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A REVIEW OF DESTRUCTIVE AND NON DESTRUCTIVE TESTING OF ALUMINUM AND ALUMINUM ALLOY PLATE OF TIG WELDING METHODS

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ABSTRACT --*This paper reviews is deals with, the welded quality of aluminum and aluminum alloy plate by TIG welding method. TIG welding method is one of the most used and popular methods to weld aluminum. Aluminum has unique properties ductile, non-magnetic, light weight, weld ability and also it has corrosion resistance in nature. Input parameters were varied according to the experimental design. The accuracy and quality of welded joints largely depends upon the type of inert gas, welding speed and type of power supply. The mechanical properties of weld joint also varying based on the parameters. The mechanical property like YS and UTS varies by pulsed and non-pulsed current by different frequencies. It has wide application in industry fields namely marine, aircraft, heat exchanger, automobile, oil refineries etc.*

Keywords-- *TIG, Aluminum, welding, Destructive testing*

I. INTRODUCTION

Depending upon the thickness of the welded joint, the fillet wire is added to the molted weld puddle. One of the methods which derives both the advantages of AC and DC welding is AC pulsed TIG welding.

The porosity content of the welded area has been found in different places depending on the gas flow rate. Shear strength varies with the change of pulse current. The tensile strength of pulsed current has found on the TIG welded joint[1]. Tensile strength and toughness of the welded joint is directly proportional to the gas flow rate[2]. Pulsed current is one of the most dominating factors in the ultimate tensile strength. The percentage of elongation and optimization of ultimate tensile strength is recommended levels of the adjustable parameters of the pulsed current TIG welding method[3]. Observed that the ultimate tensile strength is significant for the gas flow rate and welding current. The quality of the plate is directly depends on the current[4]. The tensile strength of the welded material is almost similar in the both the phases. Throughout the welded aluminum plate the automated welding system is similar[5]. The basic mechanical and input properties of a selected material should be clear and understandable. The Alternating Current voltage type is used for TIG welding machine[6]. Depending on the welding parameter namely welding current, gas flow rate and filler material the welded joint strength is varies. The gas flow rate is directly proportional to the tensile strength, when the gas flow rate is increased then simultaneously the tensile strength also increase[7]. Using TIG welding process can weld ferrous and non-ferrous

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metal also. Similarly during the welding process there is no spatter and fumes [8]. While testing the welded material in the tensile test machine, the fracture is occurred in the specimen on the welded region. The strength of the welded material is increased by using the pulsed current[9]. Due to more intensity of the current the welding speed strength also more. Tensile strength on both the side is almost equal[10]. The strength of the heat affected zone is increasing or decreasing is depends on the heat input rate. The strength of the base metal is stronger than the welded material[11]. All the condition same parameters are used in TIG welding process. The fine type of grains are observed in the Annealed and Normalizing conditions[12]. Alternating current is most preferable for TIG welding process of aluminum plate for a better strength. The selection of parameter is depends upon the welding machine and material used[13]. The performance of a pulsed current is much better than non-pulsed current in gas tungsten inert gas welding. The different current and materials are giving more results to compare[14]. The determination of Non-destructive testing by the method of Radiography testing but not possible in Liquid penetrant and Ultrasonic testing process[15].

II. MATERIALS AND METHODOLOGY

Using the aluminum alloy - 2014 plate and the process of TIG welding found the various results [2]. Similarly by the TIG welding method has been done using the aluminum alloy – 6063 by a Taguchi method[3]. The aluminum alloy 7075 is welded by the process of TIG welding and estimated the various results. TIG welding experimental process and planning of aluminum plate has been done[4]. Aluminum plate of Al-5052 is investigated which is done by a TIG welding process[5]. Aluminum alloy Al-8011 is optimized which is done by TIG welding method is estimated[8]. 2024-T3 aluminum alloy plate is welded and estimated the effects of welding parameters on TIG welding methodology[10]. The different types of analyzing process in carried out to estimate aluminum plate[12]. Aluminum alloy AA-6351 is done a welding of J-joint by pulsed current TIG welding properties of using various parameter[14]. Using the aluminum alloy Al-6082 the welding has been done and the investigation has been carried out by Non-Destructive testing[16]. Tensile strength of the aluminum alloy Al-5083 is carried out and estimated by the TIG welding method and also the various strength has been estimated[17].The aluminum alloy of Al-5052 is welded by TIG welding process and determined the welding parameters effect on the TIG welding process[19]. Characteristics and influences of welded aluminum alloy Al-5083 is explained based on the various parameters[20]. The Aluminum alloy of Al-5083 and Al-6082 is welded together by gas tungsten arc welding of butt joint is characterized based on mechanical and micro structural[21]. By using a pulse and non-pulse current of gas tungsten arc welding is evaluated by the mechanical properties of Aluminum alloy AA6082-T6 is done[22]. AA6063 is carried out the gas tungsten gas welding is experimentally investigated based on the various parameters[23]. Aluminum alloy AA6061 is welded using different gases and flow rate and estimated the yield and ultimate tensile strength using the non- pulsed current for fine grain structures[24]. Using the aluminum alloy AA-2025 and AA-7025 is welded by V groove butt weld joint using gas tungsten inert gas welding and estimated the groove angle, geometry shape and tensile strength of welded material[25]. These are the materials and methods were followed to estimate the strength of a different material in various condition.

III. RESULT AND DISCUSSION

After welded a different materials using a different gas flow rate, welding speed and type of gases, they are estimated the mechanical behavior of material. Pulse current varies then the shear strength also varies accordingly[1]. The tensile strength and the toughness of the welded material varies based on the gas flow range, which is directly proportional to the material[2]. Based on the pulsed current frequency the ultimate strength also varies, it plays a dominating role in the strength[3]. The change of gas flow rate in the range of 8 to 10 Lpm the different kind of tensile strength has been observed[7]. The analyzed of maximum and minimum breaking stress of aluminum plate by the various processes[10]. In a welded material based on the bevel angle in the range of 30 to 45 degree the maximum strength can obtained. The penetration depth of bevel height of V-butt joint is also making a difference in the strength of mechanical behavior[11]. The tensile strength has observed for various sample condition namely normalized, annealed and observed material[12]. The various welded frequency were changes the mechanical properties in the tungsten inert gas welding. The pulsed and non-pulsed current various and major response founded in the pulsed current in the lower frequency[14]. Based on the testing material grades the major strengths are obtained aluminum alloy have better strength and mixture of different flow range[16]. Using the TIG welding method of Argon gas has given better penetration obtained in the huge of welding processes of welding speed. The depth of penetration also achieved[19]. The helium and argon of various gases as estimated the values of testing methods.

IV. CONCLUSION

With this review, I conclude that the material aluminum has better mechanical behavior and effectiveness in the gas tungsten inert gas welding process. It has better in the tensile strength and also the ultimate tensile strength in the future. Using the various type of non-destructive testing namely magnetic particle testing, radiography and liquid penetrant testing get a better result of welded. The experimental investigation of every material has estimated and defined.

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