e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
Volume:03/Issue:06/June-2021 Impact Factor- 5.354 www.irjmets.com

STUDY OF TORSION TEST AND HARDNESS TEST OF DISSIMILAR MATERIAL WELD JOINT BY MIG AND MAW PROCESS

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ABSTRACT

Metal inert gas welding is an arc welding process that uses a continuous solid wire electrode heated and fed into the weld pool from a welding gun. The two base materials are melted together forming a joint. In this paper the investigation of torsional strength and hardness of welded joint. In this paper two sheets are joined to each other, mild steel and stainless steel sheets. The dimension of work piece is 230mm X 125mm X 6mm, 7mm and 8mm. The study of couple force on the weld joint, investigation of both welding and found in which make the strong weld joint. In the MIG welding process the electrode like as a wire passed through the welding gun. The welding parameter of MIG and MAW is welding time, welding current, welding force. In this paper the thickness of sheets varied

Keywords: MAW & MIG, Dissimilar Materials, Torsion Test, Hardness Test.

I. INTRODUCTION

The official start of MIG welding history is 1948, it was not until 1948 that GMAW was finally developed by that Batelle memorial institute. The work was sponsored by the Air reduction. Company with the work conducted to Devers and Hobart. MIG welding is a welding process, in which an electric arc forms between a consumable wire electrode and the work piece. This process uses inert gases or gas mixtures as the shielding gas. Argon and helium are typically used for the MIG welding of non-ferrous metals such as aluminum gases used in welding and cutting processes, shielding gases such as carbon dioxide, argon, helium, etc. fuel gases such as acetylene, propane, butane, etc. oxygen, used with fuel gases and also in small amounts in some shielding gas mixtures. These techniques usually use filler materials and are primarily used for joining metals including stainless steel, aluminum, nickel and copper alloys, cobalt and titanium. Arc welding processes are widely used across industries such as oil and gas, power, aerospace, automobile and more.

Figure 1: MIG.

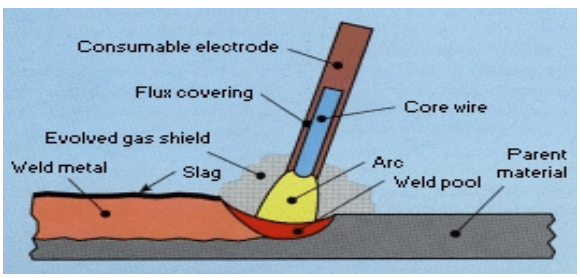

Figure 2: MAW.

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II. EXPERIMENTAL WORK

In this investigation two experiments performed torsion test for torsional strength and hardness test for hardness of weld joint, both performed for to found the strength of weld joint.

Torsion test- in this test a couple force applied on the job of dissimilar material, the one end of sample fixed at the first wheel of torsion machine and second end of sample fixed at the second wheel of torsion test machine and after this arrangement a slowly force applied then the work piece move slowly one form to another for till the failure of weld joint.

Figure 3: Torsion Machine

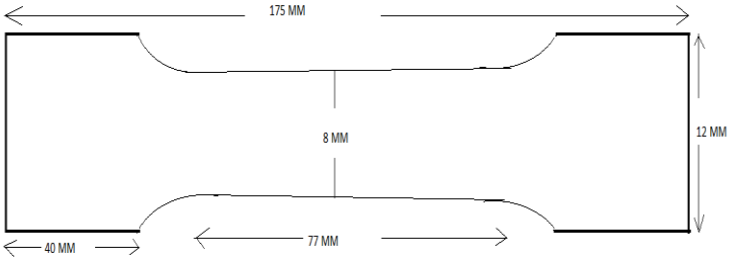

Figure 4: Specimen for torsion test

Table 1: - Parameter for torsion strength of MIG and MAW

Torsion strength of weld joint (Mpa)				
	MAW		**MIG**	
Thickness	Butt joint	V-Joint	Butt joint	V-Joint
6mm	363	373	398	398
7mm	368	378	379	421
8mm	373	389	392	427

Hardness test- this test used in mechanical engineering to determine the hardness of a material to deformation.

Figure 5: Rockwell hardness machine

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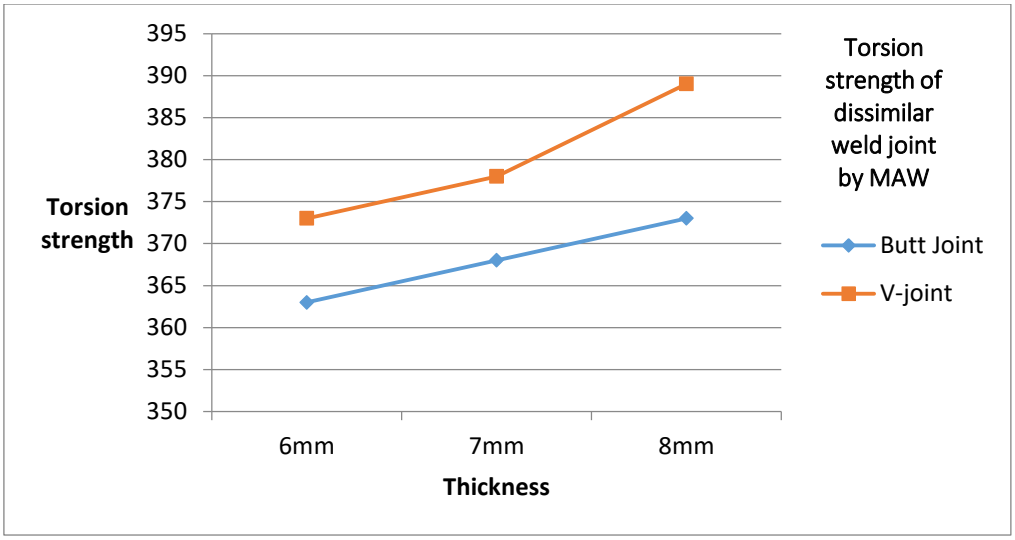
Table 2: - Parameter for hardness of MIG and MAW

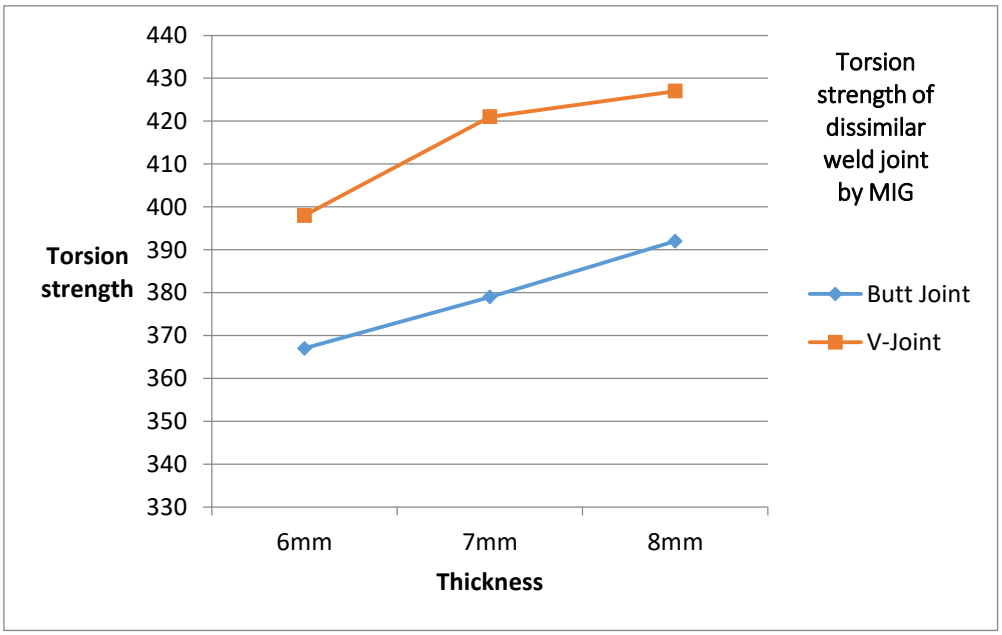
Hardness of weld joint				
	MAW		**MIG**	
Thickness	Butt joint	V-Joint	Butt joint	V-Joint
6mm	95	98	102	110
7mm	98	107	116	120
8mm	105	115	125	130

III. RESULT AND DISCUSSION



Graph 1: Torsion strength of dissimilar weld joint by MAW

In this graph shows, the torsion strength of v-joint is more than butt joint by MAW process. In this graph also found that to increase the thickness of sheets, the strength of weld joint also increase and welding time, travelling speed, welding current will be also increase.



Graph 2:- Torsion strength of dissimilar weld joint by MIG

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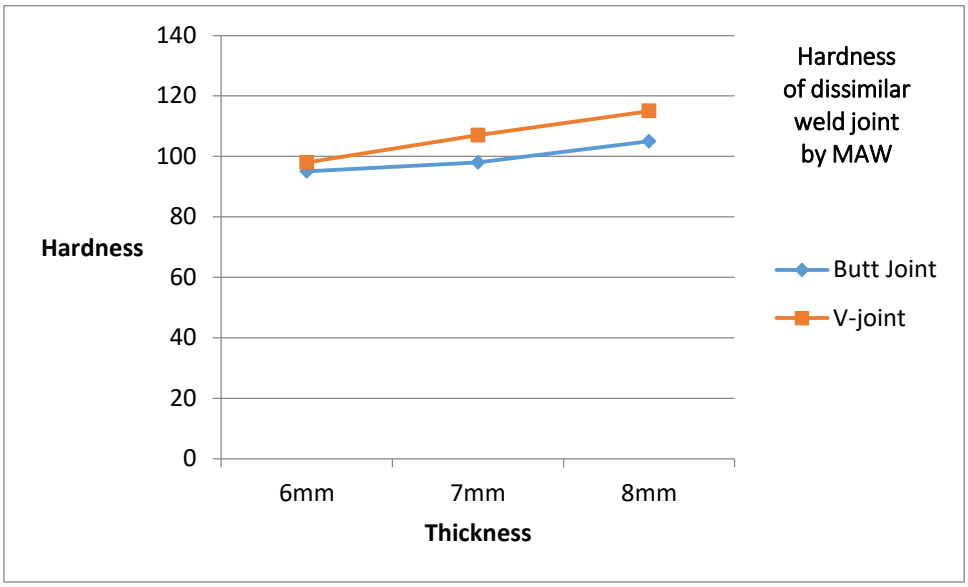
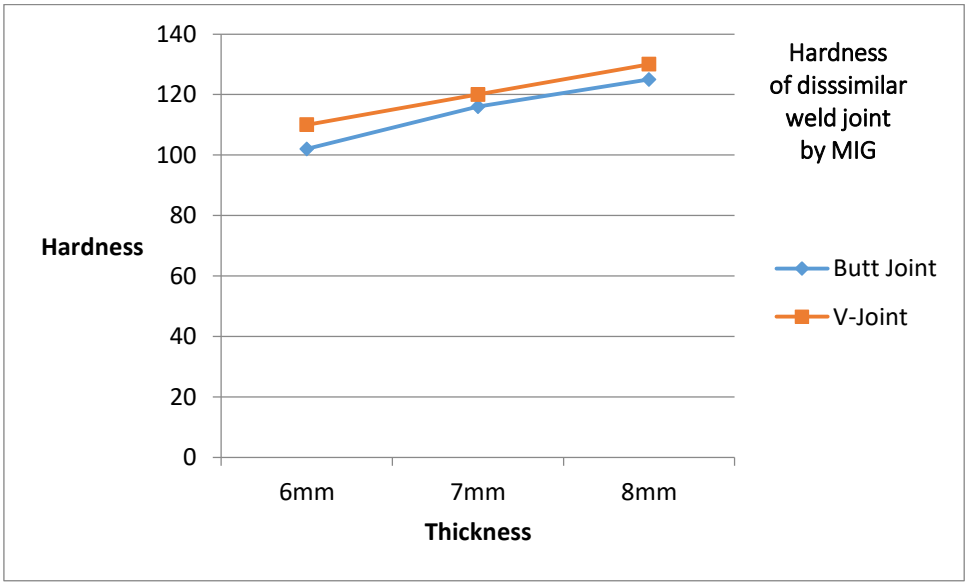


Graph 3:- Hardness of dissimilar weld joint by MAW

In this graph shows, the hardness of v-joint is more than butt joint by MAW process. In this graph also found that to increase the thickness of sheets, the strength of weld joint also increase and welding time, travelling speed, welding current will be also increase.



Graph 4:- Hardness of dissimilar weld joint by MIG

In this graph shows, the hardness of v-joint is more than butt joint by MIG process. In this graph also found that to increase the thickness of sheets, the strength of weld joint also increase and welding time, travelling speed, welding current will be also increase

IV. CONCLUSION

After all investigation found the torsion strength of weld joint v-joint have more strength of butt joint by MIG welding process, And the hardness of V-joint more strong in comparison to butt joint. MIG welding process has more strength in comparison to MAW process. MIG welding technology used in the industry very high level in comparison to MAW welding process. The V-joint have very strength of weld joint by MIG welding.

V. REFERENCES

[1] S. Dadras, M.J. Torkamany, and J. Sabbaghzadeh, "Spectroscopic characterization of low- nickel copper welding with pulsed Nd: YAG laser", Optics and Lasers in Engineering 46 pp. 769– 776, 2008.

[2] J.M. Sa´nchez-Amaya, T. Delgado, L. Gonza´ lez-Rovira, and F.J. Botana, "Laser welding of aluminium

alloys 5083 and 6082 under conduction regime", Applied Surface Science 255 9512–9521, 2009.

[3] John ion, "Laser Processing of Engineering Materials: Principles, Procedure and Industrial Application" , 2005.

[4] R. Gupta, B. Chowdhury, A. K. Barpujari, and J. Borbarua, "Development of software using fuzzy logic to predict erosive wear in slurry pipeline system", Applied computing conference (acc '08), istanbul, 2008.

[5] Hui-Chi Chen, Andrew J. Pinkerton, Lin Li , Zhu Liu, and Anil T. Mistry, " Gap-free fibre laser welding of Zn-coated steel on Al alloy for light-weight automotive applications", Materials and Design, 2010

[6] S. Yan, Z. Hong, T. Watanabe, and T. Jingguo, "CW/PW dual-beam YAG laser welding of steel/aluminum alloy sheets", Optics and Lasers in Engineering 48 732–736, 2010.

[7] Optimization of the weld bead geometry in gas tungsten arc welding by the Taguchi method1998Int. J. Adv. Manuf. Technol.14 549–554

[8] S.C. Juang, Y.S. Tang2002Process parameter selection for optimizing the weld pool geometry in the Tungsten Inert Gas welding of stainless steel*Journal of Materials Processing Technology*12233-3