

# Welding Process

①

## Principle of welding:-

Welding is a quick, reliable and flexible manufacturing technology used in machine, building, construction and maintenance of structures, plants and machinery.

There are many welding processes.

The principle of welding can be explained with the help of two main types of its processes.

## (i) Fusion welding process:-

- The metal pieces to be joined are locally heated by an electric arc or gas flame or other means.
- Extra metal is added in the form of a filler metal or a consumable electrode.
- No pressure is applied to help the formation of weld joint.

Ex- Electric Arc welding, gas welding, electron beam welding, laser beam welding etc.

## (ii) Pressure welding process:-

- pressure is applied to cause plastic deformation at the mating surfaces of metal pieces and affect the weld joint.
- There is no external heating of the metal pieces to cause melting and no filler metal is added.

Ex. electrical resistance welding

Def → welding can be defined as

" a process of joining two similar or different metals by bringing the junction to fusing point by the use of intense heat with or without the application of pressure and addition of filler material.



## Weldability:-

~~It is a define~~  
The weldability of a metal is its capacity to be welded into an inseparable joints to perform satisfactorily in the fabricated structure.  
It is depend upon the chemical composition of the metal.

## Advantages of welding:-

- Weld Joint as strong as the parent metal can be obtained.
- permanent joint is produced.
- overall cost of welding equipment is generally low.
- welding is possible for very complex structures.
- It is used in production, repair.

## Disadvantages

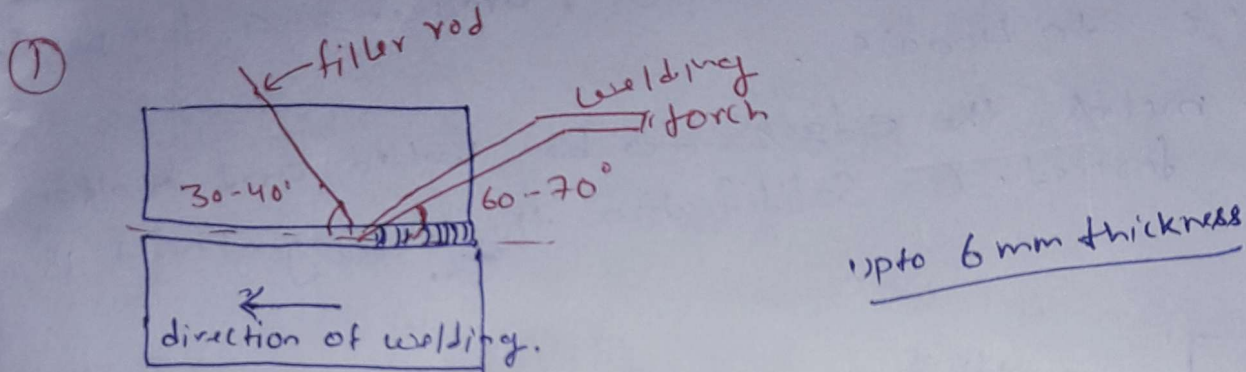
- A skilled welder is need.
- welding can create residual stresses and distortion in the workpieces.
- There can be physical & chemical changes in the structure of parent metal.
- welding can give out harmful radiations. Such as light, fumes & spatters.  
(droplet of molten material)
- welding is an accident prone process.



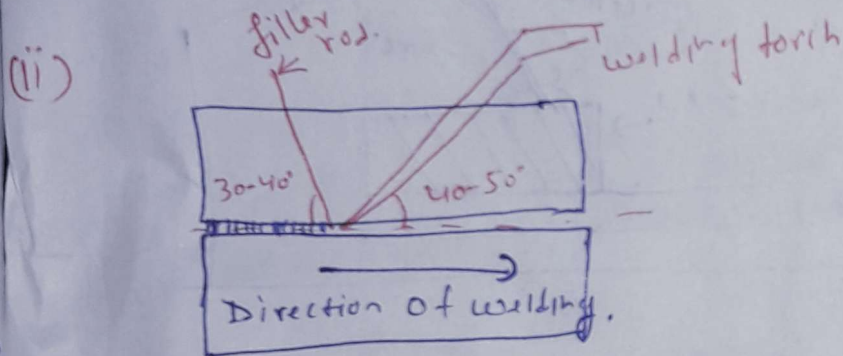
## Welding Techniques :-

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- ① Leftward or fore hand technique
- ② Rightward or back hand technique.



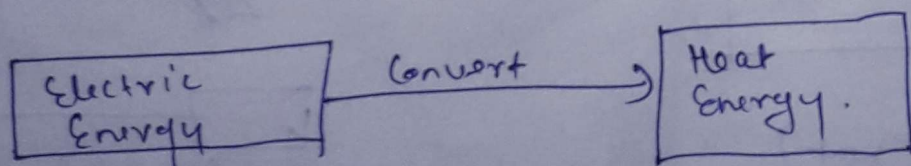
The torch tip and filler rod are moved slowly in the direction towards left.



- The Torch is moved toward right followed by filler rod.
- Torch is kept in the right hand & filler rod is kept at 30-40° in the left hand.

## Electric Arc Welding

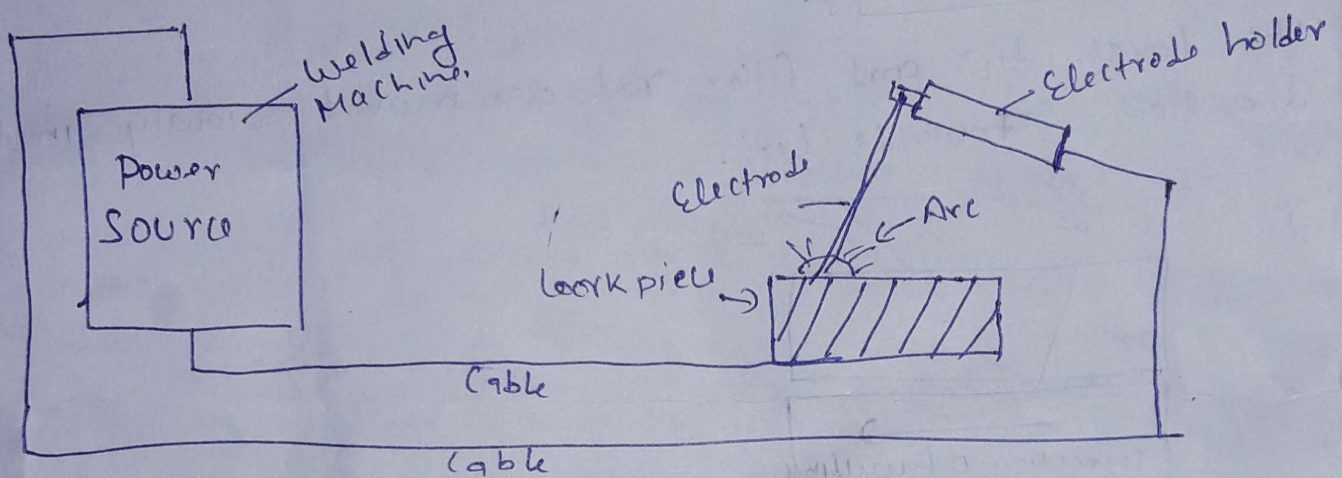
The welding in which the electric arc is produced to give heat for the purpose of joining two surfaces is called electric arc welding.



3000°C to 4000°C



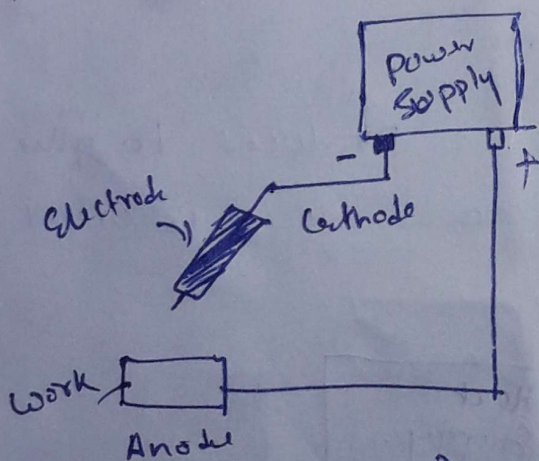
- Power Supply is given to electrode and the work. A suitable gap is kept between the work & electrode.
- A high current is passed through the circuit.
- An arc is produced around the area to be welded.
- The E.E is converted into H.E, producing a temperature of  $3000^{\circ}\text{C}$  to  $4000^{\circ}\text{C}$ .
- This heat melts the edges to be welded and molten pool is formed. On solidification the welding joint is obtained.



### Welding parameter:-

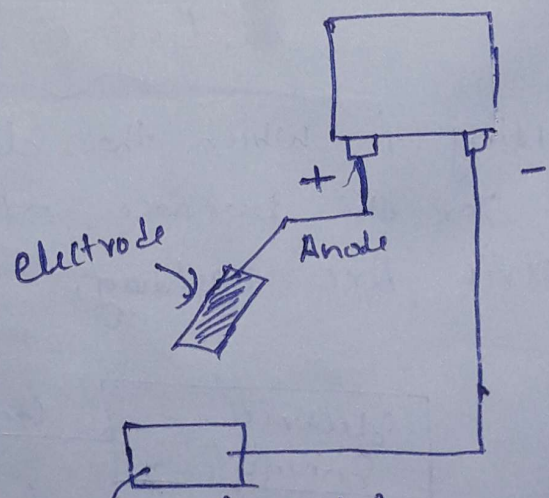
Arc Length is the distance from the tip of electrode to the bottom of the arc. It should vary from 3 to 4mm.

### Polarity -



(High heat)

Straight polarity welding



Work (Cathode)

(Medium heat)

Reverse polarity



# gas welding

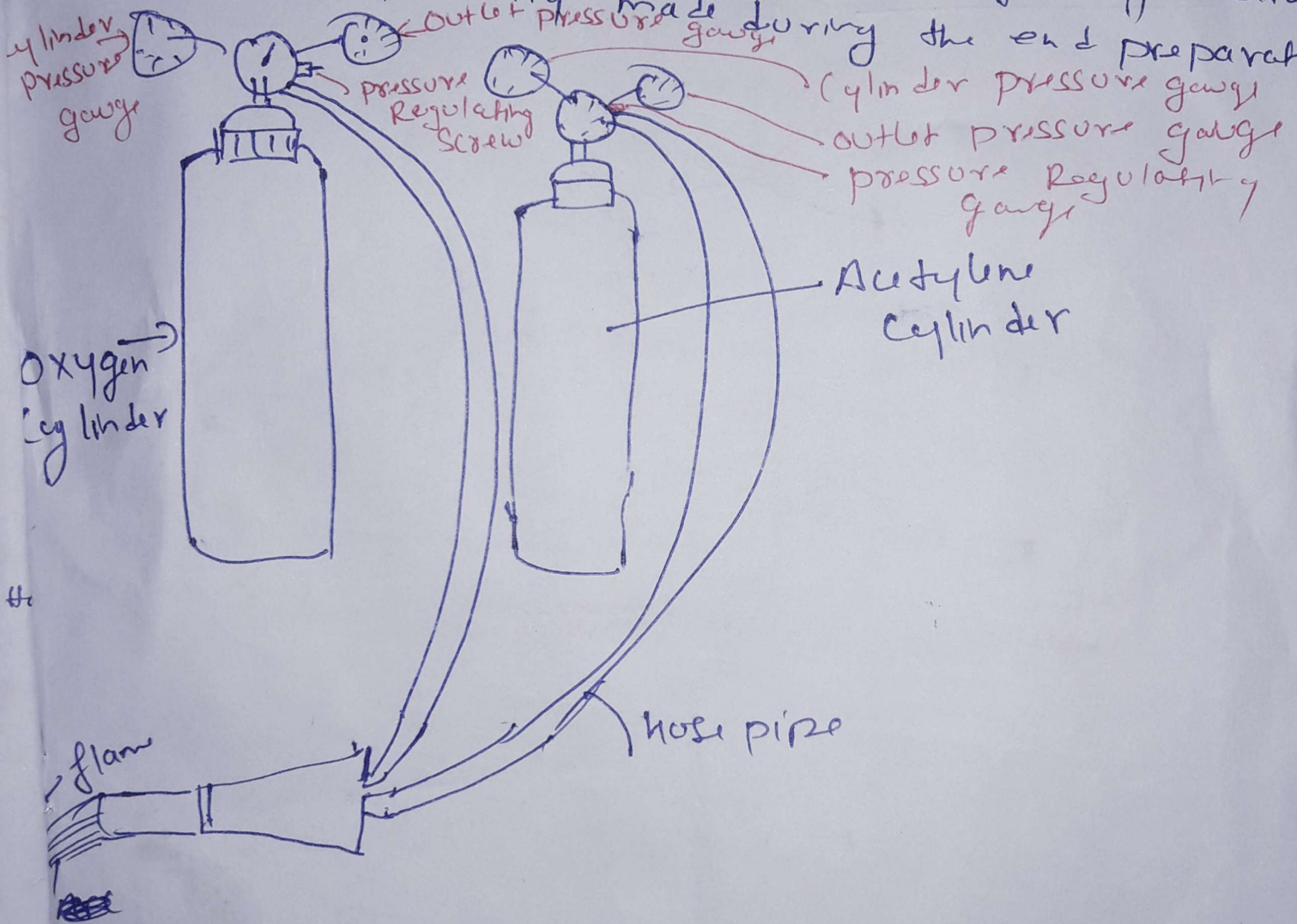
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## principle of operation:-

Gas welding is the process in which a gas flame is used to raise the temperature of the metals to be joined.

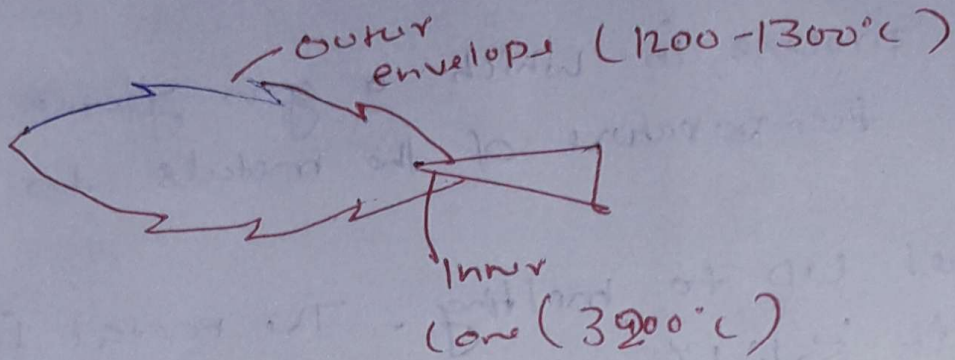
The metals are heated up to melting. The metal flows and on cooling it solidifies.

A filler metal may be added to the flowing molten metal to fill up cavity made during the end preparation.

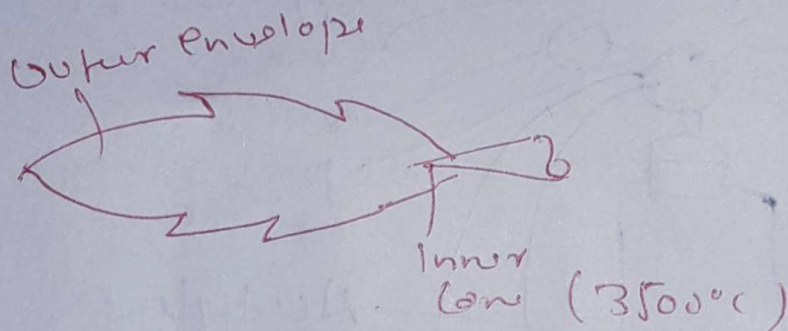


## Types of Flames

### ① Neutral or balanced flame



### ② Oxidising flame:-



### ③ Reducing flame (carburizing flame)

