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MAGNETIC PARTICLE INSPECTION FOR WELDING DEFECT DETECTION

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The paper deals with the main non-destructive control methods and their advantages and disadvantages. An understanding of benefits and drawbacks of each form of nondestructive testing makes it possible to choose the best method for any product. The term ‘weld quality’ is relative. Any weld can be considered of good quality if it meets appearance requirements and continues indefinitely to perform the job it is intended for. Nondestructive examination methods make it possible to verify compliance with standards on an ongoing basis by examining the surface and subsurface of the weld and the surrounding base material.

In the case of welds, magnetic and ultrasonic non-destructive testing are the most suitable methods. As for vessels under pressure, magnetographic non-destructive testing should be chosen, because it is one of the best techniques which is currently used to examine the surface and subsurface of the weld and the surrounding base material. This technique has been applied to measure the field strength near the surface of a ferromagnetic object using a polarized local tape magnetic carrier. The local tape magnetic carrier and the weld are magnetized together and the resulting magnetogram can be used to assess the quality of the material. Measurement and experimental graphs of the magnetic field of different steel thickness allow choosing the most suitable thickness for performing magnetographic non-destructive testing. The width of the lining affects the resultant magnetic field as well. The wider the reinforcement lining, the weaker the magnetic field in the seam area.

It is difficult to give an accurate assessment of the quality of the welded joint in the resultant magnetic field. That is why, the recommendations on the thickness of the metal to be welded are given: the metal should be thick while the reinforcement lining should be thin and narrow, because the resultant magnetic field should be strong enough for accurate magnetographic testing.

A new system for testing vessels under pressure consists of the following elements: 3 electromagnets, a local tape magnetic carrier, a vessel and holders of the electromagnets and the vessel. This system can quickly carry out testing along the contour of the vessel and give accurate information about the metal structure. The local tape magnetic carrier is pressed by electromagnets. The source of electric current magnetizes the vessel and scans the local tape magnetic carrier on the magnetic flaw detector. The magnetogram shows the quality of the weld.