

Experimental Analysis of Carbon Steel Material Using Submerged Arc Welding Process in Gate Valve Used In Pressure Vessel

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ABSTRACT: Usually the submerged arc welding is performed for the gate valves used in the pressure vessels but open performing the saw process there are some defects occurring at the gate valves especially at the corners and one such defects that occur at the corner is porosity. In order to overcome this defect we came with the solution of performing Gas tungsten arc welding at each and every joint employed in the gatevalves.

KEYWORDS: SAW, TIG, WELDING DEFECTS

I.INTRODUCTION

Welding is the process of joining two plastic or metal parts by melting them, with or without using a further molten material. The heat produced by an arc is used in welding to melt metal rods, which solidify to provide a strong joint between two metal surfaces. During welding, the work pieces to be joint can be are melted at the interface and after solidification a permanent joint can be achieved. Sometime a filler material is added to form a weld pool of molten material which after solidification gives a strong bond between the materials. Weld ability of a material. In this kind of welding, the flux begins for depositing on the joint to be welded. Whenever the flux is cold, then it acts as an insulator. The arc can be started by moving the tool by the work portion. The arc struck will constantly remain below a wide coating of flux, and the generated heat by the arc softens the granular flux .Once the flux is melted by the heat

II.LITERATURE REVIEW

1. A study on measuring system of Submerged Arc welding for panel butt joint in shipyard

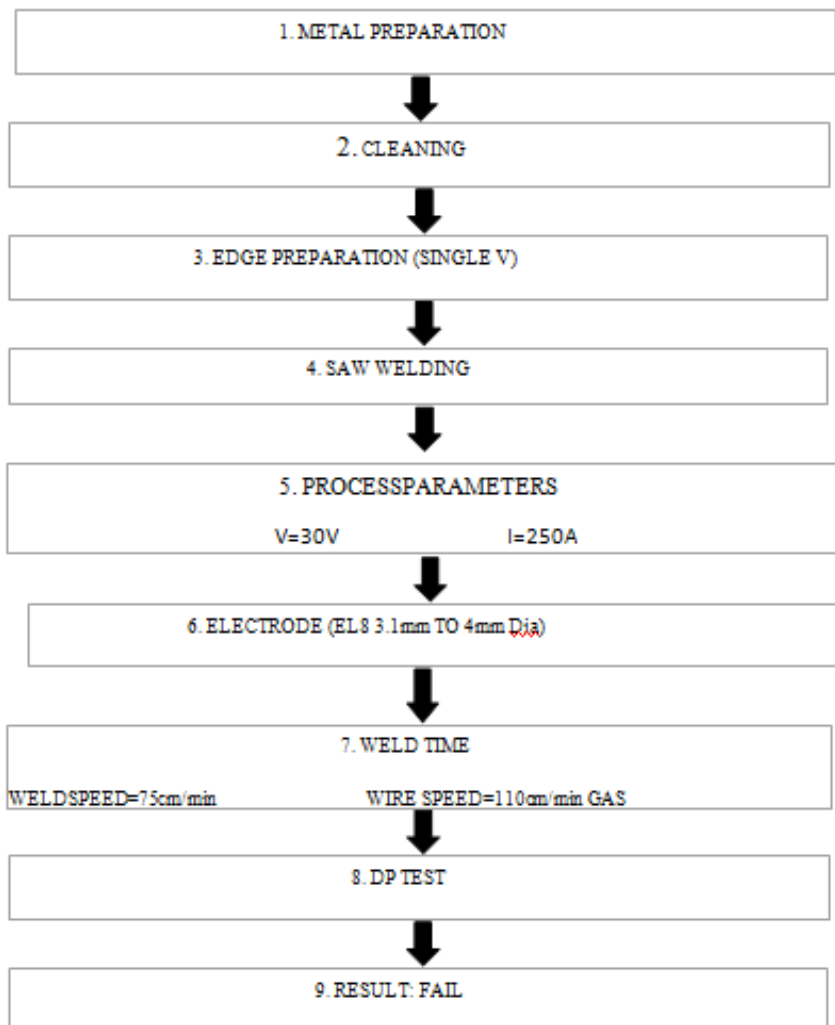
SAW (Submerged Arc Welding) machines normally consist of two or more torches to increase productivity. The performance of conventional SAW depends on the experience of the operators. Error between the measured and the actual values of welding conditions is accumulated as time goes on. Therefore, the weld quality cannot be guaranteed because of the error. Even if a number of welding defects occur, workers are not able to find out the cause of defects because the measured signals show a big difference with the actual values. In this study, a stable measuring system was developed for the welding conditions such as current, voltage, speed so that workers can easily monitor the actual weld ingconditions. If the error between monitored and measured signals occurs, workers are able to easily correct the actual welding conditions through this system. In this way, it increased the reliability of the welding conditions. This system was appliedto an actual welding system and showed that the weld qualitywas stabilized andimproved.

Author: Moon young Chung sunghoonko, Hyeong soon moon Jinwoochoi

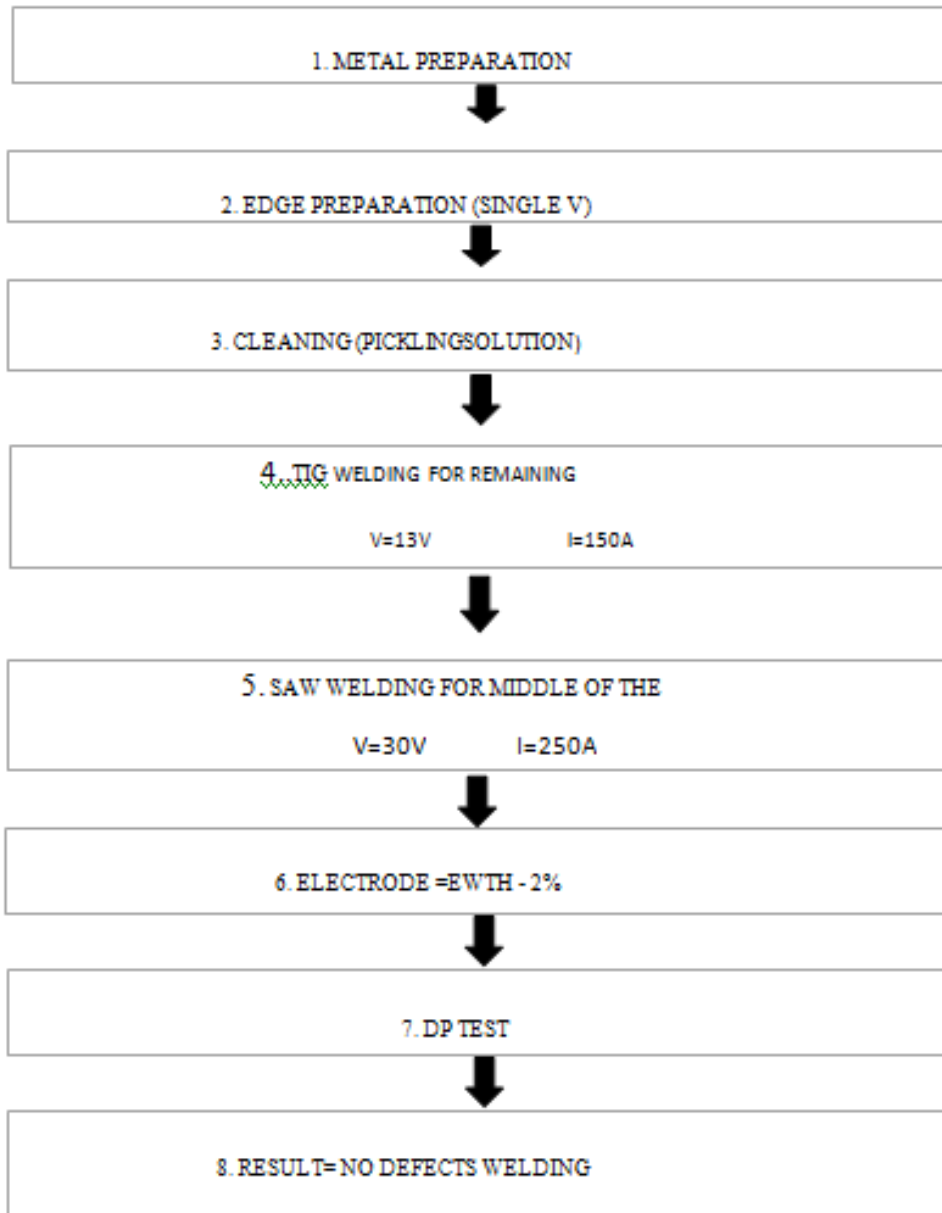


2. Capacitive coupled IDT for high temperature SAW devices

Harsh environment surface acoustic wave (SAW) sensors are being researched and developed jointly by the University of Maine (UMaine) and Environetix Technologies Corp. for wireless and wired sensor applications, such as those found in gas turbines and power plant combustors. One goal of this work is to extend the operational temperature range of SAW sensors above 1000°C, potentially up to near the melting point of piezoelectric langasite crystals at 1400°C. To achieve stable performance at 1000°C and above, UMaine has developed nanocomposite thin film electrode materials, such as PtRh/HfO₂, and protecting capping layers, such as SiAlON and Al₂O₃. However, these protective top layers, which aid in extending the life of the electrodes, are electrical insulators that prevent direct bonding to the electrodes. The Maine team also found evidence of accelerated thin-film degradation close to the SAW inter digital transducer (IDT) bond pad welds at these extreme temperatures. This paper introduces a high temperature capacitive approach to electrically couple to the IDT, thus allowing electrical access to the SAW device. The capacitive coupling approach also avoids premature failure of the nanocomposite film caused by inter diffusion between the bond wires and the SAW IDT bond pads. Author: S.C. Moulzolf, R. Behnon, T. Pollard-2



SUGGESTED METHODOLOGY



IV. EXPERIMENTAL RESULTS

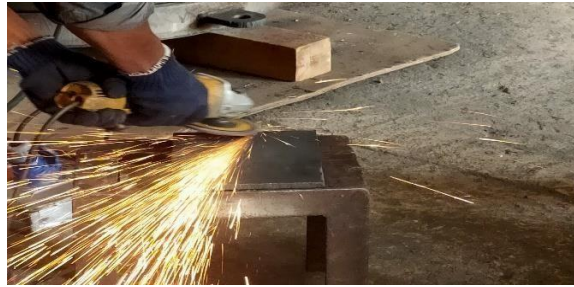
STEP 1: the saw process performed in the gate valve die penetration test applied it is known as surface preparation process the surface contain rust particles so after the surface preparation is done go to next process



STEP 2 :Then the fault location in the gate valve are identification. This valve is identified from the part number and purchase number to engrave in the material is easy to picking the material



STEP 3: Edge preparation is done in sample material. The sample material chosen is carbon steel of grade the grinding process is to be done for the purpose of receiving the material to engrave g the purpose



STEP 5: Using pickling solution cleaning process is done the liquid penetrating process the liquid solution is apply and the dwell time is given for capillary action



STEP 6: SAW is performed at the middle and TIG at the ends. If the submerged arc welding is not well for this kind of welding process so select the TIG welding process.

STEP 7: Die penetrant test is performed to the material for any defect is found like porosity that defect area is



clearly identified and it should be clearly marked for rework



STEP 8: From TIG welding process there is no defect is found compare to submerged arc welding process this is very useful in fabrication process.



STEP 9: The same procedure is repeated in order to order to obtain defect free gate valve in pressure vessel

WELD TESTING/NDE EXAMINATION



There are five basic NDT methods used to detect weld defects:

1. Visual Inspection(VT)
2. Magnetic Particle Testing (MPT)
3. Dye Penetrant Liquid Testing(DPI)
4. Radiographic Testing(RT)
5. Ultrasonic Testing(UT)

Steps used in the experiment:

1. Clean the surface with alcohol and let surface dry for 5min.
2. Apply the liquid penetrant spray (red can) to the surface and brush for further penetration. Then, wait for 20min.
3. Wipe the surface with a clean textile and subsequently apply remover spray (blue can) to remove excess residues on the surface and wait for a fewmin.
4. Apply the developer spray (yellow can) at a distance of about 30cm from the surface. The developer will absorb the penetrant that infiltrated to the surface features such as cracks, splits, etc., and then reacted with it to form a

geometric shape which is the negative of the geometry of the surface features from which the penetrant is sucked.

5. The polymerized material may be collected on a sticky paper for future evaluation and related documentation, if needed.

V.CONCLUSION

Welding distortion and defects were identified on the parent material and it was rectified using alternative welding technology on the sample material then it was applied on the parent material. There was no formation of welding defects on the parent material. In order to overcome this defect we came with the solution of performing Gas tungsten arc welding at each and every joint employed in the gate valves.

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