

SHEET METAL SHOP

Introduction

Sheet metal working involves manufacturing articles from sheets or thin sheets, which may be of black iron, galvanized Iron, copper and stainless steel. Sheet metals are hot and cold rolled metal sheets having thickness generally about 3.25 mm and below.

Tools

The tools used in sheet metal shop may be generally classified into following types.

1.Supporting tools- These tools may be defined as the tools used for the supporting the job during various operations in sheet metal shop.

Stakes- These tools are commonly used in sheet metal shop for supporting the jobs. It has different shapes on the top of the stakes as per requirement and a shank which help in mounting on table. There are different types of stakes as follows-Bick iron stake, Hatched stake, Half moon stake, Bottom stake & Conductor stake etc.

2.Measuring/Marking tools

The tool/devices used for making measurement or checking dimensions are called measuring device.

a) Scale: It is flat shape and calibrated up to 1/16 inch in B.I.S system and up to 1/2 mm in metric system. It is specified by its length. Generally available in length of 6",12",24" and 1m etc as per application. These are made up of various materials as steel, copper, wood and spring steel.

b) Standard wire gauge: It is made up of stainless steel. It is used for measuring thickness of sheet.

c) Scriber: It is metal working pencil. It is long wire or rod of steel.

d) Divider: It is used for making circles and arcs.

e) Prick Punch: It is used for indicating permanent marking. They include angle of punch is 30.

3.Cutting and shearing tools

These tools may be classified as-

a) Hand Shear (Snip): It is made up of low carbon steel or high carbon steel by forging method. It is of two type i.e. Straight hand shear & curved hand shear.

b) Power shear: A power shear is electrically or pneumatically powered hand tool designed to blank large pieces of sheet metal.

c) Bench shear: A bench shear, also known as a lever shear, is a bench mounted shear with a compound mechanism to increase the mechanical advantage.

4. Forming/Striking tool

Hammer:-It is used in sheet metal work and is of various types in terms of shapes, size and weight. They have round and square heads to suit forming of round or square shapes. Soft face hammers are used to avoid damage to sheet metals. A wooden hammer (mallet) is an example of soft hammer.

5. Sheet metal joints:

- A) Lap joint
- B) Flush joint
- C) Edge over joint
- D) Groove joint
- E) Riveted joint
- F) Double Groove joint

6. Operations/Processes involved

- A) Measuring and Marking
- B) Cutting and Shearing
- C) Edge marking
- D) Bending
- E) Laying out
- F) Piercing and Blanking



Fig. 1: Mallet



Fig. 2: Standard wire gauge

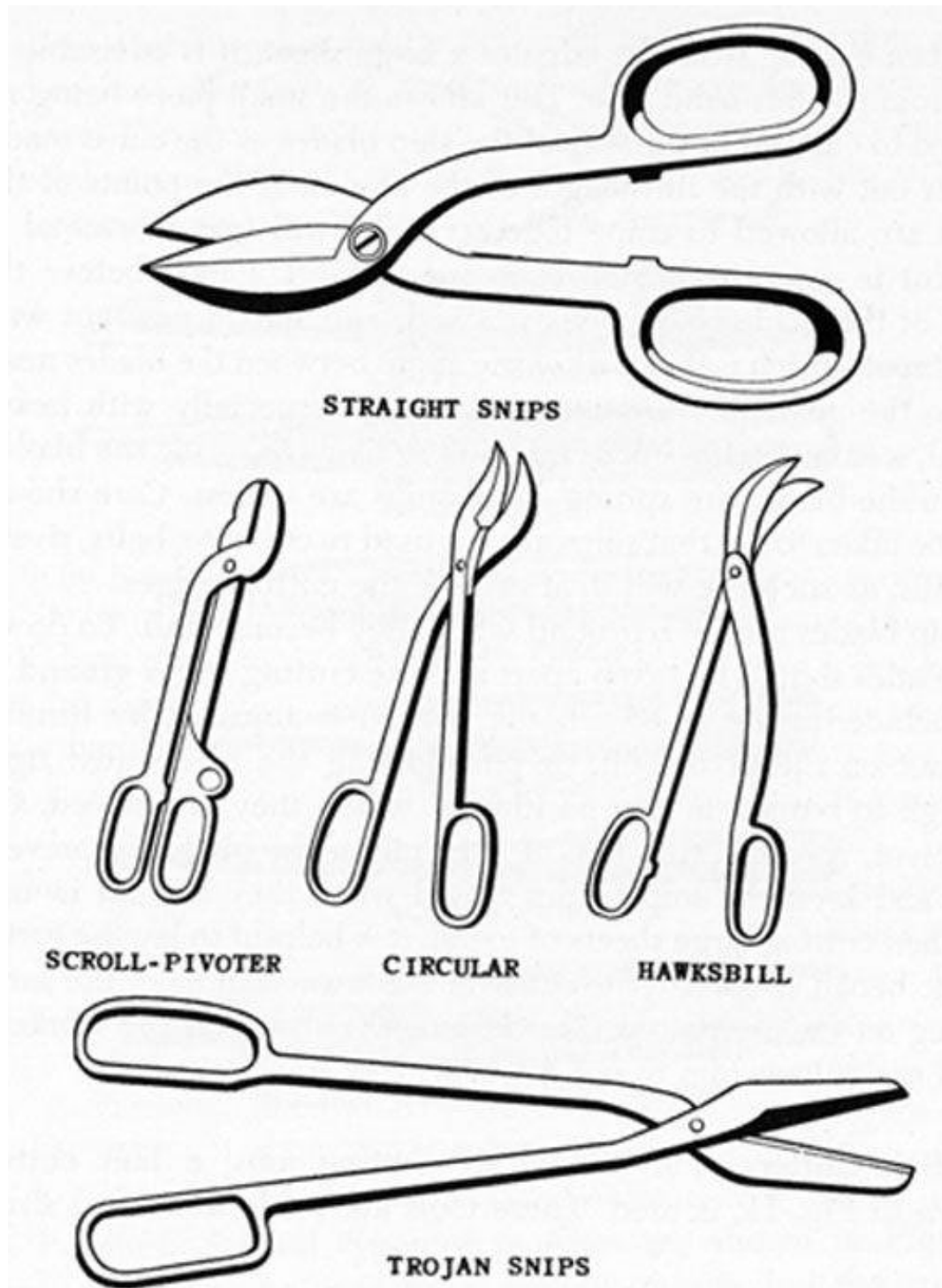


Fig. 3: Cutting Tools

PRACTICAL NO.-1

OBJECT

To make a funnel using sheet metal forming (Material: 24 SWG) of given dimensions:

Radius of funnel (R) = 35mm

Slant height of funnel (l) = 100mm

MATERIAL REQUIRED

Mild steel sheet of 24SWG [Standard wire gauge].

TOOL REQUIRED

1. Steel scale
2. Mallets
3. Hammer
4. Divider
5. Straight prick
6. Punch
7. Hand shear [300 mm]
8. Curved heat [250 mm]
9. Stake
10. Scriber

PROCESS INVOLVED

1. Measurements and Markings
2. Straight and curved shearing
3. Edge joining

PROCEDURE

1. Mark the straight line on side of the mild steel sheet with the help of scriber and steel scale.
2. Assuming the straight side as the reference side, carry out the rest of the markings using scriber.
3. Calculate the angle θ of the sheet required to form funnel. Let the top side funnel radius 'r' be 35mm and the slant height 'l' be 100mm, then angle θ is calculated as follows:

$$\theta = 360 \cdot r/l$$

4. From the calculations, obtained angle $\theta=126$, cut out the extra portion of 27 each from both the sides of sheet metal provided, cut as the marked section of circle.
5. Then the sheet is folded with the help of beak horn stake and mallet.
6. Hammering on sheet corners and external surfaces to develop the final shape of the funneling.

RESULT ANALYSIS

Changes in dimensions (length, width, dia., weight etc.).

LEARNING OUTCOMES

What did you learn in this practical?

APPLICATION

Where we can apply the knowledge gained in this practical.

SUGGESTIONS

If you have any suggestion related to this practical, please advise.

PRECAUTION

1. Properly mark the sheet according to the dimensions provided and calculated.
2. Cut the marked portion very carefully and avoid any parallel error.
3. Avoid excess hammering so that unwanted dents do not occur on the surface of sheet.
4. Keep distance from the sheet burr and sharp edges.
5. Be careful while using the straight snip.

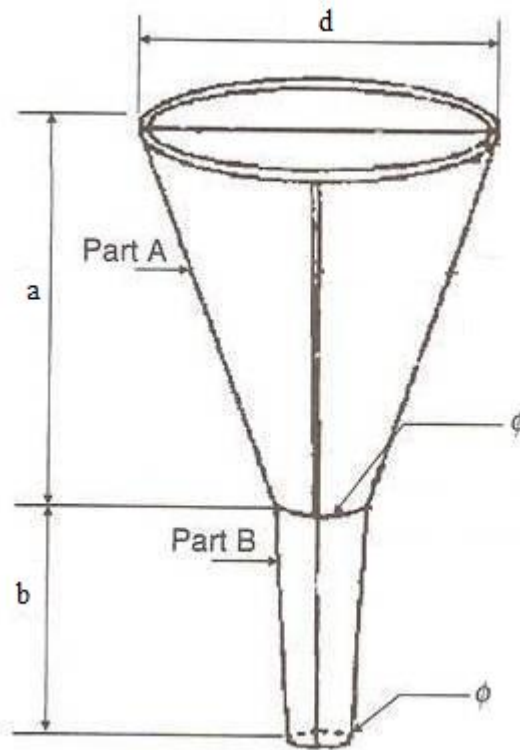


Fig. 4: Funnel

PRACTICAL NO.-2

OBJECT

To make a square sheet metal tray of size 80*80*20 mm:

MATERIAL REQUIRED

Mild steel sheet of 24SWG [Standard wire gauge]

TOOL REQUIRED

1. Steel scale
2. Mallets
3. Hammer
4. Divider
5. Straight prick
6. Punch
7. Hand shear [300 mm]
8. Curved heat [250 mm]
9. Stake
10. Scriber

PROCESS INVOLVED

1. Measurements and Markings
2. Straight and curved shearing
3. Edge joining

PROCEDURE

1. Marking on sheet metal as per required dimensions with the help of steel scale and scriber.
2. Cut the sheet in desired shape as per measurement with the help of a straight snip.
3. Matching the corner of sheet marking and stake corner.
4. Then the sheet is folded with the help of beak horn stake and mallet.
5. Hammering on sheet corners and external surfaces to develop the final shape of square tray.

RESULT ANALYSIS

Changes in dimensions (length, width, dia., weight etc.).

LEARNING OUTCOMES

What did you learn in this practical?

APPLICATION

Where we can apply the knowledge gained in this practical.

SUGGESTIONS

If you have any suggestion related to this practical, please advise.

PRECAUTION

1. Properly mark the sheet according to the dimensions provided and calculated.
2. Cut the marked portion very carefully and avoid any parallel error.
3. Avoid excess hammering so that unwanted dents do not occur on the surface of sheet.
4. Keep distance from the sheet burr and sharp edges.
5. Be careful while using the straight snip.

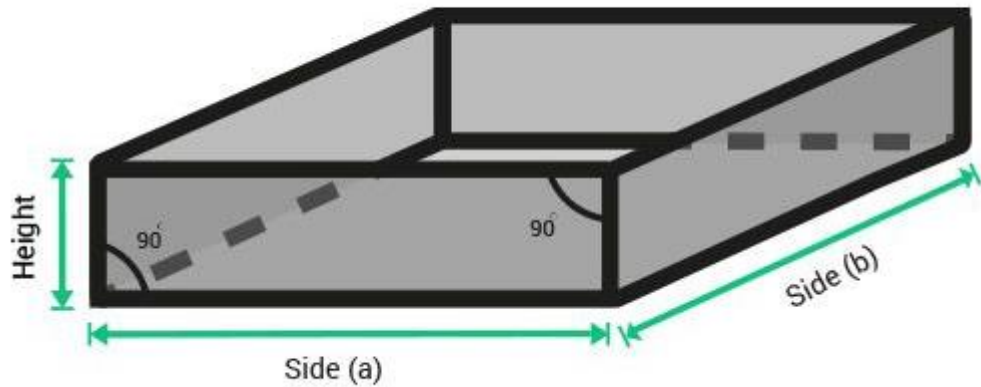


Fig. 5: Square Sheet Metal Tray



Fig. 6: Tray