

Comparison of what can be obtained by radiological testing exclusively and alternative testing

G. Nardoni AIPND-ICNDT

Summary

Radiography has been the first non-destructive testing method applied by industry to revealing defects inside the materials.

Radiography of welds, castings has been just from the beginning, the major application for radiography test.

Along the years new NDT-methods has been developed; among these, the ultrasonic examination which represent the major competitor to radiography test in a precise exposure conditions.

Increasing the thickness of welds over 60 mm the capability of Radiography-test to detect oriented defects such as cracks or lack of fusion is greatly reduced; the POD became seriously reduced.

Today for thickness more than 100 mm, Radiography test is no longer requested by the applied Codes. ASME, PED the international codes for Pressure Vessel do not required any radiography test over 100mm thickness of steel.

Remaining in the welds area, radiography test becomes mandatory as the thickness becomes smaller, for example, under 12mm.

Millions of small pipe welds of refineries have thickness ranging from 5mm to 20mm; the major part of these welds are welded only from one side with high probability of making lack of penetration at the root of the welds.

Ultrasonic examination due to the presence of the rips of the weld may easy confuse the echoes of rips with the lack of penetration.

The radiography examination is the only that can clearly estimate the presence or not at the root of the welds the presence of a lack of penetration.

Same considerations for the small thickness welds in the range of 1-5mm can be made for millions of chemical tanks with high hazardous contents need for the same reason Radiography examination instead of Ultrasonic or others non-destructive methods.

Another advantage of Radiography test is that viewing a radiography the shape of the discontinuity may be observed; as consequence, the type of defect is precisely identified. This capability of identifying defects in their nature, make radiography test the mandatory test for the qualification of welding procedure and welder qualification.

Another large application of Radiography test is the examination of castings.

Shape, coarse grains, position of defects, poor reflectivity or discontinuities need to perform extensively Radiography test to guarantee the integrity of the material.

Due to the factors over mentioned ultrasonic examination is heavily reduced in its applications.

For some types of castings, ultrasonic examinations can not be made at all, because of the contact with the transducer.

Beside the detection of defects the radiography test may be used in the electronic area to verified the rightness of the configurations of assembled components.

No other test may be used in this case .

And more, in the area of works of art radiography examination is extensively used for analysing pictures, statues and others objects .

To implement radiography examination in the industrial application, new technique has been developed .

Computer Tomography is one of the most successful technique in which the film has been substituted by solid detectors and computers by which the image may be reconstructed after multiple exposures around 0° - 90° / 0° - 180° / 0° - 360° .

Very useful is this technique for analysing the section of the object; in addition of defects this technique give information on the profile, thickness of wall and any others information inside the object in its special distribution.

Many others techniques based on the digital technology are emerging to comply the industry needs to extend the radiography examination on manufactured products without influencing production rate .

Often these products for shape, surface conditions dimensions can not be examined by ultrasonic, eddy current etc.

Radiography test still remain after 100 years of its application a fundamental test for the examination of materials; its main scope regards the detection of defects, establishment of configuration, the examination of the material structure and its properties.