Fitting and sheet metal work

Objectives : At the end of this lesson you shall be able to
- **state the types of sheets**
- **state the names of cutting tools**
- **define riveting and name the types of rivets.**

Cutting And bending of sheet metal

Almost all sheet metal industries use large quantities of steel rolled into sheets of various thicknesses. These sheets are sometimes coated with zinc, tin or other metals for various applications. Other than steel sheets, industries also use sheets made out of zinc, copper, aluminum, stainless steel etc.

The term **sheet metal** generally applies to metals and alloys rolled into sheets of various thicknesses of less than 5 mm. Sheets of thickness over 5 mm are called plates.

Earlier, sheets were specified by standard wire gauge(SWG) numbers. Each gauge is designated with a definite thickness.The larger the gauge number, the lesser is the thickness of the sheet. Nowadays, the sheet thickness is directly specified in millimetres(mm), such as 0.40 mm, 0.50 mm, 0.63 mm, 0.80 mm, 0.90 mm, 1.00 mm, 1.12 mm, 1.25 mm etc.

Types of sheets

Steel sheet: This is an uncoated sheet of mild steel having bluish-black appearance. The use of this metal is limited to articles that are to be painted or enameled.

Galvanized iron sheet: The zinc-coated iron sheets are known as galvanized iron sheets, popularly known as GI sheets. The zinc coating resists rust. These are most commonly used in making water pipes. Articles like pans, buckets, furnaces, cabinets are also made using GI sheet.

Copper sheets: Copper sheets are available either as cold-rolled or hot-rolled sheets. Cold-rolled sheets are worked easily and are used in sheet metal shops. Gutters, roof flashing and hoods are common examples where copper sheet is used.

Aluminium sheets: Aluminium sheets are highly resistive to corrosion, whitish in colour and light in weight. Since aluminium is a ductile material, it can be bent to any shape easily. Aluminium sheets are widely used in manufacturing of a number of articles such as household utensils, light fixtures, windows etc.

Tin sheets: Tin sheet is a sheet of iron coated with tin to protect the iron sheet against rust. The size and thickness of the tin sheets are denoted by special marks, not by gauge numbers.

Tinned sheets are used for food containers, dairy equipment, furnace fitting etc.

Brass sheet: Brass is an alloy of copper and zinc in various proportions. It will not corrode and is extensively used in craft.

Snips - Sheet metal cutting tools

A snip is a cutting tool used for cutting thin sheets of metal. A typical snip looks as shown in Fig 1 and 3.

There are three types of snips.

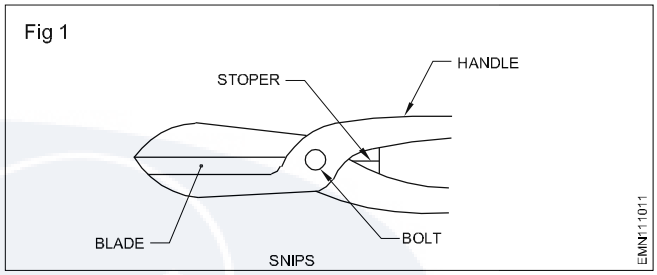
1 Straight snips

2 Bent snips/curved snips

3 Universal snips

Straight snip

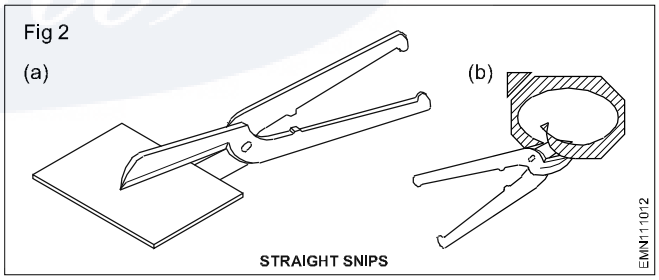
Fig 1



A typical straight snip and its parts are shown in Fig 1.

1 Handle 2 Blade 3 Stopper

Fig 2



Straight snips have straight blades for cutting thin sheets along a straight line as shown in Fig 2a. It can also be used for external curved cuts as shown in Fig 2b.

Bent snips/curved snips

Bent snips have curved blades as shown in Fig 3a. These snips are used for cutting internal curves and for trimming a cylinder on the outside of the cut as shown in Fig 3b.

Fig 4 shows a universal snips. Universal snips are used for most general purpose works. The best size of snip for general use is a pair of 300 mm long.

FOLDING TOOLS

Tools commonly used in the folding of sheet metal are:

– angle steel

– folding bar

– C clamp
– stakes
– mallet.

Fig 3

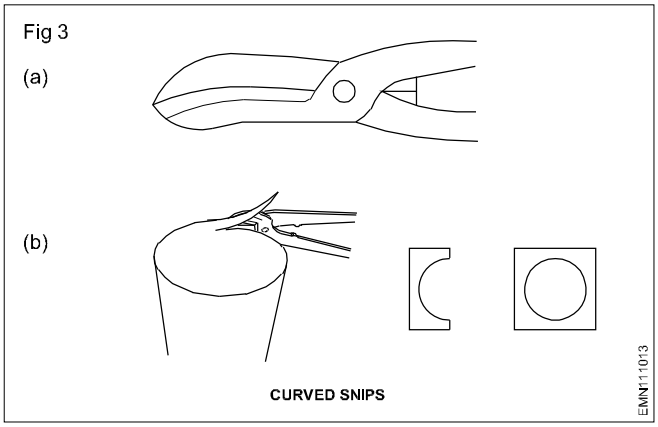
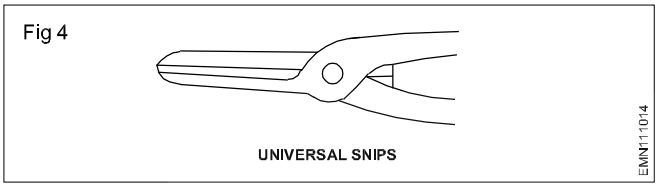


Fig 4



Angle steel: Two pieces of angles are used for folding sheet metal to an angle of 90°. These angles are fitted on a vice with the sheet metal to be bent sandwiched between the angles. For longer sheets, lengthy angles will be used along with a clamp or hand vice.

Folding bars: The sheet metal to be bent is clamped in the folding bars. The sheet metal is bent to the required shape using a mallet (wooden hammer).

C-clamp: A typical C-clamp is used as a holding device. This clamp is used when two pieces has to be securely held or fixed to one another. It is available in different sizes according to the opening width of the jaws.

Stakes: Stakes are tools used for bending, seaming and forming of sheet metal that cannot be done on any regular machine. For the above purposes, different shapes of stakes as listed below. Stakes are made of soft or cast steel.

– Hatchet stake
– Square stake
– Blow-horn square stake
– Bevel-edge square stake

Hatchet stake: It is used for making sharp bends, for bending edges and for folding sheet metal.

Square stake: It is used for general purpose bending works.

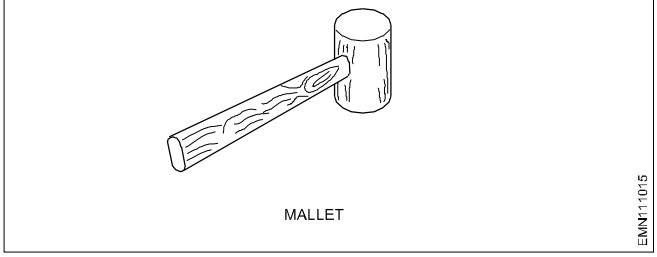
Blow-horn stake: It is used in forming, riveting or seaming tapered, cone-shaped articles, such as funnels etc.

Bevel-edged square stake: It is used to form corners and edges.

Mallet

Fig 5 shows a mallet. A mallet is used for striking while bending sheet metals. Mallets are made of wood, rubber, copper etc. Since these are soft materials, they will not damage the sheet surface while working.

Fig 5



NOTCHES

Notches are angular spaces in which the sheet metal is removed. The purpose of making notches is to allow the work to be formed to the required size and shape. Notches prevent excess material from overlapping and causing a bulge at the seam and edges.

Riveting: Riveting is one of the satisfactory methods of making permanent joints of two pieces - metal snips.

It is customary to use rivets of the same metal as that of the parts that are being joined.

Uses: Rivets are used for joining metal sheets and plates in fabrication work, such as bridges, ships, cranes, structural steel work, boilers, aircraft and in various other works.

Material: In riveting, the rivets are secured by deforming the shank to form the head. These are made of ductile materials like low carbon steel, brass, copper and aluminium.

Types of rivets

The four most common types of rivets are:

- tinmen's rivet
- flat head rivet
- round head rivet
- countersunk head rivet.

Method of riveting: Riveting may be done by hand or by machine.

While riveting by hand, it can be done with a hammer and a rivet set.

Rivet set: The shallow, cup-shaped hole is used to draw the sheet and the rivet together. The outlet on the side allows the slug to drop out.