OVERLAY OF COMPLEX CARBIDE DEPOSIION WITH MIG WELDING

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ABSTRACT

Metal inert gas welding with overlay of complex carbide deposition with higher enthalpy gases is a candidate process for welding of Austenite stainless still. The overlay of work piece has found its use extensive in power generation, electronic, nuclear reactor, cooling tower, high pressurized cylinder and chemical industries due to environmental concert, energy saving, high performance, cost saving and so on however efficient welding of ss316 material has posed a major challenge due to different in thermal, mechanical and chemical property to be joint under common welding condition.

Few areas of part to be required the hardness is very high so we choose the tungsten carbide and chromium mixer for used the overlay on work piece using welding process but tungsten carbide and chromium carbide mixer are very costly on the overlay of whole area of work piece. Because the part costing is more increase and the part is very costly, So we decide that the maximum hardness required on surface of part we do overlay process on that portion, so the maximum required of hardness and minimum cost is to our goal. And after using this overlay process we can achieve our goals, so using of this welding on parts to achieve higher quality and is to be done our requirement low cost and high hardness is done, with our satisfaction is also be done.

Keyword:- *MIG welding, Carbide percentage, bond strength , Penetration and Hardness*

1. INTRODUCTION

Weld Overlay (WOL)**,** also known as cladding, hardfacing, weld cladding, or weld overlay cladding, is a process where one or more metals are joined together via welding to the surface of a base metal as a layer. This is normally done to improve the material by adding either a corrosion resistant or hard facing layer to it. Surfaces prepared in this way can even be highly customized by layering and alloying multiple different materials together.

There exist several different methods for weld overlay, each with their own unique applications and uses. Deciding on a specific technique is dependent on the access, welding position, alloy type, and dissolution rate of the component along with one's own economic situation. The main methods of weld overlay are: shielded metal arc welding, CO2welding, Metal Inert Gas (MIG) welding/Tungsten Inert Gas (TIG) welding, Submerged arc welding, and Plasma Transferred Arc (PTA) welding.

1.1 Introduction Of MIG Welding

Metal inert gas welding, or MIG welding, is the most widely used of the arc welding and overlay welding processes. It is suitable for everything from hobbies and small fabrications or repairs, through to large structures, shipbuilding and robotic welding. MIG can be used on a broad range of materials and thicknesses, and the latest SuperPulse technology enables MIG to give a finish that is similar to that obtained with TIG (tungsten inert gas) welding, yet with the speed for which MIG is renowned

1.2 The Role of Shielded Gases

The primary function of the shielding gas in gas shielding arc welding are to protect the molten and heated metal from the damaging effect of the surrounding air and to provide suitable. If airs come in contact with molten metal, the oxygen in air will oxidize the metal, the nitrogen might cause porosity or brittleness in the weld metal, and moisture from the air might also cause porosity.

2. Design Parameter

Filler wire feed rate:- 4.60 to 5.80 m/min
Gas flow rate:- 20 psi
Voltage:-23 to 25 v
Input voltage vac: 22.7V±15%
Rated input current (A): 160
Output current range (A): 50-250
Output voltage adjustment (V): 26.8
Wire-feeding speed (M/MIN): 4.8-6.3
Duty cycle (%)): 60
Type of wire feeder: Split
Efficiency (%): 80
Power factor: 0.73
Parameter is a quantity whose value is selected for the particular circumstances and in relation to which other variable quantities may be expressed. These are the ones which influence the result. There are some parameters involved in MIG welding.

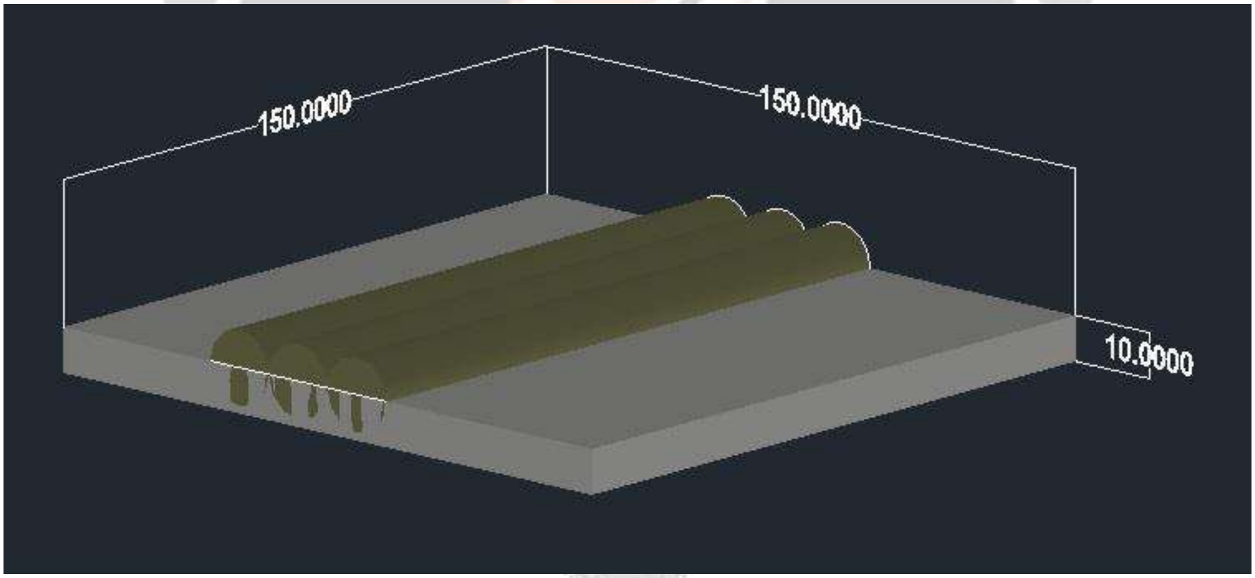


Fig -1: Auto cad design

2.1 Physical property

Melting Range: 2540-2630°F (1390-1440°C)
Density: 0.29 lb/in³ (8.027 g/cm³)
Modulus of Elasticity in Tension: 29 x 106 psi (200 GPa)
Modulus of Shear: 11.9 x 106 psi (82 Gpa)

Table -1: Mechanical Property

Grade	Tensile Stragth (MPa) min	Yield Strangth 0.2% Proof (Mpa) min	Elong (% in 50 mm) min	Rockwell B (HR B) max	Brinell (HB) max
316	515	205	40	95	217
316L	485	170	40	95	217
316H	515	205	40	95	217

2.2 Stainless Steel

We have select the stainless steel 316 for our project because the 316 are austenitic stainless steels that contain molybdenum, which increases their resistance to many chemical corrodents and marine environments. 316L is an extra low carbon version of 316 stainless steel. These materials are more resistant to general corrosion and pitting/crevices than conventional austenitic stainless steels. They also offer higher creep, stress-to-rupture and tensile strength at elevated temperatures, excellent corrosion resistance and strength properties, and they are well suited for fabricated or formed applications

- Ferritic
- Austenitic
- Martensitic
- Duplex

3. Overlay

Weld overlay is commonly used within the gas industry and can be used on components as diverse as pipes, fittings, valves, and vessels. While most components have a certain amount of corrosion allowance built in, wastage rates can still be excessive for certain materials. Thus weld overlay provides surface protection while still allowing the internal component enough strength to meet appropriate codes and standard

FIG 2:Overlay welding plate

3.1 Result

Hardness test

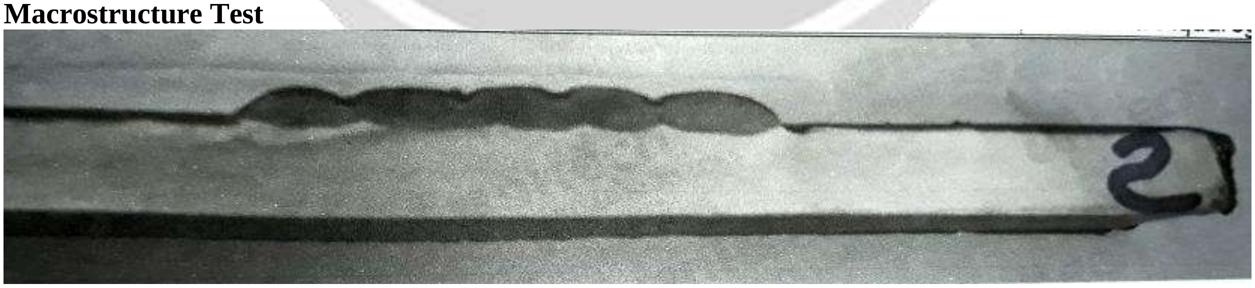
Identification	Hardness (HRBW)	
	Weld	Base
1	85,86,87	82,83,82
2	84,85,86	83,84,85
3	83,84,85	79,80,81
4	86,85,84	80,81,82
5	84,85,85	81,82,83
6	84,85,86	82,83,84
7	85,86,87	82,83,84
8	82,83,84	79,80,81
1 (M.S)	87,88,89	84,85,86
2(M.S)	85,85,86	83,84,85

Microstructure Test

Fig -3: Result

Observarion	Microstructure at PM show austenitic grain with twins. Microstructure at weld shown ferrite pools in pearlite structure. Microstructure is free from inclusion and any linear defect and show good penetration with weld and PM.

Macrostructure Test



Observarion	Macrostructure show hard facing surface exposed by sectioning is free from crake in weld, base metal. No lack of fusion or any other linear defect observed. Depth of penetration: 1.0095 mm

4. CONCLUSIONS

MIG welding processes produce weld overlay with a wide range of dilution. In MIG weld the dilution was generally less than 40%.

In mig welding, the hardness generally increased with increase in welding current and welding speed.

An increase in ampere with increase in current increased the were resist whilst an increase in ampere due to decrease in welding speed reduced the spetters.

For a given heat input electronically controlled short-circuit transfer process provide the lowest dilution (<5%). TIG welding variant also could produce weld overlay with very low dilution (<10%) with single layer.

The corrosion resistance of alloy 625 weld overlay exhibited a marked drop in corrosion resistance at dilution levels >36%Fe, in the selected test environment of 10w/v% NaCl at pH3.

The dilution levels of the marked drop in corrosion resistance were equivalent to the PREN of wrought of alloy 825, in the selected test environment of 10w/v% NaCl at pH3.

The above results suggest that restricting the heat input alone may not necessarily ensure the corrosion resistance and there appears to be opportunities for relaxing the present specified limit on dilution.

5. ACKNOWLEDGEMENT

"Obstacles are what we see when we tack out eyes off the goals"

First and foremost, We wish to express my sincere appreciation to my project guide, **Patel Sunil j** who has always been a constant motivation and guiding factor throughout the thesis time in and out as well. It has been a great pleasure for me to get an opportunity to work under him and complete the present work successfully.

We wish to extend my sincere thanks to Assi. Prof. **Sanket T. Gandhi** Head of our Department, for approving our project work with great interest.

We would also like to thank Mr.Yashwant Joshi, Principal of our institution for giving me moral guidance. We wish to express my heartiest regards to my parents for their guidance and moral support.

We are thankful to **Mr.Ragesh Bateriwala** , **Dr.Mrunal Chaudhari** and **Mr Nilesh Chudasama** for giving me guidance in the process and opportunity to carry out experiments in his company.

Our sincere thanks to **Dhruv Mistri** and entire staff of Mechanical Department. Last but not the least, Our sincere thanks to all of Our friends who have patiently extended all sorts of help and motivate for accomplishing the undertaking

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