TCR Advanced Engineering P. Ltd

Experts in Metallography, Failure Investigation and RLA

Metallurgy for Industries

Power | Petrochemical | Fertilizer | Chemical | Refinery | Engineering | Automobile

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Non Destructive Testing (NDT)

Importance of Non Destructive testing

Success of NDT rests on four pillars

i. Knowledge
ii. Perseverance of NDT personnel
iii. Integrity of the testing personnel
iv. Efforts made by NDT service taker

Knowledge

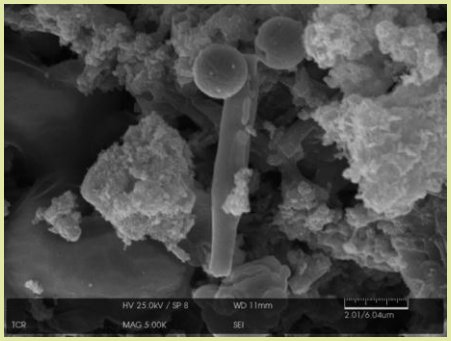
It is important both for the NDT service taker and service provider to have the knowledge of product tested and Non Destructive Testing. The testing methods and technique used for NDT should be effectively selected. The common test methods are Ultrasonic testing, magnetic particle testing, dye penetration testing, etc. Visual magnetic and fluorescent magnetic particle testing are different aspects of same testing method , viz- MT (Magnetic particle testing). Selection of test method and technique depends upon the type of defect anticipated in the product to be tested. It is essential to select specific method and technique before testing to get the best results

Several examples can be quoted. To facilitate better understanding, following examples seem to be appropriate

Consider a forged shaft. Before proceeding for the machining, NDT is more or less sine-qua–non to ensure freedom from the defects. One can perform Ultrasonic testing using normal beam technique to detect any internal/planar or volumetric defects and Magnetic particle testing for surface defects like forging laps which would normally escape in normal

Best NDT results are ensured by a joint effort from NDT service provider and service taker.

Microstructure of the Month



Magnification: *5000X*

MOC: *Carbon steel*

Component:*Pipe spool*

Observation:*The photograph shows shape and morphology, suggesting sulphur reducing bacterial (SRB) attack on carbon steel.*

Useful hints:*Presence of bacteria like activity and its consequence on corrosion of material was confirmed through SEM analysis along with other testing like EDS/Water analysis. SEM was found very useful to confirm the diagnosis.*

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beam ultrasonic testing. If any un-acceptable flaw observed, the raw material stands rejected and the processing cost can be saved. Once the raw material is satisfactory with respect to all the tests carried out, it can be processed. In the event of any heat treatment done, It becomes necessary to check for heat treatment cracks. At this stage Ultrasonic will be seldom helpful, and Magnetic particle testing requires to be carried out for detection of heat treatment cracks.

Another example of selection of technique

When inspecting ferrous material during in-service inspection, it is much necessary to anticipate a damage mechanism of component. For damages like fatigue, WFMPI (Wet fluorescent magnetic particle inspection) is the best option. Since fatigue is a surface phenomenon, WFMPI is the most sensitive technique (in comparison to PT and visible MPI) for detection of surface cracks for ferromagnetic materials.

A testing method should not be selected just because it is new and serendipitous. For instance -inspection of tubes of coolers where the damages anticipated are pitting, erosion etc from inside, techniques like IRIS and Eddy current are used, as well as APR. Whereas while the damages are from OD are expected – APR would be least helpful, and eddy current testing would be the best.

Perseverance of NDT personnel

Probability of detection of defect decreases as the quantum of testing increases. NDT personnel have to be fit both mentally and physically to carry out the testing. It is advised to carry out the testing intermittently and take a break for 5-10 minute after every hour of testing to refresh oneself.

Integrity of NDT personnel

Integrity is a part of culture of the company providing NDT services. Remuneration of NDT personnel should not be concomitant with the performance of an individual. For instance, Remuneration of personnel should not be on the basis of number of samples tested, accepted or rejected.

Efforts made by NDT service taker

One needs to make the necessary efforts to get the best of NDT. Surface preparation is one of the major areas wherein the efforts of NDT service taker are involved. If the service provider is given the responsibility of surface preparation, his energy will be wasted in preparing the surface required for NDT. Service takers should take initiative in arranging for the best surface preparation and congenial environment for NDT to get the best results.

Precautionary innuendoes

In first case cited in point 1, it will be required to carry out proof machining on forged sample before carrying out UT and MT. It will be required to remove scaling after heat treatment of shaft before carrying MT.

For 2nd example cited in point 2- It is required to carry out buffing/grinding to remove any oxide scales before carrying out WFMPI for in-service inspection.

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