

Non destructive techniques(LPT,MPT,UT and ECT) : - A review

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ABSTRACT

Non destructive testing are the techniques which are used widely in the metal industry in order to control the quality of materials. The concept of non destructive testing is to obtain the properties of material without the destruction of the specimens and to the structure health monitoring. Non destructive testing is the mechanism which helps in finding out of defects of any items like weld before major harms happen to the items without affecting its usefulness. For metals there are more than fourteen methods of NDT but in this review we are discussing most important one which are Liquid penetration test, Magnetic particles test, Ultrasonic testing and Eddy current testing in detail.

Keywords: - Non destructive testing, sensor, structure health monitoring.

Introduction

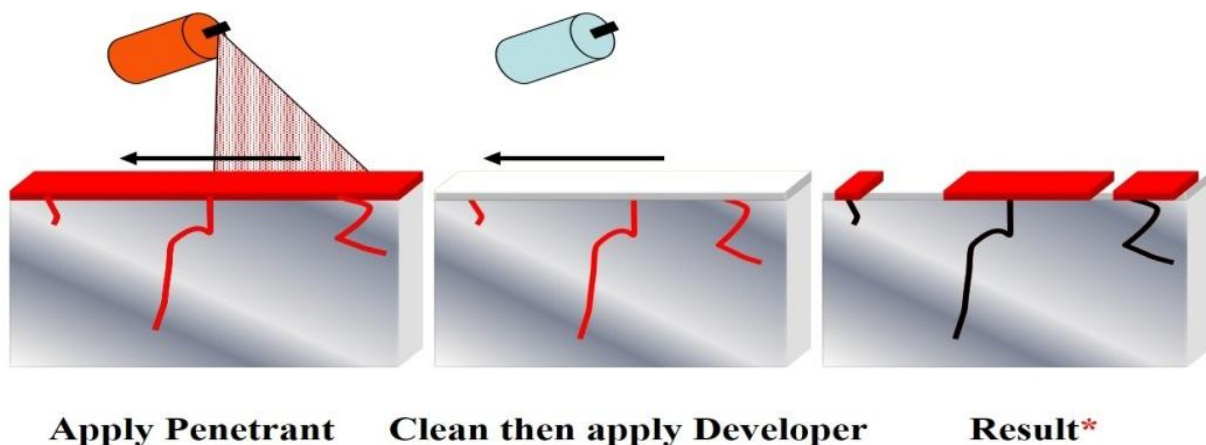
The term NDT is often considered to be only with the detection and location of flaws but actually NDT measures physical properties of the material. NDT method are widely using in the industries they give a big advantage over destructive testing that is they do not affect the usefulness of material that is material can be used after the NDT for which purpose it is made. NDT is the process of inspecting, testing, or evaluating material, components or assemblies for discontinuities, or differences in characteristics without destroying the serviceability of the part in other words when the inspection or test is completed the part still can be used.

Because non destructive testing allows parts and material to be inspected and measured without damaging them, provides an excellent balance between quality control, cost effectiveness and reliability. NDT methods are used to detect flaws and defects in tube and pipe, bar, rod, wire, cable, billets and parts. The work is done in the form of a literature review which is based on the latest journals articles and books connected with non destructive testing.

Types of NDT

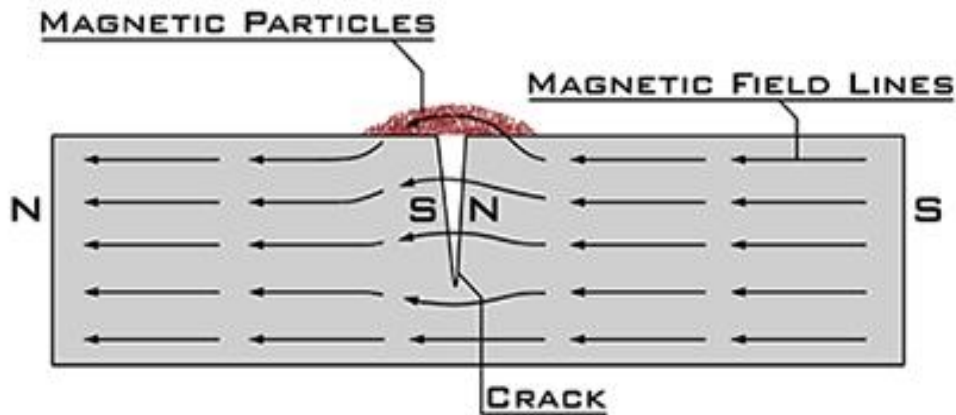
- **Liquid penetration testing (LPT)**

LPT is also known as dye penetrant testing, This testing widely used to detect surface defects in casting, forging, welding, material cracks, porosities and possible fatigue failure area. In this process the part is cleaned and coated with a visible florescent die solution, and then he/she applies developer to the material. The developer pulls the die solutions out of the imperfection due to the capillary action.



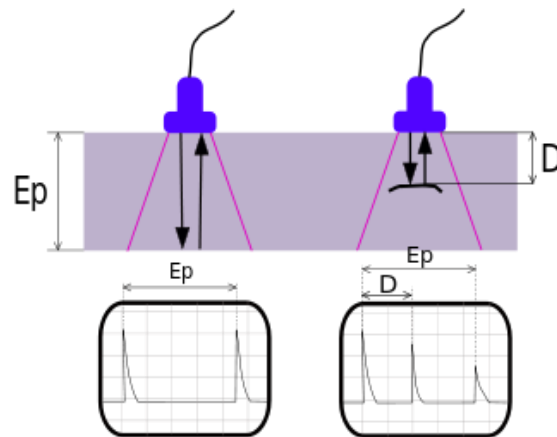
- **Magnetic particles testing:**

This process of NDT is used for detecting surface and slightly sub-surfaces discontinuities in ferromagnetic material such as Iron, Nickel, cobalt, and some of their alloys. In this process the part is subjected to magnetic field. If any defects on or near the surface are present, the defect will create a leakage field. After the component has been magnetized, iron particle, either in a dry or wet form, are applied on the surface of the part. The particle will be attracted at the flux leakage fields, thus forming a visible indication.



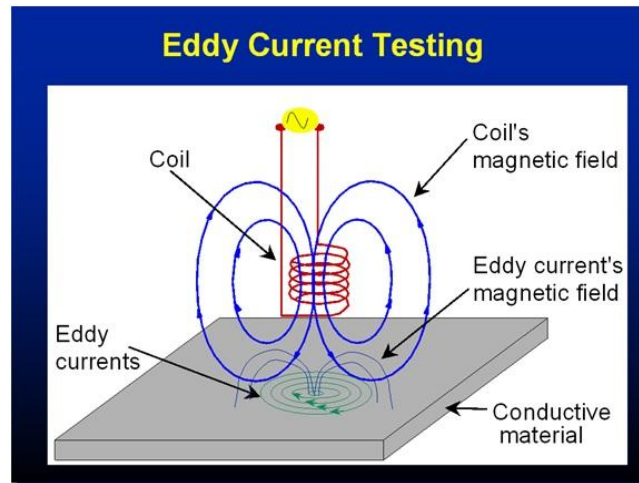
- **Ultrasonic testing:**

In this process ultrasonic waves are transmitted into the material to detect internal flaws or to characterize materials. As the waves travel through the material, they may get reflected or refracted depending upon the condition within the material. The signals are picked up by the transducer and recorded to find out the location of the flaw.



- **Eddy-current testing:**

This method makes use of electromagnetic induction to detect and characterize surface and sub-surface flaws in conductive materials. The presence of any flaw will cause a change in the eddy current field and a corresponding change in phase and amplitude of the measure signal, these changes are displayed in eddy current detector display as a distinct change in the signal.



Conclusion

As conclusion, we found that NDT are the techniques which don't harm the material and further service can be taken by the material. Eddy current testing is one of the most extensively used NDT for inspecting electrically conductive materials at very high speed that does not required any contact between the test piece and center. Every technique has its own applications according to the conditions or areas of application.

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