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RESEARCH ARTICLE

STUDY OF WELDING PARAMETERS ON MIG AND TIG WELDING

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ABSTRACT

In today's global manufacturing market the productivity and quality plays a vital role. The selection of manufacturing method should be produced the product with low cost and also increased the productivity. In most common the industries uses the welding process for make the permanent joints between the materials .In this work mainly focuses on the MIG and TIG welding process. The process parameters like type of shielding gas, welding current, gas flow rate and welding voltage plays a major role on their mechanical properties of weldments. In this study mainly focused on the welding process parameters that influences on the material mechanical properties of weldments.

INTRODUCTION

In many of the arc welding process, the TIG and MIG (Fig. 1) welding process in broadly used for joining materials. These techniques are mainly used to join a small structure, pipes, ship buildings etc. The concept of MIG welding process is quit single. The welding force has the welding wire and a small stream of shielding gas. The welding wire produces the arc between materials and welding wire and this arc produces the permanent joint between the materials .The flux core wires and shielding gases are used to prevent the weld from oxidation

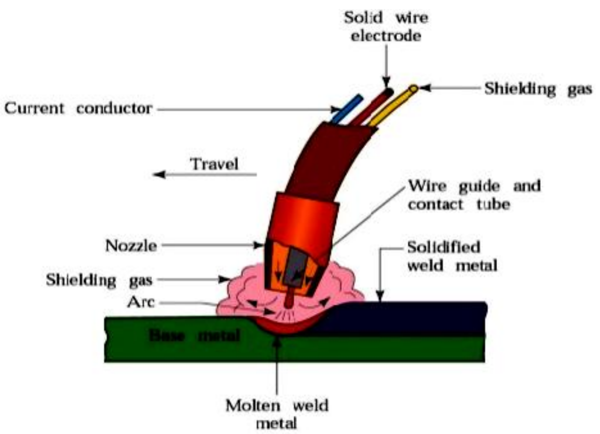

Fig. 1

LITERATURE REVIEW

Pires, Quintino *et al*, analyzed arc stability transfer modes and fume formation rate with the various shielding gases for the better working welding equipment. There are seven shielding gas mixtures used for the welding process. The mild steel plates are used as a weld material and the standard method used for the fume formation measurements. The fume practices are in the shape of cluster and in size of 0.25ɥm.The oxidising potentials like O_2 and CO_2 increases the fume formation rate. This also increases the arc length. Spray and short circuit transfer modes are altered due to various current intensities and voltage.

Pires, Quintino *et al*, examined composition of shielding gases effects on the generation of welding fumes during MIG welding. Steady state current with range of arc voltages and wire feed speeds were used. 8mm plate is welded by this process. SEM test is used to determine the dimension of particle. The chemical composition is determined by using **EDX.** The FFR was reduced by the proper welding Selection voltage and current intensity. The total amount of particles in fume is highly depends on ionization potential in the mixture of $O_2$and CO_2

Carpenter, monaghonetal, concentrated the plain steel robotic gas metal arc welding process. Chemical compositions of

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fumes are identified by **TEM EDS** and bulk phases are identified by using **XRD**. Si amount in the fume particle are very difficult to determine. The Addition of CO_2 is the main controlling factor FFR than the addition of O_2.

Matusiak *et al*, researched arc welding parameters and the emission of welding fume for the stainless steel weldments. The nickel and chromium content materials are welded by using MMA,TIG and MIG. The total amount of chromium are mainly depends on the oxidation content in shielding gasses. The argon mixtures produced less nickel content on the argon shielding gas. The fume emission is higher and mainly depends on the welding current during TIG welding Process covered electrodes produced higher chromium content in the fume.

Kang *et al*, analysed aluminium alloys weld metal with the alternate supply of shielding gases, supply to the welding zone. Pure helium and pure argon are selected as shielding gases. One electronic part controlled the shielding gas supply frequency and alternate the supply of shielding gas controlled by using electromagnetic force .The alternate supply of shielding gas produced the deepest profile of weld penetration and lowest degree of porosity and it also produced improved weld shape.

Kang *et al*, investigated 12mm thickness plate welded by GMAW. In this work the alternate supply of shielding gas is passed to the weld zone, when compared to the conventional method. Helium and argon shielding gases produced the low degree of welding distortion and good weld shape.

Srinivasan *et al*, analyzed AISI stainless steel plates during GMAW. The welding fume and chemical composition of welding fumes are analyzed with the welding parameters like heat impact and weld wire feed rate. Experimental method is used to find out the fume composition and fume generation rate. SEM XEDS and XRF analysis are used to identify the particle characterization. The result revealed that the wire feed rate directly affects the fume generation rate and it will not affect the welding fume composition. The morphological analysis revealed the spherical shape of the weld fume particle.

Sivashanmugam *et al*, evaluated the GMAW and GTAW welding techniques with the aluminium alloy 7075.The V-shaped notch is used for welding and argon used for welding process. The microstructure and mechanical properties were determined after welding. The GTAW weld joints showed more impact strength, tensile strength and hardness value than GMAW. In HAZ the hardness value should be high. Equalized grains microstructure is showed in the welding zone

Liuy *et al*, investigated aluminium 5083 microstructure characteristics and mechanical properties welded by GMAW and GTAW. The different types welding process parameters by shielding gas flow rate , welding travel speed and shielding gases are used for GTAW and GMAW .Compression test ,tensile strength are measured after the welding can be done. Hardness can be measured at 25 places on the weldments .The GMAW weld metals are produced less mechanical properties than the GTAW. The little bit of porosity can be observed after the microstructure analysis.

Arun Kumar *et al*, analysed the welding techniques like GTAW and GMAW for the hollow pipes. The pipes are produced by the different combination of the material and the thickness of the pipe is 4mm and the diameter of the tube is 54mm.GMAW used the argon as shielding gas and GTAW uses some amount of CO_2 with argon. Tungsten carbide and chromium carbide contribution increased the hardness and tensile strength values.RTR techniques showed some defects like stubs, cracks and holes in the pipe.

Nanda geetu *et al*, investigated the welding parameters influences on the mechanical properties of the austenitic stainless steel during the gas metal arc welding process. The welding voltage was kept constant during the entire process and pure CO_2 used as shielding gas. The result revealed that the mid range of welding wire speed and welding current produced the optimum mechanical properties for austenitic stainless steel plates than other process parameters.

Balaji *et al*, studied the mechanical properties of SS316L welded by the GTAW process. During that process the welding parameters gas volume, welding and bevel angle can be varied. Taguchi orthogonal array and taguchi table produced the optimum welding parameters for the experimental. The bevel angle 60^o and welding current 100 Aproduced theoptimum strength values that the other welding parameters. There is some inclusion can be showed in HAZ. Lack of penetration defects is identified by the radiography test.

CONCLUSION

TIG and MIG are the main and suitable technique for joining the dissimilar and similar materials. The mechanical Properties of weldmentsdepend on the depth of penetration. Increasing voltage of arc produces the good bead shape. If more spatter is produced by the increase of feed speed. The feed speed and heat input increases the depth of penetration. The value of current plays a vital influence on the hardness and impact properties weldments. The taguchi and DOE methods are used to find the different optimum values of process parameters for the welding process.

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