SOLDERING AND BRAZING

In metalwork, there is often a need to join metals. Hence there are various methods of doing so. Soldering and brazing are some of the methods used for joining metals quickly.

Soldering

Soldering is the joining of metal surfaces or edges with solder. There are two types of soldering: *soft soldering* and *hard soldering or brazing*.

When the solder melts below the red hot temperature of the soldering iron, it is called soft soldering.

When the solder melts at or above red heat it is called hard soldering or brazing.

Tools and materials needed for soft soldering

The following are materials needed for soft soldering: soldering copper (bit), soft solder, flux, and heat source.

- **Soldering copper (bit).** The soldering bit sometimes called soldering iron, is a square piece of copper pointed at one end and fastened to a steel bar with a wooden handle on the other end. Soldering bits are in various sizes, depending on the nature of the job to be done. Heavy copper is used in heavy jobs, while light copper is used in light jobs. Soldering coppers (bits) could either be heated electrically or by the use of burners. There are two common types of soldering bits: *straight soldering bits* and *hatchet soldering bit*.
- **Solder.** This is the material used its molten state for the joining of metals. The best soft solder is an alloy or metal made of lead and tin. Solder is used for general work. It is usually made of one-half lead and one-half tin. It is sometimes called half-and-half or fifty-fifty. Solder must have a lower melting point than the metals to be joined, so that they can melt a t 230^{o}C. Solder bits are available in long bars and also in wire form on spools. There is a form of solder known as special solder. It is used soldering aluminium.

- **Flux for soldering.** Flux is the substance applied o metals to be joined so that the surfaces of the metal can be cleaned. Flux cleanses the metal and help the solder to flow. Flux makes metal surfaces chemically clean and stops corrosion, permitting the solder to stick tightly to produce good joints. Readymade flux in liquid, crystal and paste forms is commercially available and can be used for ordinary soldering. It is important that after soldering, the article must be washed with water to stop the acid in the flux from eating the metal.
- **Heat sources.** There are mainly two sources for heating the soldering bit. One is to heat it *electrically*. All that is required here is to plug the bit cable into an electricity socket and allow it to heat up for some time. Another source of heat is from *blow lamps*. A number of blow lamps are available, and the choice of any will depend on the size of the soldering bit to be heated. Blow lamps use paraffin (kerosene) as fuel. There are also *stoves* specially designed to heat soldering bits quickly and economically.

Soldering Operations

To carry out successful soldering, the first thing to do is to clean up the soldering bit and the parts to be soldered.

Step I. Cleaning up the soldering bit is called *tinning* the bit. To tin the bit, we first clean the point thoroughly with a file; then we head the copper or bit till the flame turns light green; then we dip the heated point into flux and then we rub a stick of solder over the bit, giving it a thin coating all round.

Step II. The metals to be jointed should be cleaned. Tin plates need only be wiped with a clean duster, whilst other metals can be filed, scraped or rubbed with emery cloth. The surfaces are then coated with the flux.

Step III. Place the metals to be soldered properly, hold them firmly ready for soldering, and fasten them so that they cannot move while being soldered. If possible, clamp them together in a vice or G-clamp. The joint to be soldered should not be allowed to touch the vice or other metal.

Step IV. Hold the soldering bit in the right hand and solder in the left hand. Tack the seam or parts together; that is, connect the parts in several places with the hot copper and a few drops of solder, so that the parts will not shift.

Step V. After tacking, next is to hold the hot, tinned copper on the edge of the seam and touch the copper with the solder. Move the copper slowly along the seam, a short distance at a time. As the copper melt the solder, put a little along the edge of the seam.

Sweat Soldering is used when it is not convenient to use the soldering bit. The heat is applied to the pieces to be joined, and the solder is melted by this heat.

Hard Soldering

Hard soldering is used where a stronger joint is needed, or where the parts will afterwards have to be in greater heat than the melting point of soft solder.

Brazing. Brazing is a type of hard soldering which uses filler rods to join the metals together. Brazing is done at a higher temperature than that of soft soldering. It is used on joints that need to be strong and/or have to withstand heat. Like in soft soldering, flux is used in brazing; the appropriate flux being borax. The heat, which should be bright red, is usually supplied by an oxyacetylene blow-pipe.

Procedure for Brazing

1. Select and clean the materials or joints to be brazed.
2. Apply flux on the surfaces to be joined with the correct flux.
3. Arrange the surfaces to be joined, with a reasonable gap allowed.
4. Apply a rod to the work and heat with the acetylene tank nozzle until the rod melts flush into the joint and fasten the parts.