

REPORT

WELDING SHOP

Introduction: Welding is a process for joining two similar or dissimilar metals by fusion. It provides a permanent joint but it normally affects the metallurgy of the components. The fusion of metal takes place by means of heat. The heat may be generated either from combustion of gases or electric arc, etc. During some type of welding process, pressure may also be employed, but this is not an essential requirement for all welding processes. Some processes of welding are:

1. MANUAL METAL ARC WELDING (MMAW):

It is a commonly used arc welding process manually carried out by welder. It is an arc welding process in which heat for welding is produced through an electric arc set up between a flux coated electrode and the workpiece. The flux coating of electrode decomposes due to arc heat and serves many functions, like weld metal protection, arc stability etc. The basic setup is given below:

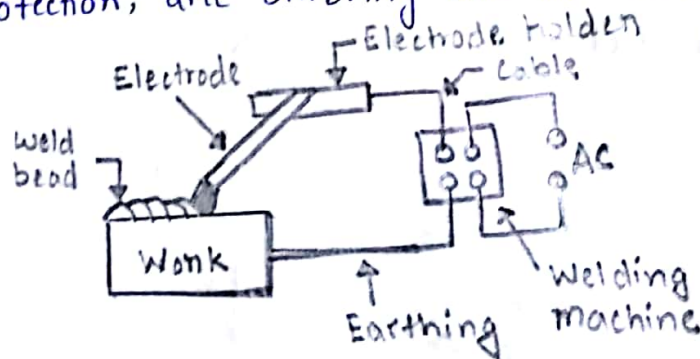


Fig. 1. Principle of arc welding

and the configuration of weld zone is shown in Fig. 2.

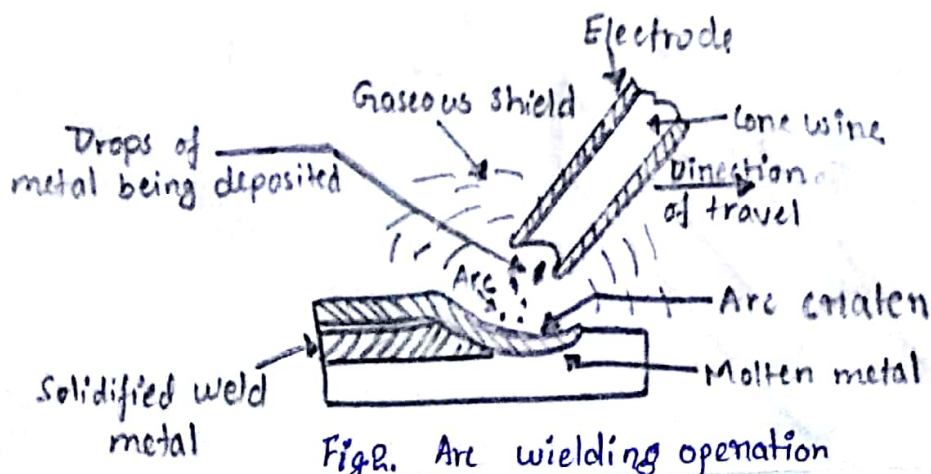


Fig. 2. Arc welding operation

2. GAS WELDING:

A fusion welding process which joins metals, using the heat of combustion of an oxygen and acetylene mixture is usually referred to as 'oxy-acetylene welding'. The intense heat thus produced melts and fuses together the edges of the part to be welded, generally with the addition of a filler metal. The balanced chemical equation is:

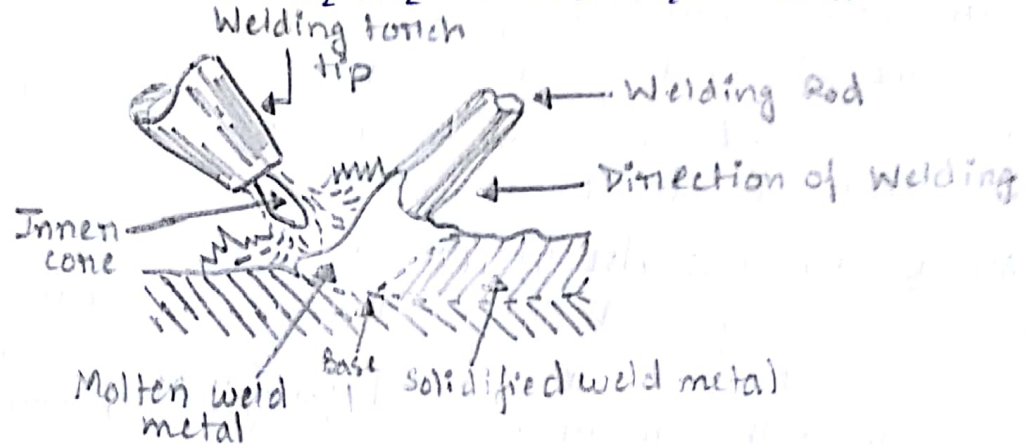
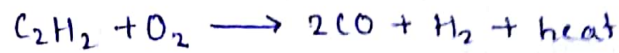
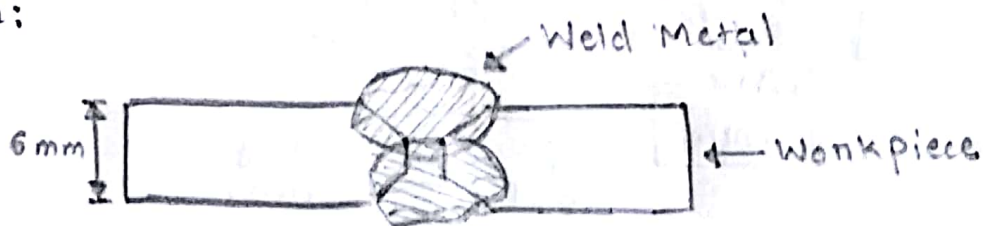


Fig.3. Gas welding operation

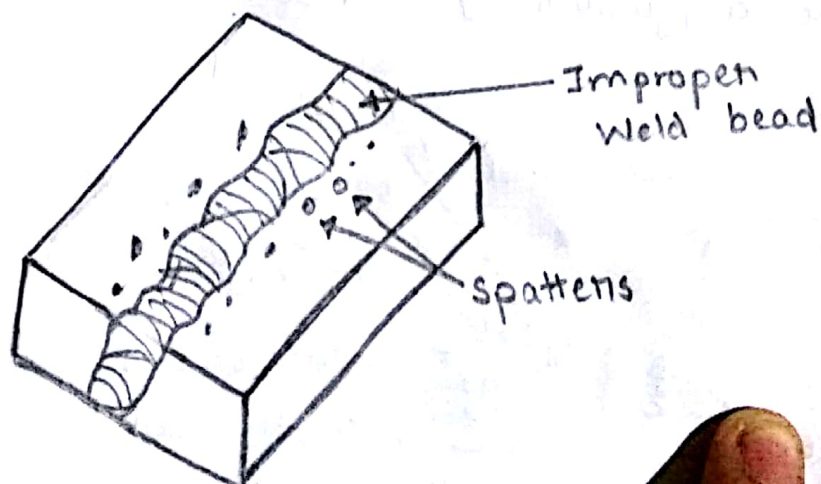
Job name:

Raw Material: Mild steel plate, 6mm thick

Diagram:

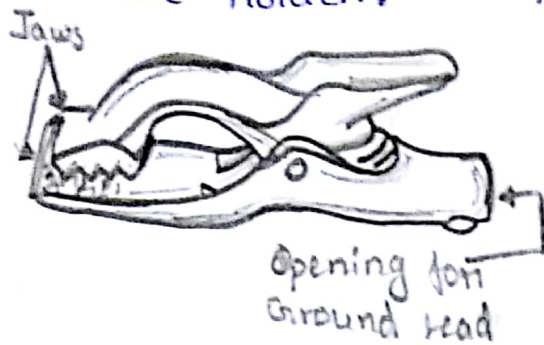


Double V-butt



Tools Descriptions:

1. Electrode Holder:



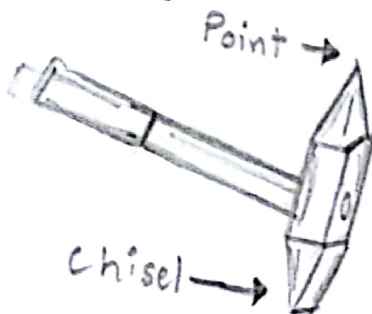
An electrode holder is a clamping device for holding the electrode securely in any position. The welding cables attached to the holder through the hollow insulated handle. The electrode holders are made of in different sizes.

2. Hand Screen:



A hand screen is used when performing certain types of welding to protect eyes, face and neck from flash burn, ultraviolet light, sparks, infrared light and heat.

3. Chipping Hammer:



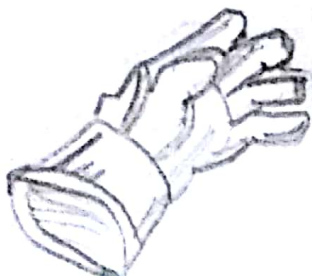
A chipping hammer is a hand tool that is used to remove welding slag from a weld, or to remove welding spatter from alongside weld.

4. Wire brush:



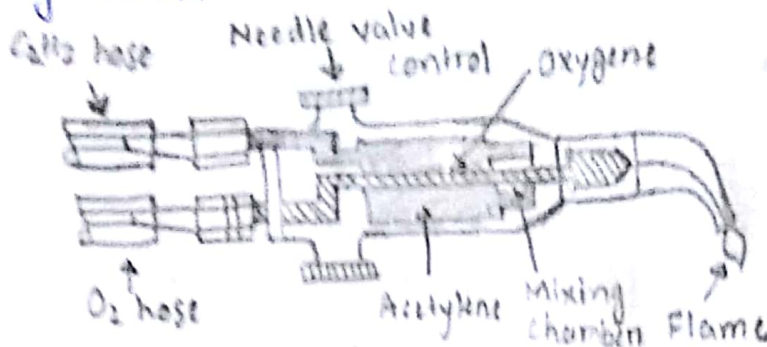
A wire brush is a tool consisting of a brush whose bristles are made of wire, most often steel wire. The wire brush is used to clean the surface to be welded.

5. ~~Box~~ Hand Gloves:



Welding gloves protect the hands of the welders from the hazards of welding. It provides abrasion resistance and enhanced grip.

6. Welding torch:



It is a tool for mixing oxygen and acetylene in correct proportion and burning the mixture at the end of a tip. Gas flow to the torch is controlled with the help of two needle valves in the handle of the torch.

Procedure:

- i) Edge preparation: Make the edge of work piece double-V butt.
- ii) Make the job ready for welding by bringing prepared faces together.
- iii) Adjust voltage and current in the welding machine.
- iv) Put on personal safety equipments. Take the electrode and insert it in the electrode holder.
- v) Put the job on the ~~to~~ table which is connected with earth clamp.
- vi) Turn on the welding power source.
- vii) Strike out by bringing electrode near the groove of the job and then slowly move electrode along groove to continue welding.
- viii) After that with the help of tong, put the job under the tap water for cooling.
- ix) Use chipping hammer to remove welding slag from the job.

Question and Answers:

1. What is weldability?

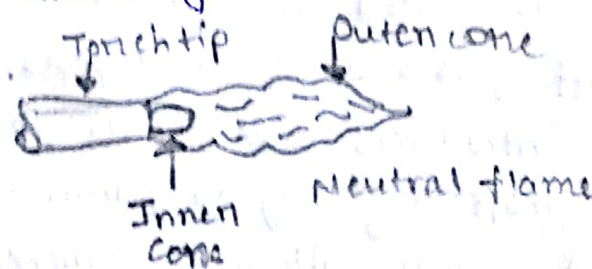
The term weldability has been defined as the capacity of bring welded into inseparable joints specified properties such as definite weld strength, proper structure etc. However, real criteria including on the weldability of a metal is the weld quality and which depends on five factors:

- i. Melting point
- ii. Thermal conductivity
- iii. Thermal expansion
- iv. Surface condition
- v. Change in microstructure.

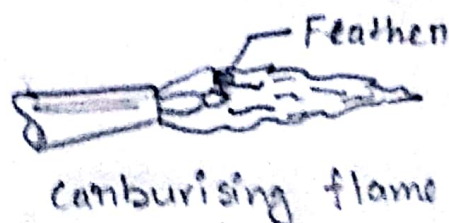
2. Describe three types of flames in gas welding with sketch?

Three types of welding flames are:

i. Neutral Welding Flames: A neutral welding flame results when approximately equal volumes of oxygen and acetylene are mixed. The temperature of the neutral flame is of the order of about 3260°C . It has a clean, well defined inner cone, indicating that combustion is complete.



ii. Carburising or Reducing welding Flame: It has excess of acetylene and can be recognized by acetylene feather, which exists between the inner cone and the outer envelope. A reducing flame has an approximate temperature of 3038°C .



- iii. Oxidising Welding flame: It has an excess of oxygen over the acetylene. An oxidizing flame can be recognized by the small cone, which is shorter, much bluer in colour and more pointed than that of neutral flame. It is hottest flame (6300°F) produced by any oxy-fuel gas source.



Oxidizing flame
(Excessive O_2)

3. Why a step-down transformer is used in Arc welding?

We know, $P = VI$, where P = Power is constant. So, $I \propto 1/V$. Thus step down transformer used to lower the voltage and gradually increase the current that can be reasonably supplied by AC mains and the required arc voltage is low once the arc is struck. So the gain in available current is a very major factor, the arc welding voltage (50V) is much safer than that of the mains (220V).

4. What are the functions of flux used in electrodes?

The electrode is coated in a metal mixture called flux, which gives off gases as it decomposes to prevent weld contamination, introduces deoxidizers to purify the weld, causes weld-protecting slag to form, improves the arc stability, and provides alloying elements to improve the weld quality.