

INVESTIGATION OF MECHANICAL PROPERTIES OF MILD STEEL AND STAINLESS STEEL SHEETS WELDED BY MIG & MAW PROCESS

Arvind Kumar Siddharth*¹, Dr. Anil Kumar*², Dr. Ramgopal Verma*³, Hemant Kumar*⁴

*¹M.Tech Scholar, Mechanical Engineering, Rajshree Institute Of Management & Technology, Bareilly, UP, India.

*^{2,3}Professor, Mechanical Engineering, Rajshree Institute Of Management & Technology, Bareilly, UP, India.

*⁴Assistant Professor, Mechanical Engineering, Future Group Of Institution, Bareilly, UP, India.

ABSTRACT

In this paper the study of strength of mild steel and stainless steels weld joint by metal inert gas welding and manual arc welding process. In this paper the dimensions of specimen is 230 X 125 X 6, 7, and 8. All dimensions are in MM. In this investigation two experiment tests performed tensile test and impact test. In this investigation also found the strong weld joint in both welding process. The mechanical properties of welding process is welding time, welding speed, welding force and welding current. The MIG welding technology is very useful for industry and this technology is latest. In this welding the electrode wire feed on the roll wheel, when the welding process started then the wire feed on the roll wheel and this wire passed through the welding gun.

Keywords: Tensile Test, Impact Test, MIG, MAW, Mild Steel, Stainless Steel Sheets.

I. INTRODUCTION

MAW was very old method for welding, in this welding process need of filler metal and this welding for production is very slow process. The welding technology mostly used in the domestic things and automobile industry etc. Manual arc welding was first invented in Russia in 1888. It involved a bare metal rod with no flux coating to give a protective gas shield. The development of coated electrodes did not occur until the early 1900s when the Kjellberg process was invented in Sweden and the Quasi-arc method was introduced in the UK. Manual metal arc welding is the most flexible and one of the most widely used arc welding processes. The heat of the arc melts the parent metal and the electrode which mix together to form, on cooling, a continuous solid mass. Arc welding is welding using the heat of arc as a heat source. In arc welding and negative voltage is applied to the base material. This makes an arc occur from the base material to the electrode.



Figure 1: MAW.

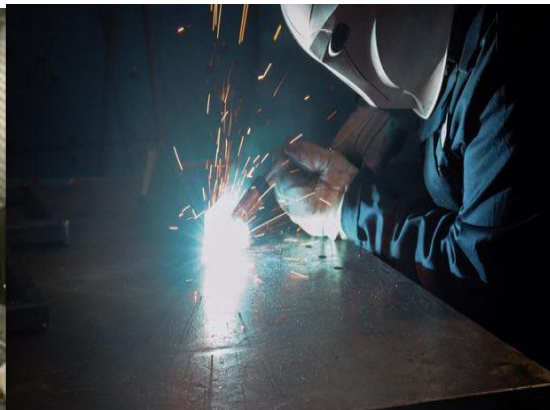


Figure 2: MIG.

In the MIG welding the shielding gas used for to protect the weld joint from the atmospheric gases. In this welding the electrode wire passed through the welding gun. In this paper the electrode wire used the diameter 0.8mm. in this paper used a rectangle which the dimension 230mm and 125mm, the thickness of sheets are 6mm, 7mm, 8mm.

ADVANTAGES OF ARC WELDING:-

- High welding speed
- Produces very less distortion
- Less smoke of sparks are involved

- Smooth welding is achieved
- Can be carried out any atmosphere
- Cheap cost
- Good impact strength
- Higher corrosion resistance.

II. EXPERIMENTAL WORK

In this investigation two experiments performed tensile test for tensile strength and impact test for impact strength both performed for to found the strength of weld joint.

Tensile test- This test performed for to check the strength of welding joint, in this experiment first end of sample clamped in the upper jaw of UTM machine and second end of sample clamped in upper jaw of UTM machine. And a slowly force applied till the failure of weld joint or permanent deformation of sample.



Figure 3: UTM Machine

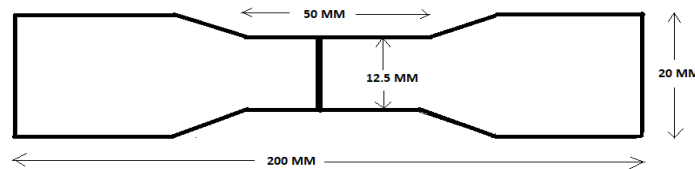


Figure 4: Specimen for tensile test



Figure 5: Dissimilar weld joint

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

Tensile strength of weld joint (Mpa)				
	MAW		MIG	
Thickness	Butt joint	V-Joint	Butt joint	V-Joint
6mm	358	368	360	392
7mm	369	379	374	431
8mm	376	387	386	442

Impact test- In this test determines the amount of energy absorbed by a material during fracture. This absorbed energy is a measure of a given materials toughness and acts as a tool to study temperature-dependents brittle ductile transition. It is to determine whether the material is brittle or ductile in nature.



Figure 6: Impact test machine

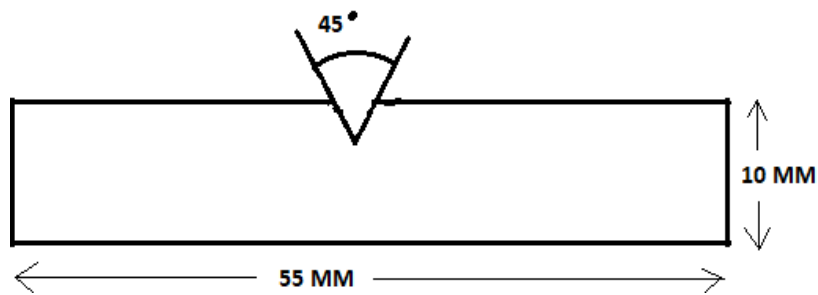


Figure 7: Specimen for impact test

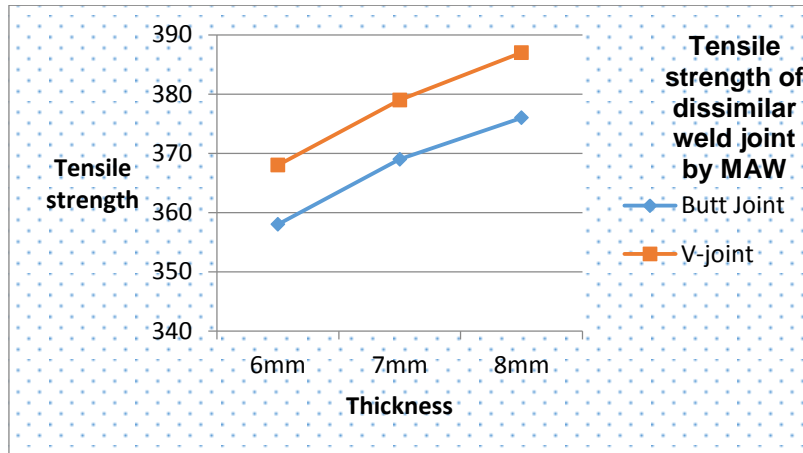


Figure 8: weld joint

Table 2:- Parameter for impact strength of MIG and MAW

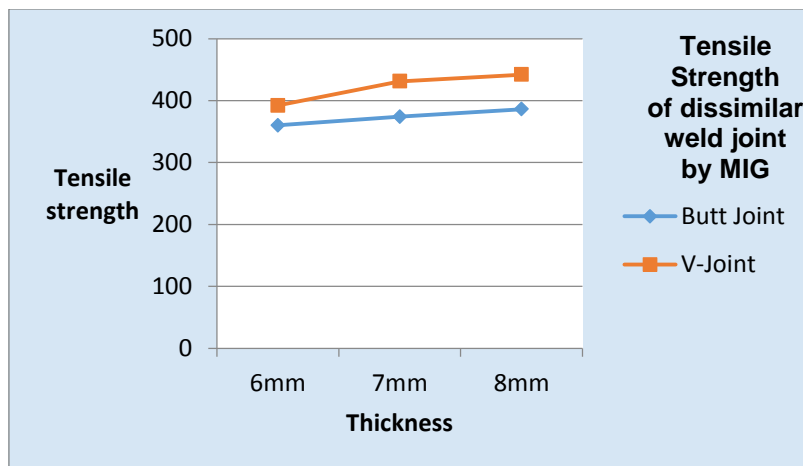
Impact strength (Mpa) of weld joint				
Thickness	MAW		MIG	
	Butt Joint	V-Joint	Butt Joint	V-joint
6mm	35	45	54	56
7mm	56	64	68	78
8mm	64	71	79	86

III. RESULT AND DISCUSSION



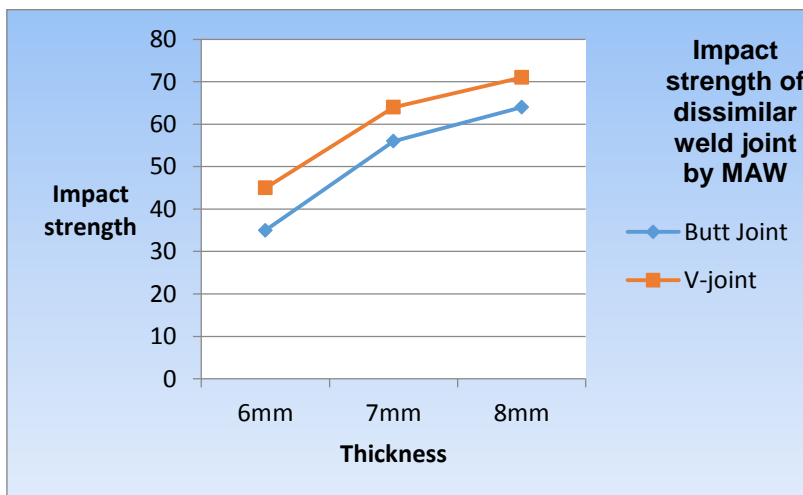
Graph 1: Tensile strength of dissimilar weld joint by MAW

In this shows, the tensile 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.



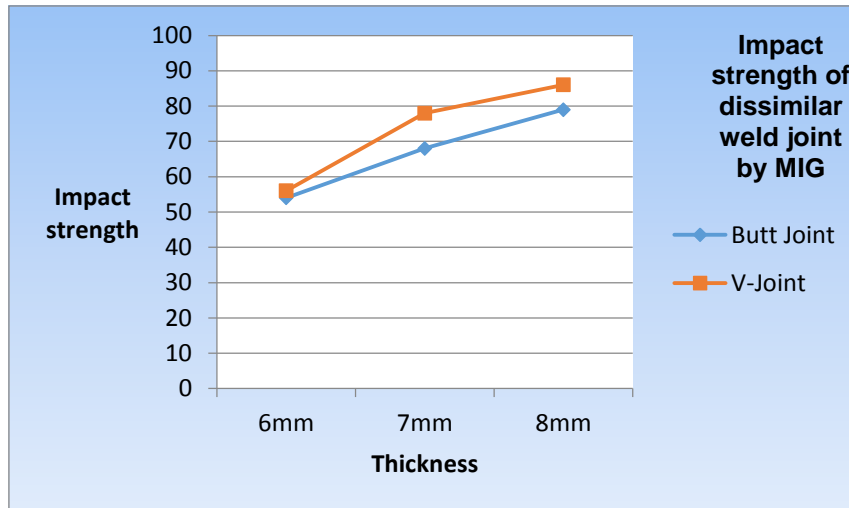
Graph 2: Tensile strength of dissimilar weld joint by MIG

In this shows, the tensile strength 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.



Graph 3: Impact strength of dissimilar weld joint by MAW

In this shows, the impact 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 4: Impact strength of dissimilar weld joint by MIG

In this shows, the impact strength 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 investigation the conclusion is both welding techniques are very useful for industry and demotic things. MIG welding is very advance in comparison to MAW welding technology. After investigation found that weld, butt joint and V-joint have good strength but the v-joint is strong in comparison to butt joint in the process of MIG welding process. MIG welding technology is very fast process in comparison to MAW welding process.

V. REFERENCES

- [1] Optimization of mig welding process parameters to predict maximum yield strength in aisi 10402012*int. j. mech. eng. & rob. res.* 2012
- [2] Optimization of the weld bead geometry in gas tungsten arc welding by the Taguchi method1998*Int. J. Adv. Manuf. Technol.*14 549–554
- [3] S. Suryakumar, K.P. Karunakaran, Alain Bernard, U. Chandrasekhar, N Raghavender, Deepak Sharma2011Weld bead modeling and process optimization in Hybrid layerd Manufacturing *Computer Aided Design*43331-334
- [4] 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
- [5] Taguchi Method for Optimization of Cutting Parameter in Turning Operation2010*Proc. of Int. Conf. on Advance in Mechanical Engineering*
- [6] Y.S. Tarnng, H.L. Tsai, S.S. Yeh1989Modeling, optimization and classification of weld quality in TIG welding *International Journal of Machine Tools & Manufacture*39 (9)1427–14381427-1438
- [7] 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
- [8] 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.