Effect on Ultimate Tensile Stress by Altering Groove Butt Weld in IS 2062 E-250 Mild Steel Plates using MIG Welding

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Abstract:**MIGweldingiswidelyused technique in different areas. For the strength point of view there is groove welding which is also very popular. In this study, important process parameters namely welding current, gas flow rate, gas proportion, feed rate and weldingspeedkept constant throughout. Experiments are conducted on specimens of single-v butt welded joint, material selected for preparing the test specimen is IS2062 E250 grade. The ultimate tensile strength of the welded joint is tested by a universal testing machine and the results are evaluated.**

Keywords:MIG welding,v-buttweld,welding current, welding speed, feed rate, tensile strength.

I. INTRODUCTION

Welding is a permanent joining process used to join varied materials like metals, alloys or plastics, together at their contacting surfaces by application of heat and or pressure. During welding, the work-pieces to be joined are melted at the interface and after solidification a permanent joint can be achieved. Sometimes a filler material is added to form a weld pool of molten material which after solidification gives a strong bond between the materials. Mechanical properties of butt weld can be different in different groove angles. In given research paper, tensile strength for different groove angles is checked. After testing this checking of tensile stress is carried out in computer by various software of analysis and result is shown in various types of graph.

II. LITERATURE REVIEW

(1)SatyaduttsinhP.Chavda, Jayesh V.Desai, TusharM.Patel : The experiment done by them is based on the taguchi method they check the various effects on the specimen by changing the parameter and done the analysis of it. The research material was AISI1045 Medium carbon steel. They also done analysis on the ansys14.5

(2)Rakesh Kumar and Satish Kumar: On the going trend Rakesh Kumar and Satish Kumar used the ANOVA technique.The observed variance in a variable is partitioned into components attributable to various sources of variation. Analysis of variance technique is used to check the adequacy of the model. The term "signal" represents the desirable mean value and the "noise" represents the undesirable value. Hence, the S/N ratio represents the amount of variation, which presents in the performance characteristics.

(3)S.Shaghulhameeth,T.Siva,S.Sathishkumar,K.Sowndh ar: The four persons team come up with the different approach and their words are "MIG welding can be used successfully to join SS410 and mild steel. The processed joints exhibited better mechanical and metallurgical characteristics. The joints exhibited 90-95% of parent material's Hardness value. The specimen failures were associated depending upon the improper changes of heat value. In our experiment we found out the input parameter value 140 AMPS VOLT-26 GAS PRESSURE is the best value and it does not create any major changes and failures in the testing process."

(4)A.A.Noraini,A.S.Zainaland M.A.AzmahHanim: The results obtained for tensile strength and hardness show that various levels of ampere, voltage and travel speed in the welding process affect the maximum and minimum values of the weld properties. The study determines that the process parameters to obtain maximum values for the weld properties are between 200-220 amp for the current, 24 volts for the voltage and 45-50cm/min for travel speed. The maximum value of tensile strength and hardness of the weld are needed to obtain a quality weld to ensure that the weld can sustain higher loading, especially during working conditions such as those for bridge application.

(5)Ajit Hooda, Ashwani Dhingra and Satpal Sharma: The similar weld joint of AISI 1040 material was developed effectively with MIG welding with selected range of input variable parameters. The maximum yield strength both transverse and longitudinal, at the optimum values of process variables-welding voltage, welding current, wire speed and gas flow rate were experimented. The longitudinal yield strength is greater than the transverse yield strength. In future, we can state the relationship between the transverse and longitudinal yield strength by comparing their values and studying their microstructure.

III. MATERIALS

Mild steel plates (IS2062 E250) with the dimensions of 160*100*16*(in mm) are prepared for the welding.

Grade	C % max	Mn % max	S% max	P% max	Si % max	C.E% max
A	0.23	1.50	0.05	0.05	0.40	0.42

Table 1. Composition of the material

There are total four plates which are having groove angle 0,40,60 and 80 degree. Pressure of shielding gas cylinder is taken as 2.5 bar. Understanding interrelationship between process variable, weld speed and weld bead profile other parameters are kept constant. As a shielding gas CO2 (20%) and argon (80%) is used throughout the weld process. There is different type of electrodes available for the MIG weld but here Sg-Fe used which having the diameter 1.2 mm. generally used electrode composition is given below.

C = 0.06 – 0.15	Ni = 0.15 max
Mn = 1.40 – 1.85	Cr = 0.15 max
Si = 0.80 – 1.15	Mo = 0.15 max
P = 0.025 max	V = 0.03 max
S = 0.035 max	Cu = 0.50 max

Table 2. Composition of electrode

IV. PROCEDURE

Four pairs of groove butt (single-V) weld prepared on planner miller which were having angles of 0, 40, 60 and 80 degrees. All the four pairs of specimens were Co2 and argon welded based on parameters designed. The gas flow rate and welding current were measuredusing a regulator and an anemometer. For the entire welding, speed of weld was 0.3 m/min and feed rate was7.5 m/min kept constant throughout the experiment. Current and voltage were 239 A and 25.8 V respectively. The gas combination cylinder is used as per design(argon 20 % and Co2 80 %). Each butt weld was formed by two passes of welding. One over the other single-V butt weld (welded only one sided) preparation was used.

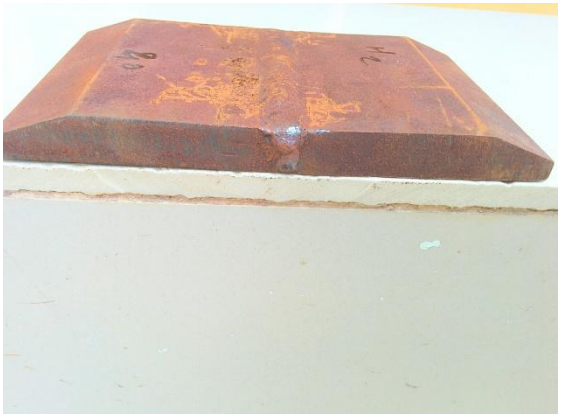

Fig 1. 40-degree groove angle specimen

Fig 2. 80-degree groove angle specimen

Fig 3. 0-degree groove angle specimen

Fig 4. 60-degree groove angle specimen

V. TENSILE TEST

The tensile is used to provide information that will be used in design calculations or to demonstrate that a material with requirement of appropriate specification. The test is made by gripping the ends of a suitably prepared standardized test pieces in a tensile test machine and then applying a continually unidirectional load until failure occurs. After failure process of testing is completed then results can be illustrate on graph paper and analysis of result is carried by the computer through the analysis software

VI. RESULT AND DISCUSSION

Firstly, trial runs carried out before the actual welding. All parameters kept constant throughout the welding. Tensile test was done on the 0, 40, 60, and 80 degrees specimens. After the test, out of the all the weld specimen, comparison between ultimate tensile stress shown in graph below.

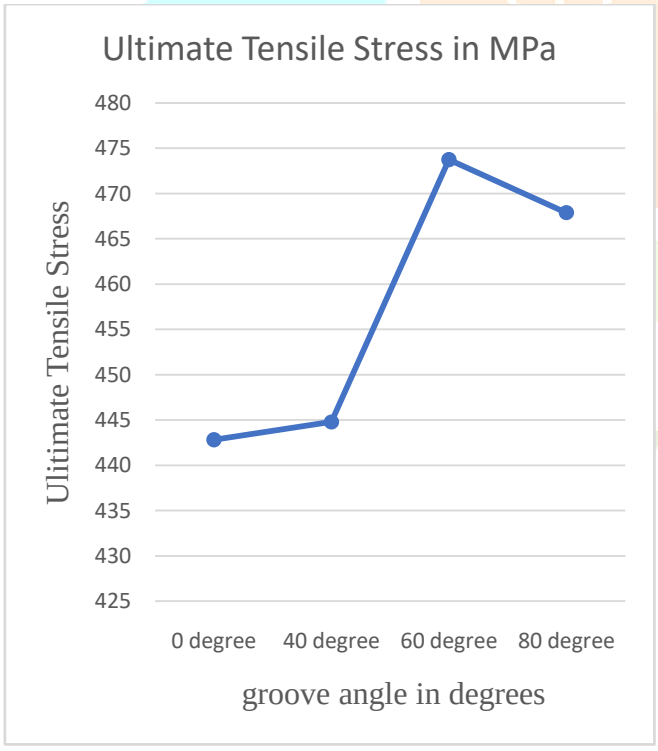

Fig.3Ultimate Tensile Stresscomparison

VII. CONCLUSION

The value of the ultimate tensile stress by altering groove but weld on given four specimens is shown in graph. Here specimen of degree 60 is giving the highest value of the ultimate tensile stress i.e. 473.75 MPa. Current, voltage and other parameters kept constant throughout the experiment.

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