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# MECHANICAL CHARACTERISTICS AND EVALUATION OF BEND RADIUS ON MS PLATE BY USING ARC WELDING

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**Abstract -** Arc welding is a process of joining metals by using electrodes, by using high heat to melt the parts together and allow them to cool causing fusion. It is a type of welding to join metals, other than joining process like brazing and soldering. We have used metal like Mild steel (MS) with thickness about 6mm. We have done Arc welding on MS plates with different thickness. By using electrode E 6013 with different gauges like 2mm, 3.5mm, 4mm for (filling V-GROVE) applying 3 layers of weld bead, for finding the welding defects on weld joint.

***Key Words***: Arc welding, electrodes, melt, cool causing fusion, brazing, soldering

## 1.INTRODUCTION

The welding is a process of joining two or more, similar or dissimilar metals by heating them to a suitable temperature, with or without the application of pressure, filler material and flux. The heat may be supplied by electric arc (In case of arc welding), combustion of gas (in case of gas welding), electrical resistance (in case of resistance welding) or by black Smith's fire (in case of forge welding).

## 2. Classification of Welding Process

Welding process can be classified on the basic of certain criteria mentioned below

- On the basis of type of interaction.
- On the basis of source of heat.
- On the basis of metallurgical aspect.

### Selection of material

- Two 6mm thicknesses of MS metal plates are selected for Shielded Metal Arc Welding.
- In ARC welding 150×150mm MS plate of 6mm is used for welding
- No of pieces: 2

### Preparation of job

- Prepare the area to be v-grooved and weld. Remove all flammable materials on the work piece and find a good surface to weld on.
- First using shield metal arc welding machine for welding process. Set up weld parameters to weld the metal piece. Clean the work piece before welding, it is done by brushing with a wire brush or grinder.

- Start the welding on the first and second plates, maintain 1.6mm to 2.4mm distance between 6013 electrode and metal plates and keep the torch at 60 degrees of angle.
- Start moving the weld pool across the metal. Clean the slag by using chipping hammer to break the slag. Use the wire brush to clean the weld

**Selection welding parameters**

- The four important parameters are the welding current, wire electrode extension, welding voltage and arc travel speed. These parameters will affect the weld characteristics to a great extent.

**Welding Execution**

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**Testing of welds**

- Examine the weld piece for testing the weld like dye penetration test b and bending test.

**Material**

Mild steel is a type of carbon steel with a low amount of carbon – it is actually also known as "low carbon steel." Although ranges vary depending on the source, the amount of carbon typically found in mild steel is 0.05% to 0.25% by weight, whereas higher carbon steels are typically described as having a carbon content from 0.30% to
2.0%. If any more carbon than that is added, the steel would be classified as cast iron.

- In shielded metal arc welding 15mm mild steel plates are used.
- Size of the each MS plates are 150 x120 x15mm.

## Chemical properties

Mild steel has lower carbon content than medium and high carbon steels. The carbon content is up to 0.25% in mild steel but some schools of thought consider a carbon steel as mild steel up to a carbon content of 0.45%.

The low carbon content makes this steel a highly machinable metal. It can be cut, machined, formed into intricate shapes without adding proportional stresses to the workpiece. It also facilitates better weldability.

**Table -1:** ***Sample chemical composition of mild steel.***

| Elements | Avg content |
|---|---|
| Carbon | 0.1999 |
| Silicon | 0.1548 |
| Sulphur | 0.0594 |
| Phosphorous | 0.0459 |
| Manganese | 0.5826 |
| Nickel | 0.131 |
| Chromium | 0.1105 |
| Vanadium | 0.0013 |
| Copper | 0.384 |
| Cobalt | 0.0098 |
| Arsenic | 0.0051 |
| Tin | 0.0377 |
| Aluminium | 0.0028 |
| Calcium | 0.0001 |
| Zinc | 0.0048 |
| Ferrum | 98.2476 |

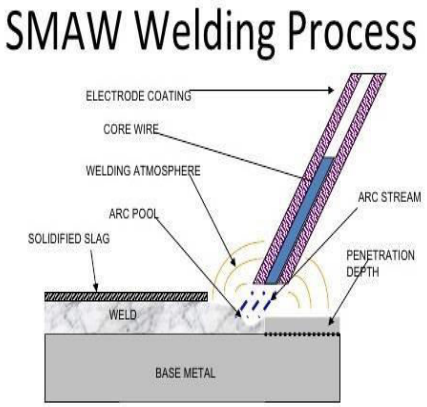



**Fig -2:** SMAW Process

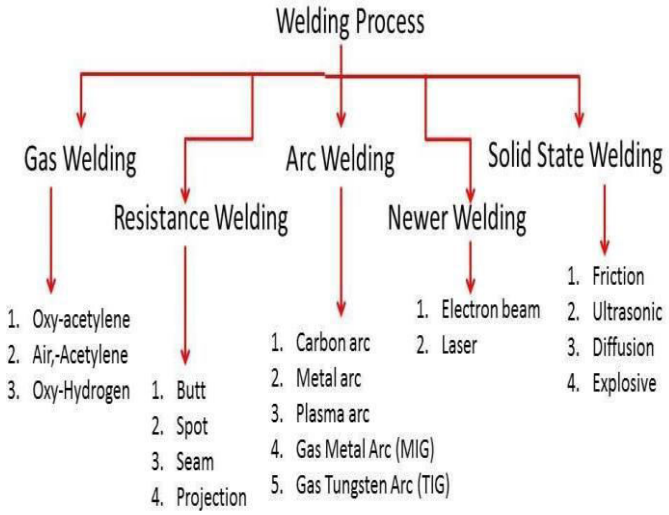
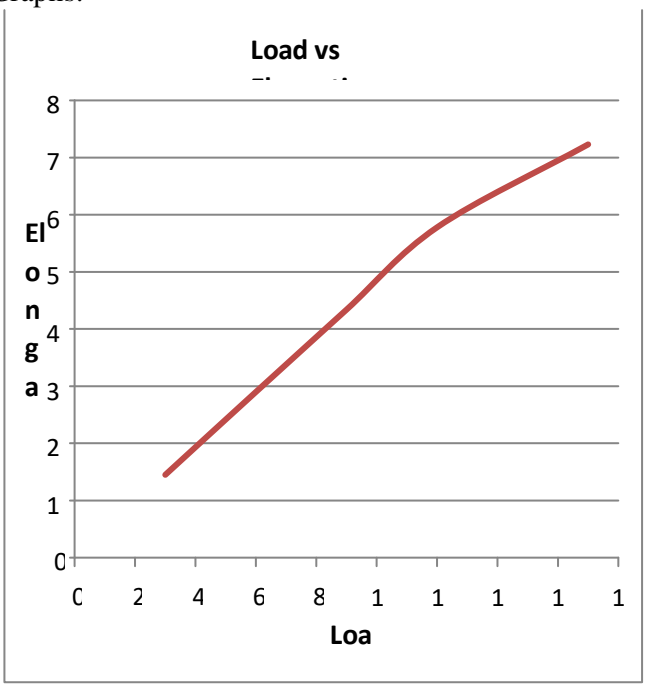



***Fig: Types of Welding***

Graphs:




Graph: ***Load vs elongation of bend test on face side.***

**Process**

SMAW Arc Welding (stick welding) uses the arc heat to melt the base metal and tip of a consumable electrode. The electrode and base metal are part of an electric circuit or welding circuit. This circuit includes

- Power source
- Welding cables
- Electrode holder
- Ground clamp
- The work or base metal
- Arc welding electrode

## 3. CONCLUSIONS

From the results derived from the project we conclude that.

- The arc welding is a process to use to join two different metals easily by using the processes of welding the parameters and the welding qualities increased and joint become strong.
- After performing the different tests, the problems arise due to weld defects are due to an improper welding procedure. Once the causes are determined, the operator can easily correct the problem. Defects usually encountered include incomplete penetration, incomplete fusion, undercutting, porosity, and longitudinal cracking.

## ACKNOWLEDGEMENT

The mini project entitled "**Mechanical characteristics and evaluation of bend radius on M.S. plate by using arc welding"** is the sum of total efforts of our batch. It is our duty to bring forward each and every one who is directly or indirectly in relation with our project and without who it would not have gained structure.

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