DISTRUCTIVE & NON- DESTRUCTIVE TESTING OF MATERIAL

Non destructive testing: Non destructive testing (NDT) is a wide group of analysis techniques used in science and technology industry to evaluate the properties of a material, component or system without causing damage.

Destructive testing: In destructive testing (or destructive physical analysis, DPA) tests are carried out to the specimen's failure, in order to understand a specimen's performance or material behavior under different loads.

DESTRUCTIVE TESTING OF MATERIAL

Detecting the failure can be accomplished using a sound detector or stress gauge which produces a signal to trigger the high-speed camera. It is usually not economical to do destructive testing where only one Universal Testing Machine (UTM) or very few items are to be produced. Destructive testing is most suitable, and economic, for objects which will be mass-produced, as the cost of destroying a small number of specimens is negligible. These tests are generally much easier to carry out, yield more information, and are easier to interpret than nondestructive testing. In Destructive Testing (or Destructive Physical Analysis, DPA) tests are carried out to the specimen's failure, in order to understand a specimen's performance or material behavior under different loads.

The following test methods are considered destructive testing and are described in more detail in the respective article

- tensile test
- compression test
- hardness test
- flexural test
- Charpy impact test
- fatigue test
- creep rupture test
- relaxation test
- cupping test

NON DESTRUCTIVE TESTING OF MATERIAL

Nondestructive testing (NDT) is a wide group of analysis techniques used in science and technology industry. Innovations in the field of nondestructive testing have had a profound impact on medical imaging, including on echocardiography, medical ultrasonography, and digital radiography. NDT is commonly used in forensic engineering, mechanical engineering, petroleum engineering, electrical engineering, civil engineering, systems engineering, aeronautical engineering, medicine, and art. NDT does not permanently alter the article being inspected, it is a highly valuable technique that can save both money and time in product evaluation, troubleshooting, and research. properties of a material, component or system without causing damage.

Visual testing, Ultrasonic, Radiographic, liquid penetrant, Magnetic-particle and Eddy-current testing are commonly used methods of non destructive testing of material :

Eddy-current testing: Eddy-current testing is one of many electromagnetic testing methods used in nondestructive testing (NDT) making use of electromagnetic induction to detect and characterize surface and sub-surface flaws in conductive materials. 1. In its most basic form — the single-element ECT probe — a coil of conductive wire is excited with an alternating electrical current. This wire coil produces an alternating magnetic field around itself. The magnetic field oscillates at the same frequency as the current running through the coil. When the coil approaches a conductive material, currents opposed to the ones in the coil are induced in the material eddy currents. Variations in the electrical conductivity and magnetic permeability of the test object, and the presence of defects causes a change in eddy current and a corresponding change in phase and amplitude that can be detected by measuring the impedance changes in the coil, which is a telltale sign of the presence of defects. This is the basis of standard

Dye penetrant inspection (DPI), is a widely applied and low-cost inspection method used to locate surface-breaking defects in all non- porous materials (metals, plastics, or ceramics). The penetrant may be applied to all non-ferrous materials and ferrous materials, although for ferrous components magnetic-particle inspection is often used instead for its subsurface detection capability. Dye Penetrant Testing Kit

LPI is used to detect casting, forging and welding surface defects such as hairline cracks, surface porosity, leaks in new products, and fatigue cracks on in-service components. DPI is based upon capillary action, where low surface tension fluid penetrates into clean and dry surface-breaking discontinuities. Penetrant may be applied to the test component by dipping, spraying, or brushing. After adequate penetration time has been allowed, the excess penetrant is removed and a developer is applied. The developer helps to draw penetrant out of the flaw so that an invisible indication becomes visible to the inspector. Inspection is performed under ultraviolet or white light, depending on the type of dye used - fluorescent or non fluorescent (visible).