency sound waves to detect imperfections or changes in properties within the materials. It can also be used to measure the thickness of a wide range of metallic and non-metallic materials where access from one side only is available.

Radiography Testing -RT

Radiography uses an x-ray device or radioactive isotope as a source of radiation which passes through the material and is captured on film or digital device. After processing the film an image of varying density is obtained. Possible imperfections are identified through density changes.

Surface Examination Method

Visual Inspection -VT

The oldest of all the methods. Components are scanned visually, sometimes with the aid of low or high power lenses, fibrescopes, cameras and video equipment, to determine surface condition.

Liquid Penetrant -PT

In Liquid Penetrant the test object or material is coated with a visible or fluorescent dye solution. The excess dye is removed from the surface and a developer which acts like a blotter is applied drawing penetrant out of imperfections open to the surface. With visible dyes, the vivid colour contrast between the penetrant and the developer is used. With fluorescent dyes an ultraviolet lamp is used to make the 'bleed out' fluoresce brightly allowing the imperfection to be seen readily

Magnetic Particle -MT

Magnetic Particle inspection is used to identify surface and near surface discontinuities in ferromagnetic materials such as steel and iron. The technique uses the principle that magnetic lines of force (flux) will be distorted by the presence of a discontinuity. Discontinuities (for example, cracks) are located from the flux distortion following the application of fine magnetic particles to the area under test.

Eddy Current -ET

In eddy current testing electrical currents are generated in a conductive material by an induced magnetic field. Distortions in the flow of the electric current (eddy currents) caused by imperfections or changes in a material's conductive properties will cause changes in the induced magnetic field.

These changes, when detected, indicate the presence of the imperfection or change in the test material.

Integrity Examination Method

Leak Testing -LT

Leaks can be detected by using electronic listening devices, pressure gauge measurements, liquid and gas penetrant techniques or a simple soap-bubble test. Several techniques are used to detect and locate leaks in pressure retaining components such as pressure vessels and pipelines

Acoustic Emission Testing-AET

When a solid material is stressed, growing imperfections, if any within the material emit short bursts of acoustic energy called "emissions". As in ultrasonic testing, acoustic emissions can be detected by special receivers. Emission sources can be evaluated through the study of their intensity, rate and other characteristics. The growing defects can be located by triangulation technique (similar to earthquake epicenter location)

Condition Monitoring Method

Thermography – Infrared Testing - IR

Thermography enables the thermal profile of an item, machine or building to be presented in a graphic form which allows a working temperature assessment to be derived. From this, variations in the material or component temperature are identified, enabling working limits or corrective actions to be identified.

Vibration Analysis - VA

The rotary machines produce vibration noise. By monitoring the frequency, amplitude etc. of the vibration the condition of the machine can be estimated.

Special NDT methods

NDT engineers and technicians also use magnetic resonance imaging, vibration monitoring, laser ultrasonics, holography, computed tomography as well as many other specialized methods for specialized applications

A Career in NDT

Careers can be in a variety of areas:

- Service Inspection Companies
- Smelters & Foundries
- Rolling & Forging Mills
- Petro Chemical & Refineries
- Mining & Mineral Processing
- Aircraft Maintenance & Manufacturing
- Vehicle Maintenance & Manufacturing
- Engineering Firms
- Research & Development Facilities
- Education & Training
- Equipment Manufacture & Sales
- Maintenance, Service & Repair of Equipment