METAL WORK PROCESSES AND PROJECTS

Metalwork processes include marking out, cutting, bending, drilling and joining. These processes are employed to produce metal products which are also referred to as projects. Below are some metalwork projects and how they are done:

Marking Out

Marking out is the technical term used for measuring and marking parts before they are cut out or bent. This is the first step in project production. However, before any clear and accurate marking out operation is carried out, the surface to be marked must be prepared by cleaning and filing off the roughness of the surface and then brushing the surface with a little whitewash, Prussian blue or copper sulphate.

When marking out a rectangular workpiece, first file two adjacent faces flat and at right angles (i.e. 90^{o}) to each other. These two faces will then be the datums (datum means *point of reference*) from which all measurements will be made; and the lines scribed from one datum face will be both parallel to that face and at right angles to the lines scribed from the other datum face.

Projects with curved or radiused profile are always marked out by using the centre line as datum. One can also mark out using both the straight edge and the centre line as datum.

Cutting and Filing to Size

Cutting and filing to size is the process carried out when marking out is completed. Cutting and filing include measuring, hacksawing, chiselling, filing, scraping and threading. When a metalwork project is to be done, cutting and filing on the bench cannot be avoided.

Hacksawing

In hacksawing, both the position of the saw and how it is held, are very important for efficient and safe cutting operation. The right hand is used to hold the handle, while the left hand is used to hold the other end.

Do not use a hacksaw with strictly worn out teeth. Do not also stand an saw on an oily floor. Always use the right type of hacksaw for the job at hand.

Chiselling

Chiselling is one of the methods of metal removal on the bench. Usually, workpieces are cut with a clearance to allow for chiselling or filing.

When chipping, the chisel should be held about midway between the head and the edge, and at the correct inclination. If the inclination is large, the chisel will dig deep into the work but if it is too small it may not cut.

When using a chisel, it should be held tightly and firmly, the hammer should always strike only on the chisel head and chisel with bad or battered head should not be used.

Filing

After cutting your workpiece from the stock, it is necessary to bring the workpiece to its final or actual size. Filing is the act of removing metal from the workpiece in order to bring it to the actual size. Before filing, it is important to mark out the amount of metal to be removed. Filing is the most common operation carried out on bench work. There are two commonly used methods of filing: cross-filing and draw-filing.

Cross-filing method is the method used for general work, roughing down, squaring, smoothening, etc. Cross filing method leaves file marks on the field surface. Hence, draw filing is carried out in order to remove the file marks to give a good finish.

Bending and Folding

At times, some projects may involve sheet metal, or may even be purely sheet metalwork. In such cases, after the project has been developed and cut to size, the next stage will be to bend and form it to shape. Before shaping, it is necessary to know about the tools used for the various types of bending. Some of the tools are: bench vice, bench plate, stakes, hand groover, bar folder, setting hammer.

- **Bench vice.** It is sometimes necessary to bend sheet metal in a vice.
- **Bench plate or anvil.** The bench plate is always used in conjunction with the work bench. It has various holes in it of different shapes: round, rectangular, square, etc. These holes are to receive the bottom of the stakes which are used for bending operations.
- **Stakes.** Stakes are used for forming various kinds of bends or curves on sheet metalwork. They are like anvils to the sheet metalworker. Stakes are available in various types, according to the function they perform. They include double-seaming stake, breakhorn stake, bevel-edge square stake, hatchet stake, needle-case stake, blowhorn stake, hollow mandrel stake, etc.

Folding and Wiring Edges

Folding and wiring are processes employed in sheet metalwork to protect edges of products from tear. Folding and wiring also protect the user of the product from injury.

How to fold and wire edges

1. Bend or fold the developed pattern into the product to be made.
2. Bend each of the edges of the box outwards in preparation for folding and wiring. After cutting the required wire, fix it in the folded box.
3. Fold over the edges of the box using a setting down hammer.
4. Already the wire is place over the bent edges. With pliers, squeeze the edges down a bit to fasten the wire in position.
5. Finally, use the setting-down hammer or mallet to close the edges completely.