

Ultrasonic Testing Workshop Course Content

Techfest is the annual science and technology festival of IIT Bombay. Following is the basic outline of the **in-person** workshop that would be happening at **Techfest in IIT Bombay**

Nondestructive testing (NDT) is the process of inspecting, testing, or evaluating materials, components or assemblies for discontinuities, or differences in characteristics without destroying the serviceability of the part or system. In other words, when the inspection or test is completed the part can still be used.

Today modern non-destructive tests are used in manufacturing, fabrication and in-service inspections to ensure product integrity and reliability, to control manufacturing processes, lower production costs and maintain a uniform quality level. During construction, NDT is used to ensure the quality of materials and joining processes during the fabrication and erection phases, and in-service NDT inspections are used to ensure that the products in use continue to have the integrity necessary to ensure their usefulness and the safety of the public.

NDT is commonly used in forensic engineering, mechanical engineering, petroleum engineering, electrical engineering, civil engineering, systems engineering, aeronautical engineering, medicine, and art.

The 4 Main Types of NDT Testing

- **Ultrasonic testing** - Manual ultrasonic testing (UT) is one of the more common non-destructive testing methods performed on materials. This testing utilizes high-frequency mechanical energy, i.e. high frequency sound waves, to conduct examinations and measurements on a test area.
- **Magnetic particle testing** - This NDT process uses magnetic fields to find discontinuities at or near the surface of ferromagnetic materials. The magnetic field can be created with a permanent magnet or an electromagnet, which requires a current to be applied.
The magnetic field will highlight any discontinuities as the magnetic flux lines produce leakage, which can be seen by using magnetic particles that are drawn into the discontinuity.



- **Liquid penetrant testing** - Liquid penetrant testing involves the application of a fluid with low viscosity to the material to be tested. This fluid seeps into any defects such as cracks or porosity before a developer is applied which allows the penetrant liquid to seep upwards and create a visible indication of the flaw. Liquid penetrant tests can be conducted using solvent removable penetrants, water washable penetrants or post-emulsifiable penetrants.
- **Radiographic testing.** Radiographic testing uses radiation passed through a test piece to detect defects.

X-rays are commonly used for thin or less dense materials while gamma rays are used for thicker or denser items. The results can be processed using film radiography, computed radiography, computed tomography or digital radiography. Whichever method is used, the radiation will show discontinuities in the material due to the strength of the radiation.

We will focus mainly on Ultrasonic Testing & also Advance Ultrasonic Testing which is very widely presently used in Petrochemical, Oil & Gas , Offshore, Shipping , Aerospace & many more Industries after giving brief presentation on other 3 above described methods