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Fabrication of single V-butt welded test specimens with artificial defects for Non Destructive Testing training and research purposes.

Non- Destructive Testing (NDT) test specimens are very important in training of NDT personnel and are useful in evaluation of defects in actual NDT inspections. These test specimens must contain defects, which have known dimensions simulating the real defects that can occur in fabricated or in-service industrial components.

Non-Destructive Testing personnel involved in the inspection of weldments must have a basic understanding of standard welding processes and the types of flaws common to such welding processes. Proper knowledge on types of flaws and welding processes enables the manufacture of test specimens with artificial defects. Wrong manipulation of the electrode, incorrect welding current/speed, welding on dirty surfaces, welding with damp electrodes, rapid cooling of the weld metal, high strength quenching are some sources of defect formation.

Conventional methods in use to create artificial defects in weldments are, restraining the weld from contract to create cracks, leaving arc air gauging in places where lack of penetration is required, welding to form blow holes at a crater etc. These may cause the manufacturer fatigue and may be time consuming and costly. In this work the authors have introduced relatively a simple and less expensive way to prepare single V-butt welded steel plates and pipes with artificial defects using shielded metal arc welding process. The flaws prepared in the weldments were incomplete penetration, slag, porosity, lack of fusion and crack. From the observations it is concluded that Low-welding current (64-68 Amp) can be effectively used to create incomplete penetration, porosity and lack of fusion in the weldments. Cracks can be originated at rigid joints, high strength quenching and if the parent metal cannot contract freely during welding. Using low electrode angle (48-52 degrees) non- metallic inclusions can be created. The results of the findings were confirmed using conventional NDT techniques such as Radiographic Testing and Ultrasonic Testing.