Gas Metal Arc Welding By Taguchi Technique

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ABSTRACT: MS-1018 is non-hardened ductile steel belonging to low carbon steel groups. It has been extensively used for machining applications such as machine parts, rods, bolts, studs, etc. It indicates that welding capability is strong and that it is often used for carburized parts. The present study paper studies the effect of various process parameters such as welding current, voltage, gas flow rate, welding speed and gas pressure on mechanical properties such as tensile strength and percentage of elongation of GMAW welded MS 1018 plate joints. GMAW welding is a high deposition rate welding process in which the wire is continually fed by a pistol or a spool. GMAW welding gives a few advantages like all capable places, long welding etc. Optimization was made to find optimal welding conditions to optimize tensile strength and percentage elongation of welded joints. The confirmation test was also performed to verify the desired configurations of the parameters. From the review papers report, it was observed that when welding current, voltage, GFR increased, the tensile strength decreased, but when welding speed increased but also increases the tensile strength.

Index Terms: MS-1018, Tensile power, Elongation Percentage, Taguchi Technique, Current, Voltage, Gas Flow Rate.

INTRODUCTION

Welding is a process by which two identical and non-similar metals or non-metals are mixed with the application of heat and pressure, but in some situations without the application of pressure the process has been carried out. The filler wire is used enter the metal in the GMAW process with the help of a spool cartridge [1]. Welding is used to render permanent joints. It is used for the manufacture of car components, train wagons, aircraft frames, machine parts, tanks, structural works, boilers, ship-building furniture, etc. Gas Metal Arc Welding (GMAW) (figure 1) is an arc welding process that creates the coalescence of metals by heating them with an arc between the continuous metal filler electrode and the job. The arc and the welding pool are coverer from ambient exposure by moving the necessary gas through the nozzle to form a protective shield around the welding field [2].

Gas metal arc welding (GMAW) is often used in chassis parts, where it is important to maintain the strength and rigidity of the joint. The method also has the freedom to connect sections of different shapes to structural members, such as pipes and brackets [3]. The long fatigue life of the welding joint is a prerequisite. Spatter, fit-up and void problems need to be resolved in the pieces produced during welding. Certain designs of components prohibit the use of spot resistance welds. Furthermore, there are closed sections that cannot be approached by means of resistance spot welding arms [4]. The GMAW method is favored for such applications. The GMAW process is also referred to as metal inert gas or metal active gas welding. In the latter phase, carbon dioxide is the active shielding gas. Consumables with matching strengths are chosen to satisfy the mechanical properties specifications of the joint, but low-strength wires have been used to achieve mechanical properties by depositing extra steel.

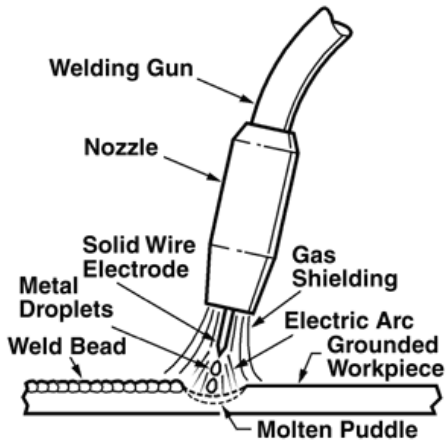

Figure 1: Gas metal arc welding

1.1 BENEFITS

1.1.1 High deposition performance as used in such modes of transmission [5]. Both electrode weights are inserted into the weld, while in other methods you have to account for stub depletion, flux/slag, etc.

1.1.2 No chip slag relative to SMAW and FCAW

1.1.3 The method can be extended to thin materials with relative ease if properly set. GTAW can also be used on thin fabrics, but GMAW wins hands down in certain situations, such as Auto Body [6].

1.1.4 High hydrogen welding deposit for both electrodes

1.1.5 High output factor as no slag is needed to be extracted and a continuous electrode is used.

1.1.6 With the parameters appropriately set for the application, no one can weld after a very limited period of practice.

1.2 DISADVANTAGES:

1.2 .1 Needs a wire feeder that is difficult to transfer and may also be a maintenance/repair strain.

1.2 .2 Requires Shielding Gas so welding can be difficult in windy conditions.

1.2 .3 No slag device so out of place welding is sometimes more difficult.

1.2 .4 Increased risk of loss of fusion if the parameters and welding technique are not regulated.

1.2 .5 It's hard to get the pistol to close areas [7].

1.2 .6 It is not ideal for windy weather.

LITERATURE REVIEW

The GMAW process is also referred to as metal inert gas or metal active gas welding. In the latter phase, carbon dioxide is the active shielding gas. Consumables with matching strengths are chosen to satisfy the mechanical properties specifications of the joint, but low-strength wires have been used to achieve mechanical properties by depositing extra steel [6].

RESULT AND CONCLUSION

From the review paper report, it is observed that when welding current, voltage, GFR increases, the tensile strength decreases, but when welding speed increases, the tensile strength also increases. In the case of lengthening it's almost the same for the tensile power. Optimization was made to find optimal welding conditions to optimize tensile strength and the percentage of elongation of welded joints. The research addressed the optimization of the GMAW parameters of Mild Steel 1018 by Taguchi's experimental design. The procedure was performed using a particular series of controllable parameters: Voltage, Current, and Gas Flow Rate for Tensile Strength reaction variables. L9 orthogonal series, S/N variance ratio analysis was used for the analysis. The study showed that the control factors had various effects on the response variables.

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