

MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY



Course Code : 162

Study of Electric Arc Welding

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Signature of Teacher :

Experiment No: 03

Name of The Experiment: Study of Electric Arc Welding

Theory:

Arc welding is a type of welding that uses a welding power supply to create an electric arc between an electrode and the base material to melt the metals at the welding point. They can use either direct (DC) or alternating (AC) current and consumable or non-consumable electrodes. The welding region is usually protected by some type of shielding gas, vapor or slag. Arc welding processes may be manual, semi-automatic or fully automated. First developed in the late part of the 19th century, arc welding became commercially important in shipbuilding during the second world war. Today it remains an important process for the fabrication of steel structures and vehicles.

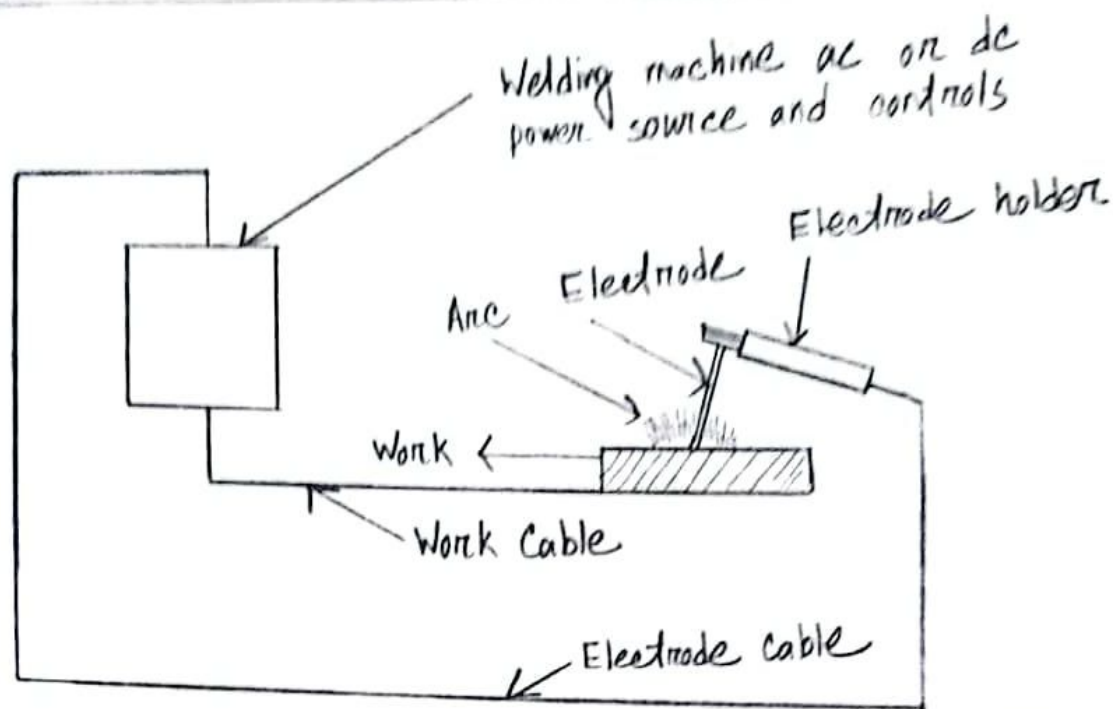


Figure: Schematic illustration of the shielded metal-arc welding operation (also known as stick welding, because the electrode is in the shape of a stick)

Metallic arc welding uses a metallic electrode of a soft grade of iron, low carbon steel or other kind of filler rod or wire according to kind of work which is required to be done. The size of wire used varies from $1/16$ in to $3/16$ in diameter.

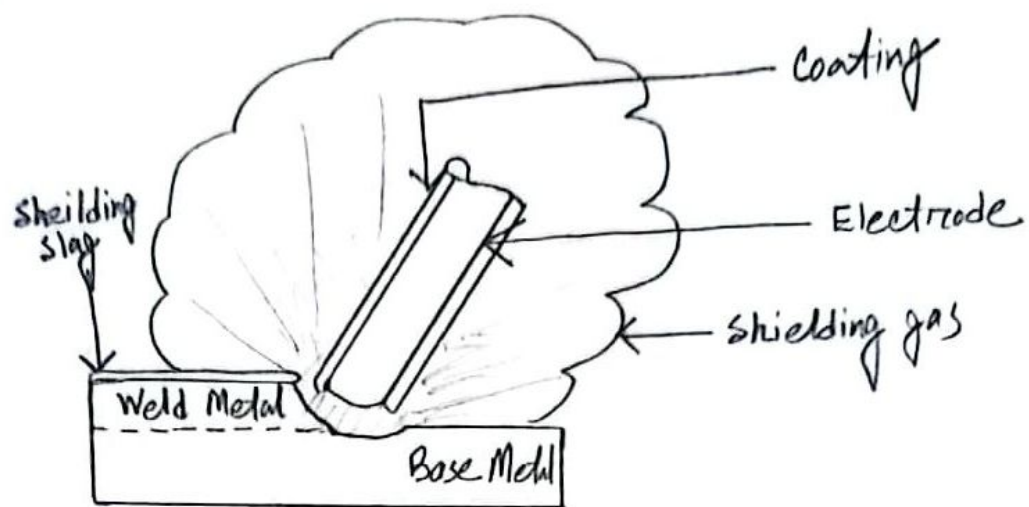


Figure: Schematic illustration of the shielded metal arc welding process

The heat of the arc is not only sufficient to melt the end of the electrode, but also fuse the surface of the work being welded over a small area. The two metal being fused and at the same time coming into close contact cause complete intermixing. As supply of heat to the arc is constant, the deposition of metal from the electrode remains continuous and uniform.

characteristics of arc welding -

Metal arc welding consists essentially of localized progressive melting and flowing together of adjacent edge of base metal parts by means of temperatures approximately 10000°F of a sustained electric arc between a metal electrode and the base metal.

Polarity -

Polarity means the relative connection of electrode and work piece with power source. There are two systems of polarity. Namely: -

a) Straight Polarity:

The arrangement of arc welding leads where work is connected with the positive pole and the electrode is connected with the negative pole of the circuit.

b) Reverse Polarity:

Reverse polarity is just opposite of straight polarity.

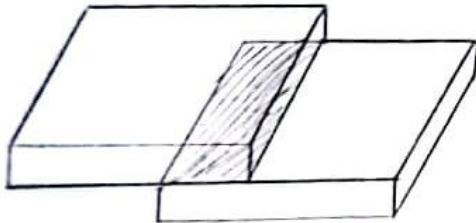
Welding Joints -



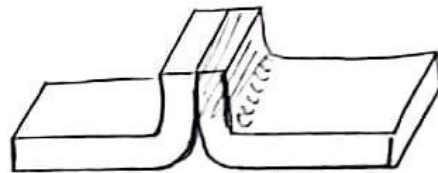
Butt Joint



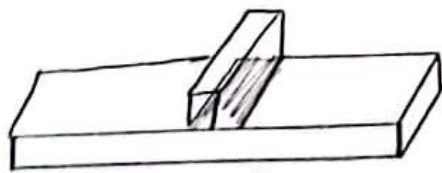
Corner Joint



Lap Joint



Edge Joint



Tee Joint

Precaution:

① Heat, fire and explosion hazard -

Because many common welding procedures involve an open electric arc or flame, the risk of burns from heat and sparks is significant. To prevent them, welders wear protective clothing in the form of heavy leather gloves and protective long sleeve jackets to avoid exposure to extreme heat, flames and sparks.

② Eye damage -

Exposure to the brightness of the weld area leads to a condition called arc eye in which ultraviolet light causes inflammation of the cornea and can burn the retinas of the eyes. Welding goggles and helmets with dark face plates - much darker than those in sunglasses or oxy-fuel goggles - are worn to prevent this exposure.

③ Safety Issues -

Welding can be a dangerous and unhealthy practice without the proper precautions; however, with the use of new technology and proper protection the risks of injury or death associated with welding can be greatly reduced.

Discussion:

For the first time the arc ~~is~~ welding was very challenging. Every time the face shield is used to do any type of welding. The emitted ray can damage the retina so the glass are very dark. We can see the light when the sparks were generated. To maintain the line of butt joint was another challenge. Overall practices can improve the accuracy of ~~of~~ arc welding.

Assignment:

1. During welding, because of the heat of the arc the flux coating on the electrode melts and perform the following function. It stabilizes the arc, remove oxide, scales etc.

2.

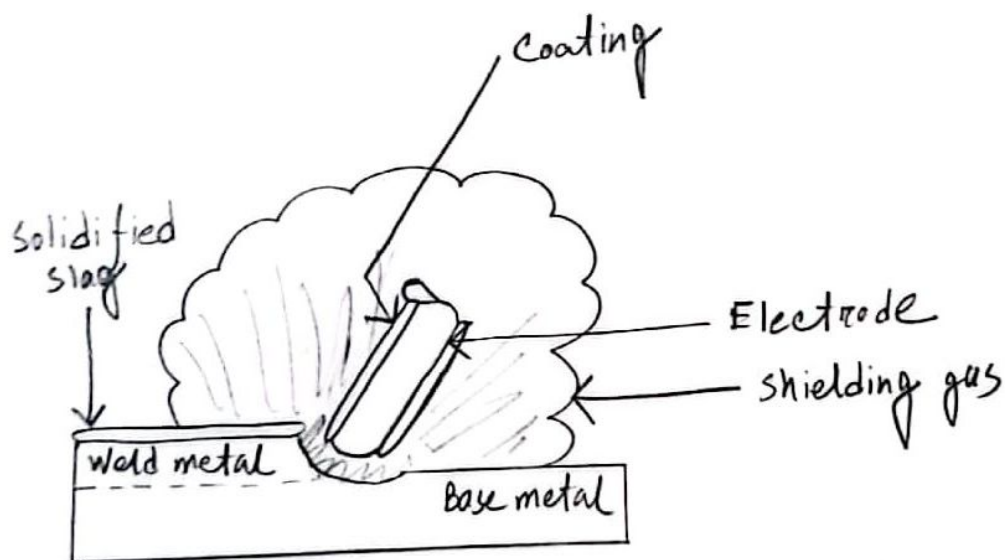


Figure: schematic illustration of the SMAW operation

3. Tack welds are used to hold two metal pieces in place ready for final welding, just as a tailor may use pins to hold two pieces of material together before sewing. These welds make sure the workpieces are correctly and rigidly aligned.