Submerged Arc Welding Process for Mild Steel - Review

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Abstract- *In the paper, we are going to study about the welding process in the mild steel IS1606. These mild steel becoming progressively striking for producing industrial applications. The main application is the airport structure, especially in boiler. The purpose of this project is to study the welding parameter such as current, voltage and welding speed to investigate the tensile properties, microstructure, micro hardness and strength. This paper is used to find the optimum parameter. To identify the hardness of the welding element in the Submerged Arc Welding (SAW) process IS1606 based on the experimental approach*

Keywords- Submerged Arc Welding, mild steel, Process parameter.

I. INTRODUCTION

Submerged Arc welding is a high quality welding process with a very high deposition rate. It is commonly used to join thick sections in the flat position. The wire is feed continuously to the arc by a feed mechanism using motor-driven rollers.

The flux is feed from a hopper fixed to the welding head and a tube from hopper spreads the flux in a continuous manner in front of the Arc. When molten, the flux becomes conductive, and provides a current conducting path between the electrode and the work.

The mild steel is for the boiler application. The mild steel is high strength material. The mild steel is used to overcome difficulties like fabrication rate, melting efficiency. The functional variables used in the SAW process outcomes in varying heat input in the weldment.

The consequence of this is the worsening of the chemical constituents of the weld bead. Therefore, the possessions of the parent metal cannot sufficiently match those of the weldment to ensure good performance in service, especially in low temperature services.

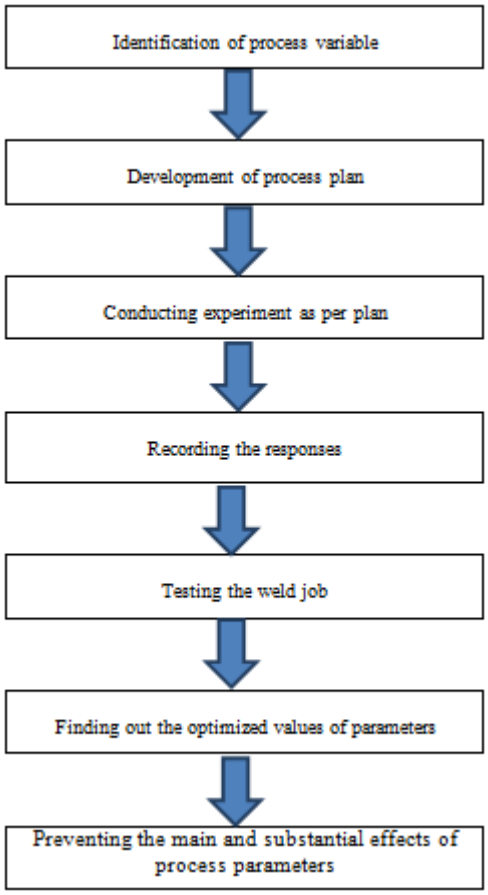

Figure 1.1 Methodology of the process

II. LITERATURE REVIEW

Most of the works have been carried out to study the design and development of SAW process parameters.

Mild steel IS2062 5mm thickness plate was optimized for the process parameters of welding current, welding speed and welding voltage on weld bead thickness and bead hardness. But microstructure analyse has not been carried out.

Experiments are conducted for submerged arc welding process parameters (welding current, arc voltage and welding speed) on mild steel of 12 mm thickness. The researchers proposed the effect of these parameters depend on

depth of penetration. From the study of literature survey 6mm thickness plate is consider, to analyse the effect of these parameters considering the weld strength.

III. SUBMERGED ARC WELDING

Submerged-arc welding (SAW) is a common arc welding process that involves the formation of an arc between a continuously fed electrode and the workpiece.

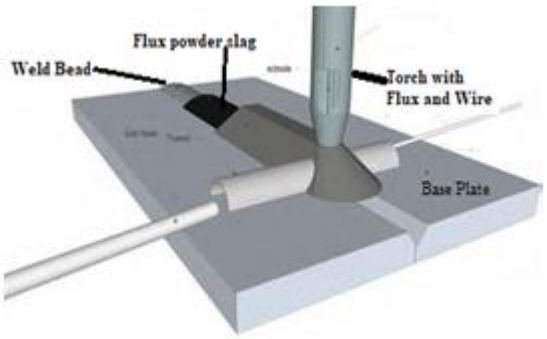

Fig 3.1 SAW Joining

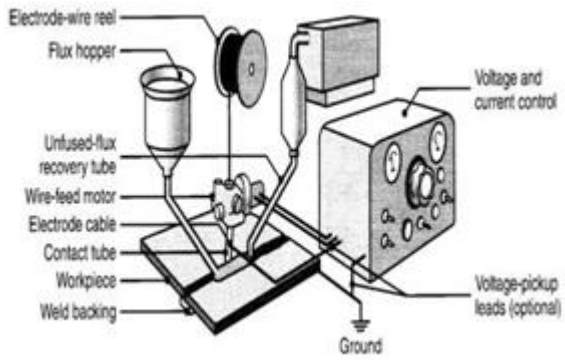

Fig 3.2 General arrangement

IV. EXPERIMENTAL PROCEDURE

In order to understand the effect of SAW parameters such as welding current and travel speed on the physical and mechanical properties mild steel (IS2062), the as welded test specimens were evaluated by weld geometry measurements to findtherelationshipbetweentheweldingparametersandweldgeo metryparameters.

Murugan and Gunaraj (2005) suggested that mechanical strength of welds is influencednotonlybythecompositionofthemetalbutalsobythewe ldbeadshape in SAW. So the selection of the process variables and control of weld bead shape has become essential.

Ghosh et al. (2011) suggested that in submerged arc welding process parameters play a significant role in determining the quality of a weld. So for such applications, optimum welding process parameters must be selected providing desired weld properties.

4.1 MATERIAL TO BE USED

Alloy steels such as mild steel may require preheat in the 300-450°F range, the chemical composition of mild steel is given below.Table 1 Chemical composition (wt. %) of the base metal IS: 2062

Element	Percentage
C	0.150
S	0.014
P	0.027
Si	0.108
Mn	0.840
Al	0.015

Tensile Testing Observation for mild steel the micro alloying elements, such as boron, vanadium and titanium added singly or to obtain higher strength to weigh tratio combined with better toughness, form ability and weld ability as compared to unalloyed steel of similar strength level.

4.2 FILLER METAL

The electrode having low carbon, pure tungsten or tungsten alloyed with thorium oxide or lanthanum-oxide, which gives a better current carrying capacity, it is used in submerged arc welding of mild steel. This type of electrode is very easy to strike and re-strike. Welding performance is excellent with a very smooth, low spatter arc producing a finely rippled bead surface with excellent slag detachability.

Element	Percentage
C	0.11
S	0.003
P	0.02
Si	0.20
Mn	0.91
Cu	0.11

4.3 SAW FLUX

Role of fluxes in SAW is largely similar that of coating in stick electrodes of SAW. protection of weld pool from inactive shielding gases generated by thermal decomposition of coating material. SAW fluxes can influence the weld metal composition appreciably in the form of addition or loss of alloying elements through gas metal and slag metal reactions.

Element	Percentage
C	0.052
S	0.006
P	0.027
Si	0.530
Mn	1.560
Al	0.012

V. ANALYSIS OF SAW BENEITS AND IMPORTANCE

This submerged arc welding process has high (45kg/h) deposit rate.

1) In automatic applications.
2) Very small welding smoke can be observed.
3) No edge training is required.
4) This method is used in indoor, and outdoor.
5) No chance of weld sprinkles because it is submerged within flux blanket.

VI. CONCLUSIONS

An overview in to the evaluation and advances in SAW technology has been presented. The process said to have evolved significantly leading to some industrial application in two decades. With the discussion on the above it is found that flux constituents have a major effect on flux behaved. It can be possible welding without filter material and its producing detect free joint comparing with other welding process.

Similar metal welding process have more challenging in micro structure and required mechanical properties , but by using the submerged arc welding achieved better microscope and mechanical properties.

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