1.22.3 Soldering Methods

It is similar to that of brazing. Here the flux used is not intended to remove any appreciable amount of contamination. Hence, the surface has to be cleaned to remove all dirt, oil and grease before the flux is applied.

As in brazing, soldering may also be classified into various types based on the methods adopted for heating the joints. Dip soldering is used extensively for soldering electronic appliances. Induction soldering is used for large number of identical parts. In iron soldering, electric soldering iron is the commonly used heat source. In case of low melting point solders, infra-red heat source can be used which is called as infra red soldering.

1.22.4 Flux Removal in Brazing and Soldering

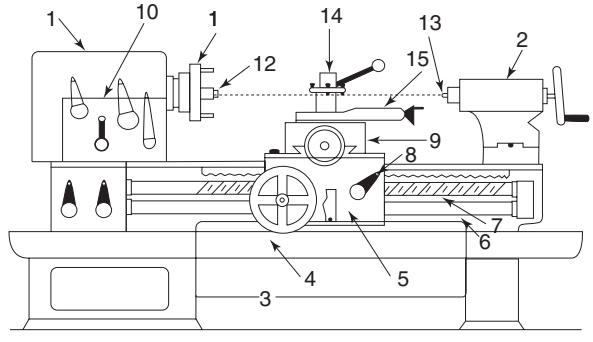
Some fluxes used in brazing and soldering are corrosive. So, the flux residues must be completely removed for preventing corrosion in joints. Water soluble fluxes are removed with hot water. Alcohol or grease can also be used as solvents for flux removal.

1.23 LATHE

Lathe is one of the oldest and most important machine tools. The lathe has become a general purpose machine tool which is used widely in production works. It removes the excess material from the work piece by rotating it against a cutting tool. The tools can be fed deep through the excess material on the work piece. The job is held between rigid supports.

1.23.1 Main Parts of a Lathe

The main parts of a central lathe are given in Fig. 1.33.



1. Head stock
2. Tail stock
3. Leg/Bed
4. Tray
5. Carriage
6. Feed shaft
7. Lead screw
8. Half-nut lever
9. Cross-slide
10. Gear box
11. Driving plate
12. Live centre
13. Dead centre
14. Tool post
15. Compound rest

Fig. 1.33 *Centre lathe*

1. Bed The bed is the basic structure of the lathe and constitutes 70-90 percent of the total weight of the lathe. All other parts are fitted on to this bed. Two sets of parallel, longitudinal guideways are contained on the bed's upper surface. These guideways are precision machined to ensure accurate alignments of other parts fitted on the bed. It is made strong enough to resist the deflections and vibrations due to cutting forces. The bed is usually made of cast iron or nickel cast iron alloy.

2. Head Stock The head stock is mounted at the left end of the bed. It provides the power required for rotating the work at various speeds and for the tool movement as well. The head stock receives the drive from an electrical motor and it makes use of the cone pulleys and gears for getting various spindle speeds. There are speed change levers on the head stock for this purpose. The head stock also contains work holding devices such as chucks, face plates and dog plates on it. The head stock mounts the live centre.

3. Tail Stock The tail stock is mounted at the right end of the bed. It mounts the dead centre. It can be moved along the lathe bed for accommodating work pieces of different sizes. It is mainly used for the following purposes:

(a) To support one end of a long work piece
(b) To hold a tool for the operations like drilling, reaming, tapping, etc.

4. Carriage The carriage provides the means for mounting and moving the cutting tools. The carriage has the following parts:

(a) *The saddle:* It is H-shaped casting fitted onto the bed and moves along the outer set of guideways on the bed surface.

(b) *The cross slide:* It is mounted on a transverse bar on the saddle and can be moved by means of the feed screw that is controlled by a small hand wheel. The cross slide is used to move the cutting tool along a perpendicular direction to the axis of rotation of the work piece.

(c) *The compound rest:* It consists of a base, which is mounted on the cross slide and an upper casting. The base is graduated in angle for swivel of the compound rest through any angle. The upper casting is mounted on guide ways on the base. It can be moved along the guide ways by a hand wheel.

(d) *The tool post:* It is mounted on the compound rest. The cutting tool is clamped in the tool post.

(e) *The Apron:* It is attached to the front of the carriage. It contains the mechanism for the manual and automatic motion of the carriage and the cross slide. For the manual movement of the carriage along the bed, there is a hand wheel on the front of the apron. The hand wheel shaft has a pinion at its other end which engages with a rack attached to the bed.

5. Feed Mechanism The power is transmitted to the apron through the feed mechanism. It is located at the left of the bed. Power is transmitted to the apron by a rotating feed rod through the gearing and clutch arrangement in the apron.

For cutting threads, the drive is given by a lead screw by a direct connection between the apron and the lead screw by means of a split nut.

1.23.2 Important Operations Done on a Lathe

1. Turning Turning is a lathe operation in which the diameter of cylindrical jobs is reduced to the desired dimensions. In turning, the work piece is held between the lathe centres or in a chuck. The tool is clamped in the tool post.

The work piece is rotated and tool is fed parallel to the axis of rotation, as shown in Fig. 1.34. Turning operation resulting in the same diameter over the full length of the work piece is called straight turning and when different diameters are obtained, it is called step-turning or shoulder turning.

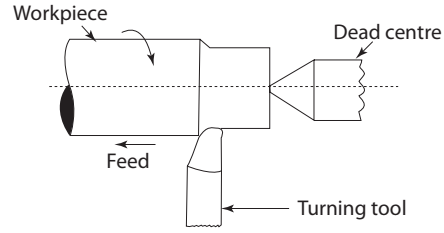


Fig. 1.34 *Turning*

2. Knurling In knurling, the surface of the work piece is made rough for easy gripping as shown in Fig. 1.35. The knurling tool consists of two or more hardened steel rollers which have diamond patterns on their surface. These patterns are formed on the surface of the work piece by pressing the knurling tool against the rotating work piece.

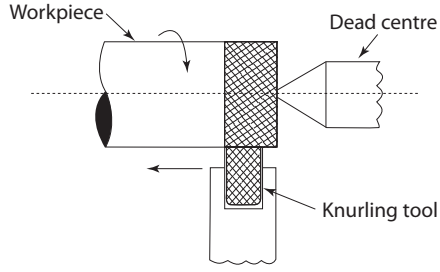


Fig. 1.35 *Knurling*

3. Forming The required profile is obtained by pressing a form tool against the surface of the rotating work piece. Forming can produce concave, convex or any irregular shape as shown in Fig. 1.36.

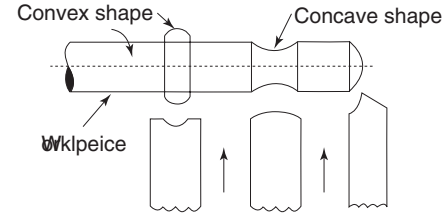


Fig. 1.36 *Form turning*