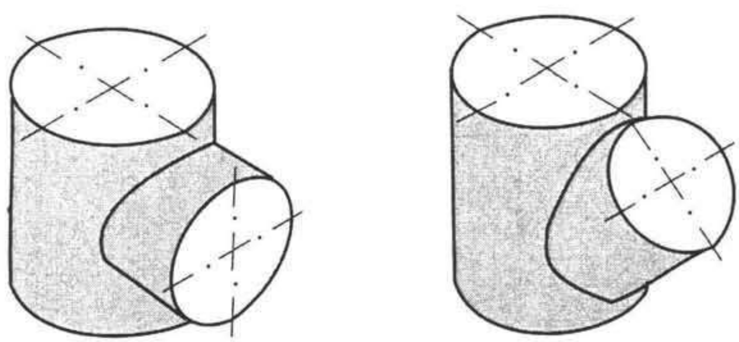
CHAPTER 8

Intersection of Surfaces

8.1 Introduction

Ducts, pipe joints, smoke stacks, boilers, containers, machine castings etc., involve intersection of surfaces. Sheetmetal work required for the fabrication of the above objects necessiate the preparation of the development of the joints/ objects. Orthographic drawings of lines and curves of intersection of surfaces must be prepared first for the accurate development of objects. Methods of obtaining the lines and curves of intersection of surfaces of cylinder and cylinder, prism and prism are shown to introduce the subject. Figure 8.1 Shows intersection of two cylinders.



(a) (b)

Fig. 8.1

8.2 Intersection of cylinder and cylinder

Example 1: *A horizontal cylinder of diameter 40 mm penetrates into a vertical cylinder of diameter 60 mm. The axes of the cylinders intersect at right angles. Draw the curves of intersection when the axis of the horizontal cylinder is parallel to the VP.*

Solution : (Fig 8.2)

1. Draw the top and front views of the cylinders.
2. Draw the left side view of the arrangement.
3. Divide the circle in the side view into number of equal parts say 12.

4. The generators of the horizontal cylinder are numbered in both front and top views as shown.
5. Mark point m, where the generator through 1 in the top view meets the circle in the top view of the vertical cylinder. Similarly mark m_2,.........m_{12}.
6. Project m^1_7 to m^1_1 on the generator 1^1 1^1 in the front view.
7. Project m^7 to m^1_7 on 7^1_7. Similarly project all the point.
8. Draw a smooth curve through m^1_1.......m^1_7.

   This curve is the intersection curve at the front. The curve at the rear through m^1_4, m^1_8------m^1_{12} coincides with the corresponding visible curve at the front.

   Since the horizontal cylinder penetrates and comes out at the other end, similar curve of intersection will be seen on the right also.
9. Draw the curve through n^1_1...... n^1_7 following the same procedure. The two curves m^1_1-m^1_7 and n^1_1-n^1_7 are the required curves of intersection.

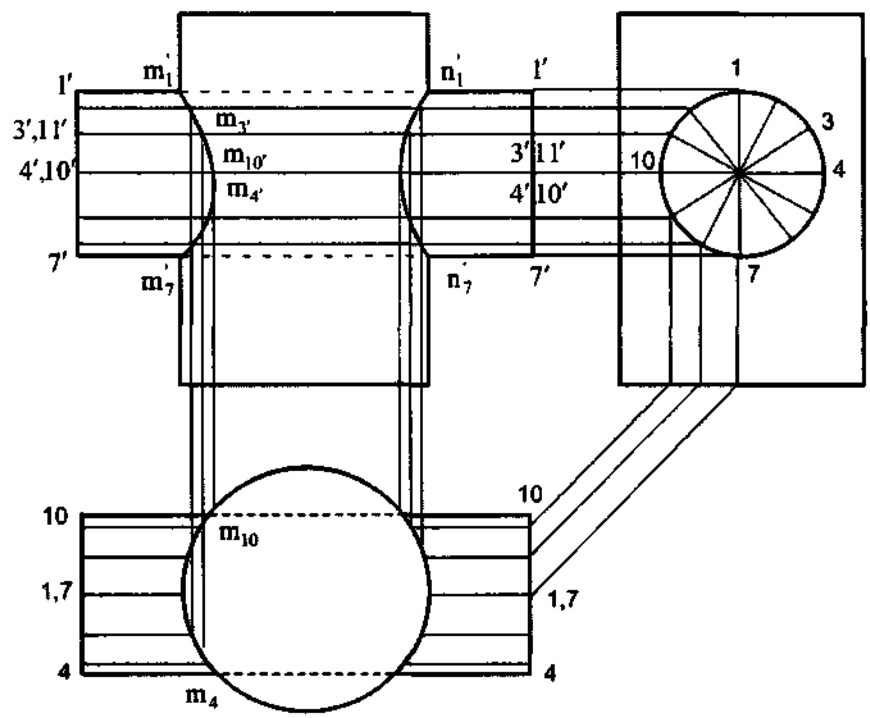


Fig. 8.2

Case II Cylinders of Same size

Example 2: *A T-pipe connection consists of a vertical cylinder of diameter 80mm and a horizontal cylinder of the same size. The axes of the cylinders meet at right angles. Draw the curves of intersection.*

Construction : (Fig 8.3)

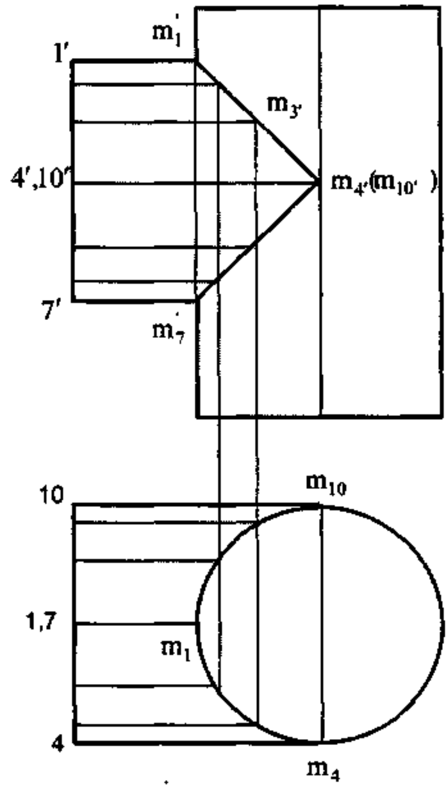


Fig. 8.3

The procedure to be followed is the same as that in example above. The curves of intersection appear as straight lines in the front view as shown in the figure. The two straight lines are at right angles.

Example 3: *A vertical cylinder of diameter 120 mm is fully penetrated by a cylinder of diameter 90 mm, their axes intersecting each other. The axis of the penetrating cylinder is inclined at 30⁰ to the HP and is parallel to the VP. Draw the top and front views of the cylinders and the curves of intersection.*

Construction : (Fig 8.4)

1. Draw the top and front views of the cylinders.
2. Following the procedure in example 1 locate points m_1 in the top view. Project them to the corresponding generators in the inclined cylinder in the front view to obtain points m^1_1, m^1_2 etc.
3. Locate points n^1_1 ....n^1_{10} etc., on the right side using the same construction.
4. Draw smooth curves through them to get the required curve of intersection as shown in the figure.

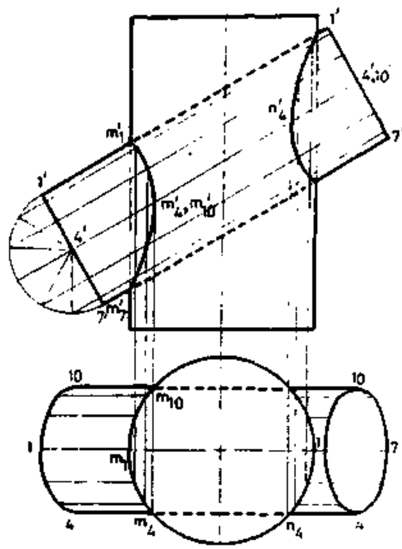


Fig. 8.4

8.3 Intersection of prism and prism

When a prism penetrates another prism, plane surface of one prism intersects the plane surfaces of another prism and hence the lines of intersection will be straight lines. In these cases, lines on the surface of one of the solids need not necessarily be drawn as it is done with cylinders. Instead, the points of intersections of the edges with the surface are located by mere inspection. These points are projected in the other view and the lines of intersection obtained.

Example 4: *A square prism of base side 60 mm rests on one of its ends on the HP with the base sides equally inclined to the VP. It is penetrated fully by another square prism of base side 45 mm with the base side equally inclined to the HP. The axes intersect at right angles. The axis of the penetrating prism is parallel to both the HP and the VP. Draw the projections of the prisms and show the lines of intersection.*

Construction : (Fig 8.5)

1. Draw the top and front view of the prisms in the given position.
2. Locate the points of intersection of the penetrating prism with the surfaces of the vertical prism in the top view by inspection. Here, the edges 2-2_1, of the horizontal prism intersects the edge point of the vertical prism at m_2 in the top view. n_4 corresponds to the edge 4-4_1, and the immediately below m_2, m_1 and m_3 relate to 1-1_1, and 3-3_1 respectively.
3. Similarly locate points n_1, n_2, n_3 and n_4.
4. Project m_1 onto 1^1-1^1_1 in the front view as m^1_1. Similarly project all other points. m^1_3 coincides with m^1_1 and n^1_3 coincides with n^1_1.
5. Join m^1_2 m^1_1 and m^1_1 m^1_4 by straight lines. Join n^1_2 n^1_1 and n^1_1 n^1_4 also by straight lines.

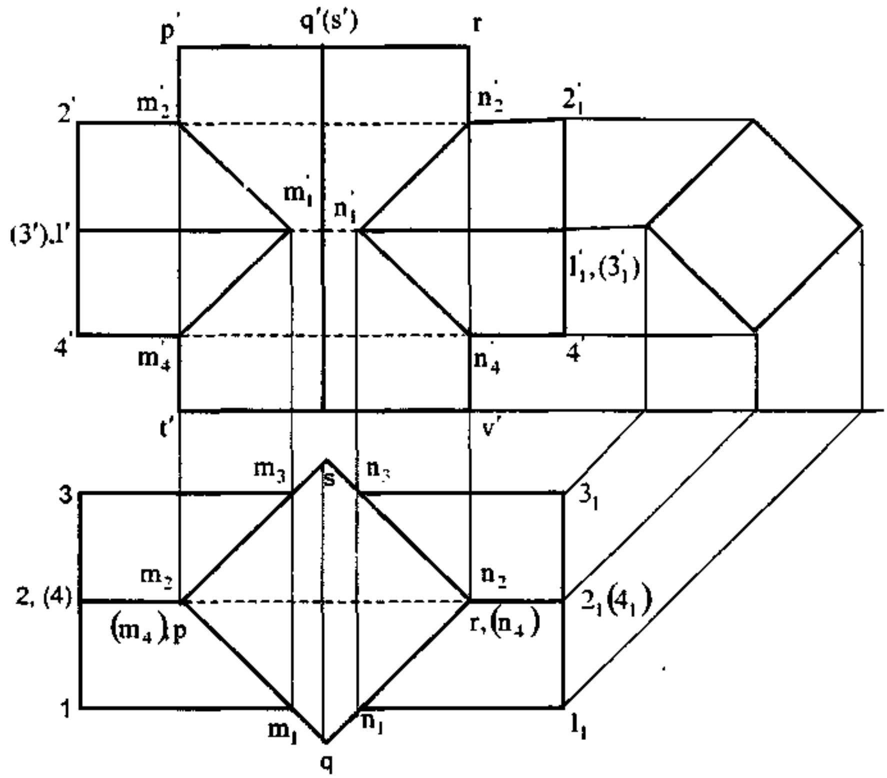

p'
q'(s')
r
2'
m'2
n'2
2'1
m'1
n'1
(3'),1'
1'1,(3'1)
4'
m'4
n'4
4'
t'
v'
m3
s
n3
3
3_1
m2
n2
2, (4)
(m4),p
r,(n4)
2_1(4_1)
1
m1
n1
1_1
q

Fig. 8.5

Chapter 9

Isometric Projection

9.1 Introduction

Pictorial projections are used for presenting ideas which may be easily understood by persons even with out technical training and knowledge of multi-view drawing. The Pictorial drawing shows several faces of an object in one view, approximately as it appears to the eye.

9.2 Principle of Isometric Projections

It is a pictorial orthographic projection of an object in which a transparent cube containing the object is tilted until one of the solid diagonals of the cube becomes perpendicular to the vertical plane and the three axes are equally inclined to this vertical plane.

Insometric projection of a cube in steps is shown in Fig.9.1. Here ABCDEFGH is the isometric projection of the cube.

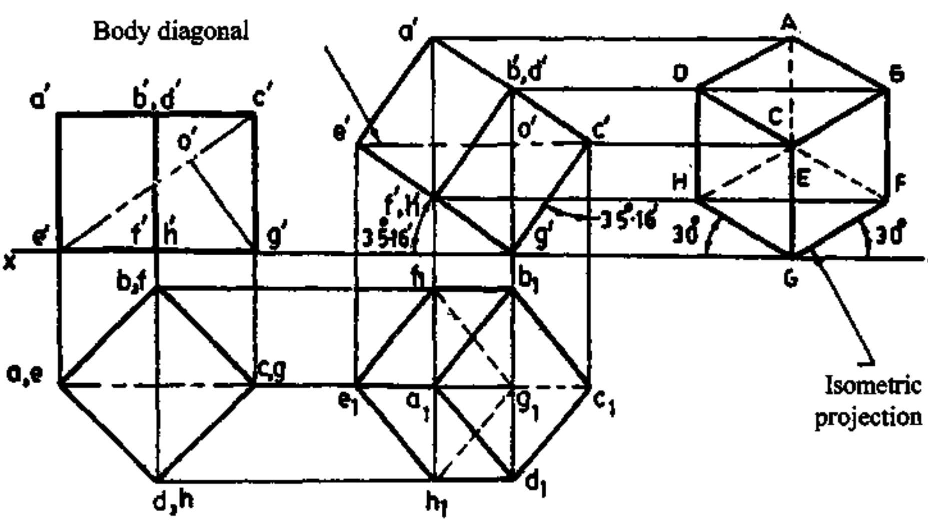


Fig. 9.1 Principle of Isometric Projection

The front view of the cube, resting on one of its corners (G) is the isometric projection of the cube. The isometric projection of the cube is reproduced in Fig.9.2.

Isometric Scale

In the isometric projection of a cube shown in Fig.9.2, the top face ABCD is sloping away from the observer and hence the edges of the top face will appear fore-shortened. The true shape of the triangle DAB is represended by the triangle DPB.

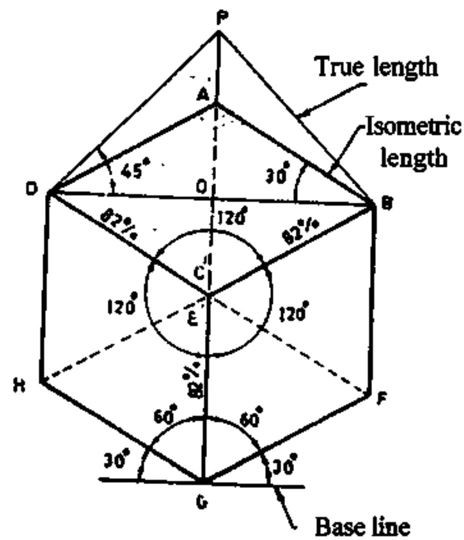


Fig. 9.2 An isometric Cube

The extent of reduction of an sometric line can be easily found by construction of a diagram called **isometric scale**. For this, reproduce the triangle DPA as shown in Fig.9.3. Mark the devisions of true length on DP. Through these divisions draw vertical lines to get the corresponding points on DA. The divisions of the line DA give dimensions to isometric scale.

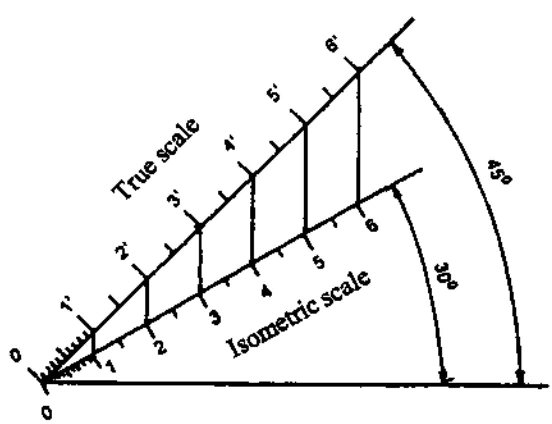


Fig. 9.3 Isometric Scale

From the triangle ADO and PDO in Fig.9.2, the ratio of the isometric length to the true length,

i.e., DA/DP = cos 45^0/cos30^0 = 0.816

The isometric axes are reduced in the ratio 1:0.816 ie. 82% approximately.

9.2.1 Lines in Isometric Projection

The following are the relations between the lines in isometric projection which are evident from Fig.9.2.

1. The lines that are parallel on the object are parallel in the isometric porjection.
2. Vertical lines on the object appear vertical in the isometric projection.
3. Horizontal lines on the object are drawn at an angle of 30^0 with the horizontal in the isometric projection.
4. A line parallel to an isometric axis is called an isometric line and it is fore shortened to 82%.
5. A line which is not parallel to any isometric axis is called non-isometric line and the extent of fore-shoretening of non-isometric lines are different if their inclinations with the vertical planes are different.

9.2.2 Isometric Projection

Figure 9.4(a) shows a rectangular block in pictorial form and Fig. 9.4(b), the steps for drawing an isometric projection using the isometric scale.

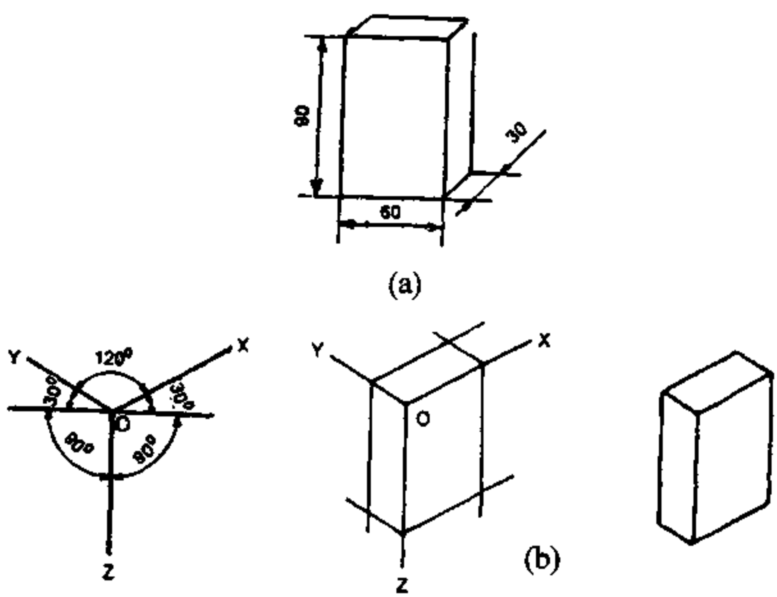
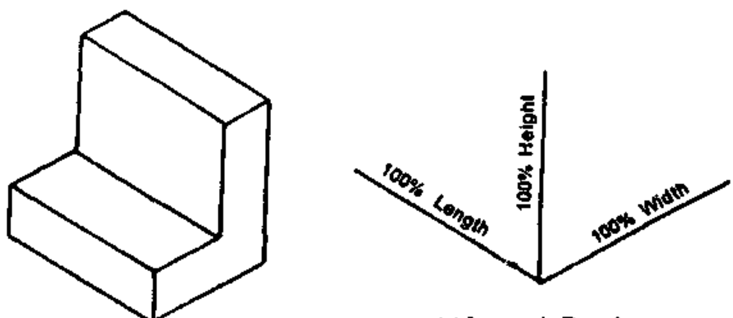


Fig. 9.4 Developing Isometric Projection

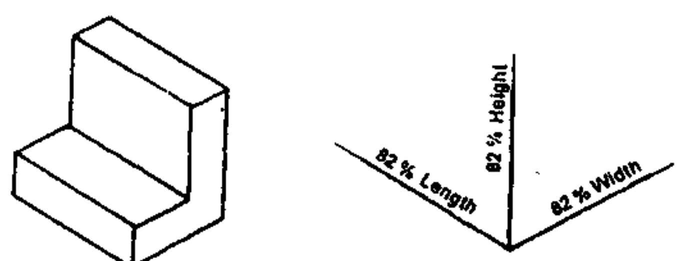
9.2.3 Isometric Drawing

Drawing of objects are seldom drawn in true isometric projections, as the use of an isometric scale is inconvenient. Instead, a convenient method in whichtheforeshorten-ing of lengths is ignored and actual or true lengths are used to obtain the projections, called isometric drawing or isometric view is normally used. This is advantageous becausethe measurement may be made directly from a drawing.

The isometric drawing of figure is slightly larger (approximaely 22%) than the isometric projection. As the proportions are the same, the increased size does not affect the pictorial value of the representation and at the same time, it may be done quickly. Figure 9.5 shows the difference between the isometric drawing and isometric projection.



(a) Isometric Drawing



(b) Isometric Projection

Fig. 9.5

Steps to be followed to make isometric drawing from orthographic views are given below (Fig. 9.6).

1. Study the given views and note the principal dimensions and other features of the object.
2. Draw the isometric axes (a).
3. Mark the principal dimensions to their true values along the isometric axes(b).
4. Complete the housing block by drawing lines parallel to the isometric axes and passing through the above markings(c).

5. Locate the principal corners of all the features of the object on the three faces of the housing block(d).
6. Draw lines parallel to the axes and passing through the above points and obtain the isometric drawing of the object by darkening the visible edges(e).

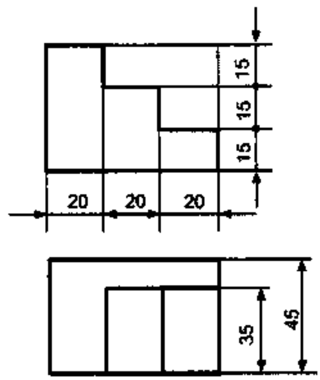


Fig. 9.6(a) Otrhographic view

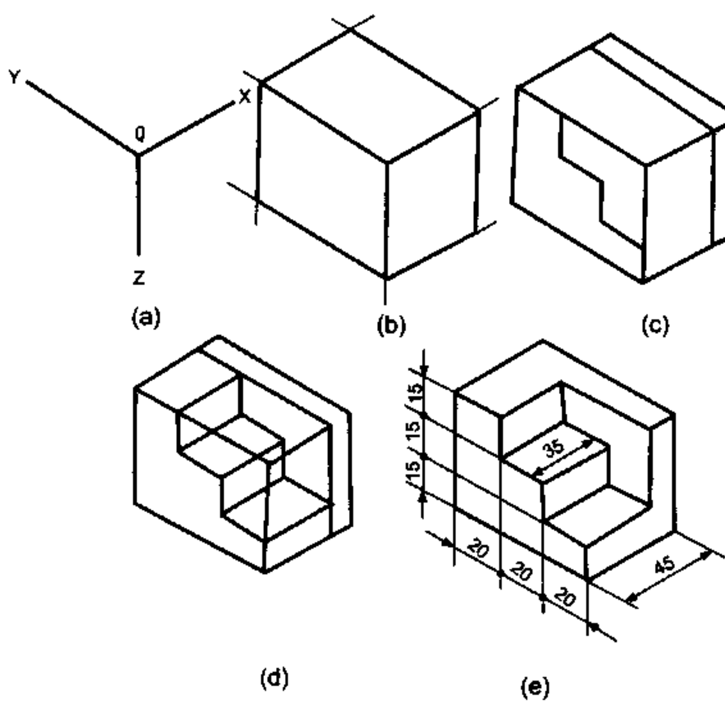


Fig. 9.6(b) Isometric View

9.2.4 Non-Isometric Lines

In an isometric projection or drawing, the lines that are not parallel to the isometric axes are called non-isometric lines. These lines obviously do not appear in their true length on the drawing and can not be measured directtly. These lines are drawn in an isometric projection or drawing by locating their end points.

Figure 9.7 shows the steps in constructing an isometric drawing of an object containing non-isometric lines from the given orthographic views.

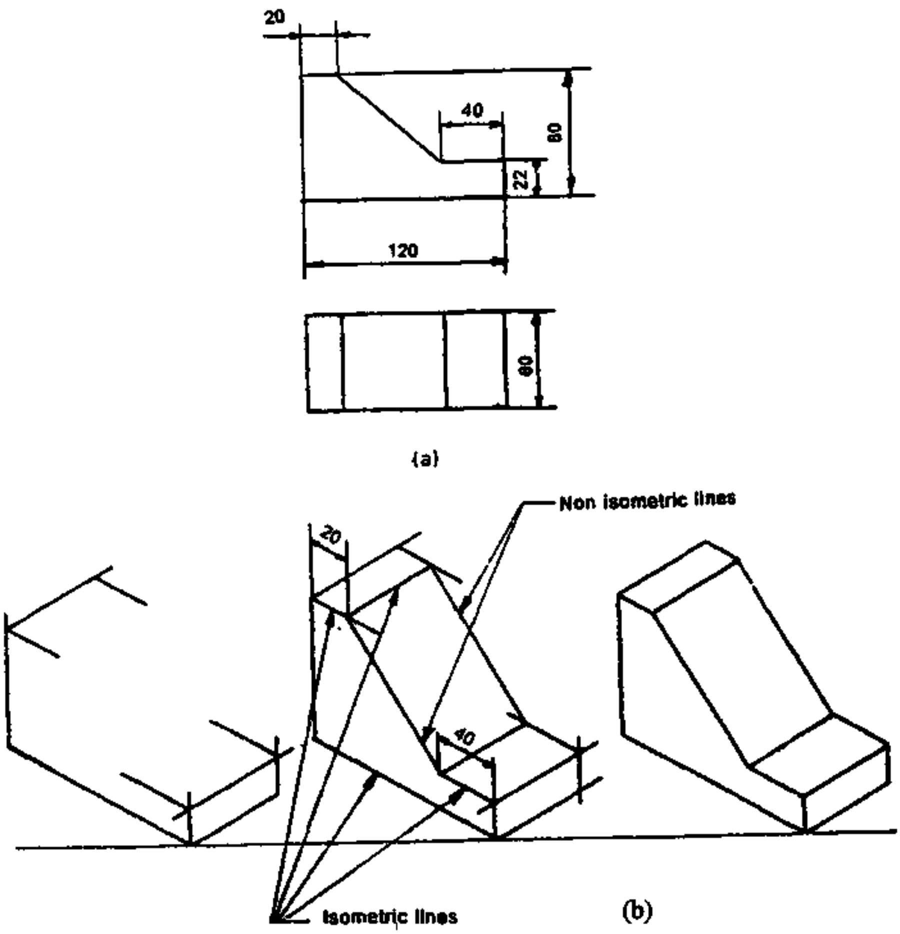


Fig. 9.7

9.3 Methods of Constructing Isometric Drawing

The methods used are :

1. Box method.
2. Off-set method.

9.3.1 Box Method (Fig. 9.8)

When an object contains a number of non-isometric lines, the isometric drawing may be conveniently constructed by using the box method. In this method, the object is imagined to be enclosed in a rectrangular box and both isometric and non-isometric lines are located by their respective points of contact with the surfaces and edges of the box.

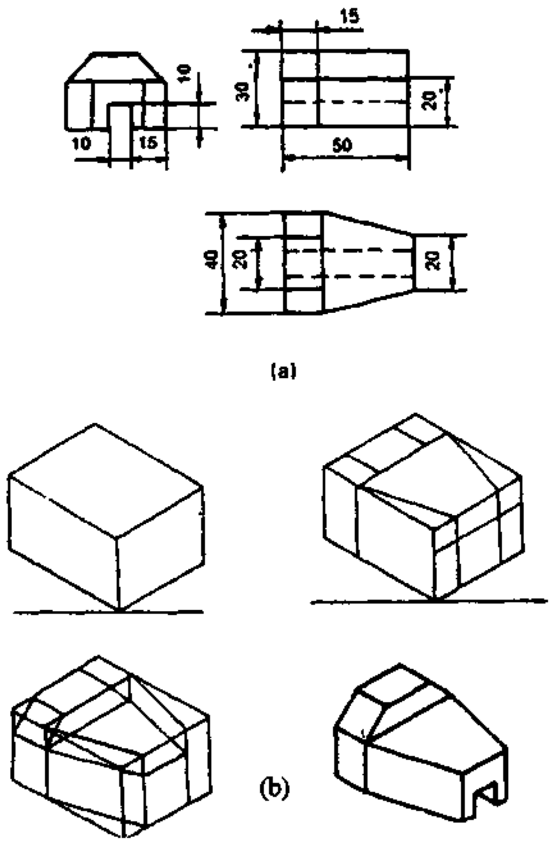


Fig. 9.8

9.3.2 Off-set Method

Off-set method of making an isometric drawing is preferred when the object contains irregular curved surfaces. In the off-set method, the curved feature may be obtained by plotting the points on the curve, located by the measurements along isometric lines. Figure 9.9 illustrates the application of this method.

9.4 Isometric Projection of Planes

Problem : *Draw the isometric projection of a rectangle of 100mm and 70mm sides if its plane is (a) Vertical and (b) Hirizontal.*

Constructon (9.10)

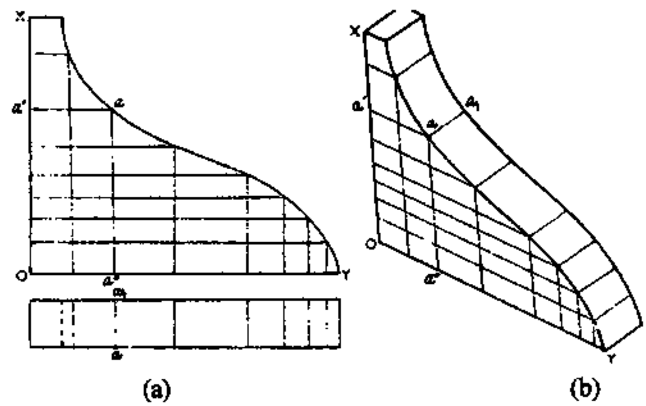


Fig. 9.9

1. Draw the given rectangle ABCD as shown in Fig.9.10(a).

Note :

(i) In the isometric projection, vertical lines are drawn vertical and the horizontal lines are drawn inclined 30° to the base line.

(ii) As the sides of the rectangle are parallel to the isometric axes they are fore-shortened to approximately 82% in the isometric projections.

Hence AB = C D = 1000 x 0.82mm = 82mm. Similary, B C = A D = 57.4mm.

(a) When the plane is vertical:

2. Draw the side A D inclined at 30° to the base line as shwon in Fig.9.10b and mark A D = 57.4mm.
3. Draw the verticals at A and D and mark off A B = D C = 82mm on these verticals.
4. Join B C which is parallel to A D.

A B C D is the required isometric projection. This can also be drawn as shown in Fig.9.10c. Arrows show the direction of viewing.

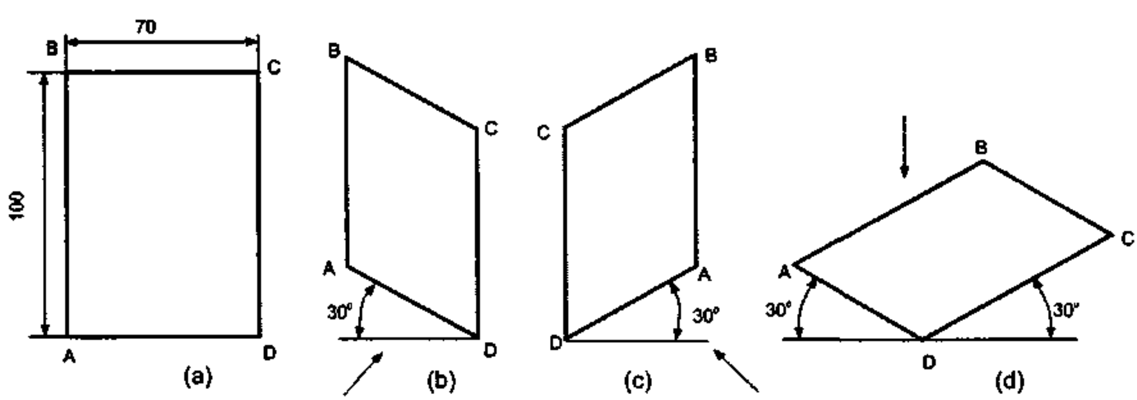


Fig. 9.10

(b) When the plane is horizontal.

5. Draw the sides AD and DC inclined at 30° to be base line and complete the isometric projection A B C D as shown in Fig.9.10d. Arrow at the top shows the direction of viewing.

To draw the isometric projection of a square plane. (Fig. 9.11a)

Construction (Fig. 9.11)

Case 1 Vertical plane (Fig. 9.11b)

1. Draw a line at 30° to the horizontal and mark the isometric length on it.
2. Draw verticals at the ends of the line and mark the isometric length on these parallel lines.
3. Join the ends by a straight line which is also inclined at 30° to the horizontal.

There are two possible positions for the plane.

Case II Horizontal plane (Fig. 9.11c)

1. Draw two lines at 30° to the horizontal and mark the isometric length along the line.
2. Complete the figure by drawing 30° inclined lines at the ends till the lines intersect.

Note

(i) The shape of the isometric projection or drawing of a square is a **Rhombus**.

(ii) While dimensioning an isometric projection or isometric drawing true dimensional values only must be used.

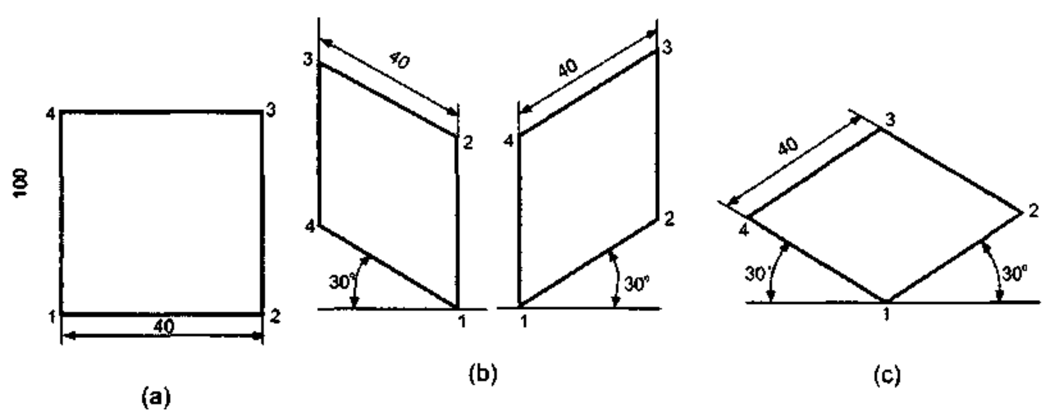


Fig. 9.11

Problem : Figure 9.12a shows the projection of a pentagonal plane. Draw the isometric drawing of the plane (i) when the surface is parallel to V.P and (ii) parallel to H.P.

Construction (Fig. 9.12)

1. Enclose the given pentagon in a rectangle 1234.
2. Make the isometric drawing of the rectangle 1234 by using true lengths.
3. Locate the points A and B such that 1a = 1A and 1b = 1B.

4. Similarly locate point C, D and E such that 2c = 2C, 3d = 3D and e4 = E4.
5. ABCDE is the isometric drawing of the pentagon.
6. Following the above princple of construction 9.12c can be

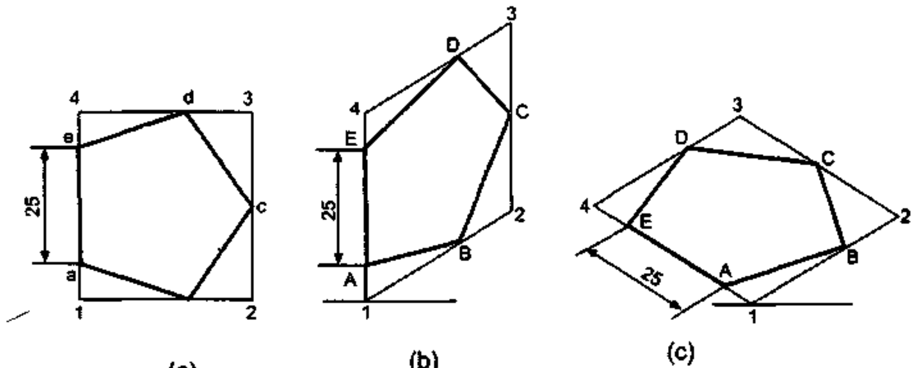


Fig. 9.12

Problem : *Draw the isometric view of a pentagonal plane of 30mm side when one of its sides is parallel to H.P. (a)When it is horizontal and (b)vertical.*

Construction (9.13)

1. Draw the pentagon ABCDE and enclose it in a rectangle 1-2-3-4 as shown in Fig.9.13a.

(a) When it is horizontal the isometric view of the pentagon can be represented by ABCDE as shown in Fig.9.13b.

(b) When the plane is vertical it can be represented by ABCDE as shown in Fig.9.13c or d.

Note : It may be noted that the point A on the isometric view can be marked after drawing the isometric view of the rectangle 1-2-3-4 for this, mark 1A' = **1A** and so on.

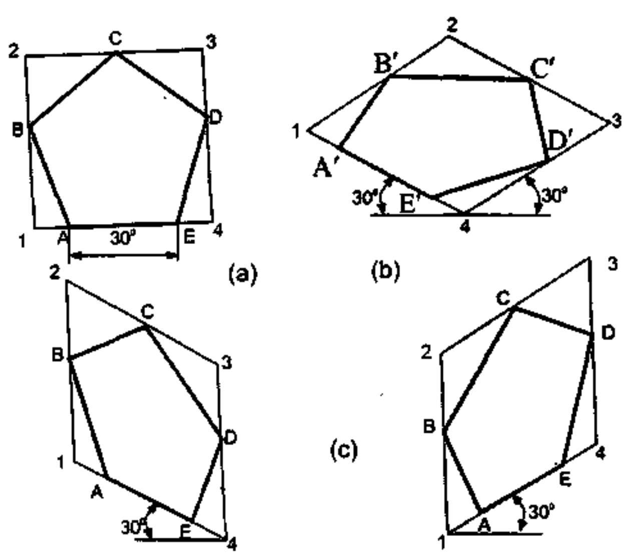


Fig. 9.13

Problem : Figure 9.14a shows the orthographic view of a heyagonal plane of side 30mm. Draw the isometric drawing (view) of the plane keeping it (a) horizontal and (b)vertical.

Construction (Fig. 9.14)

Following the principle of construction of Fig.9.13 obtain the figure 9.14b and 9.14c respectively for horizontal and vertical position of the plane.

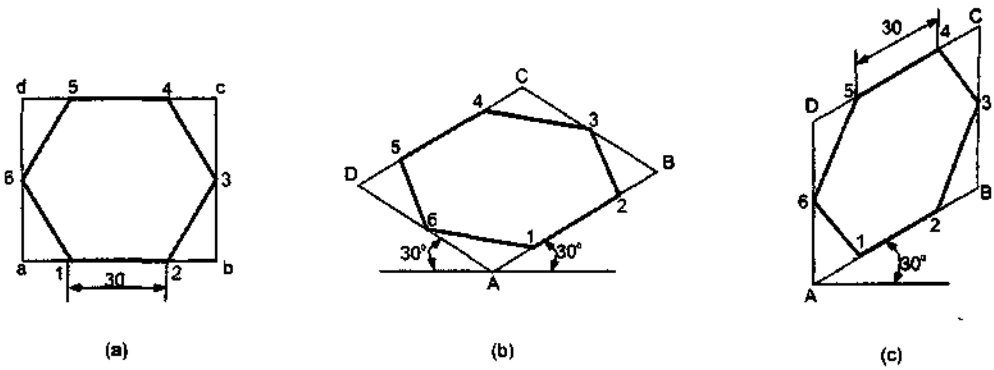


Fig. 9.14

Problem : *Draw the isometric view of a circular plane of diameter 60mm whose surface is (a) Horizontal, (b) Vertical.*

Construction (Fig. 9.15) using the method of points

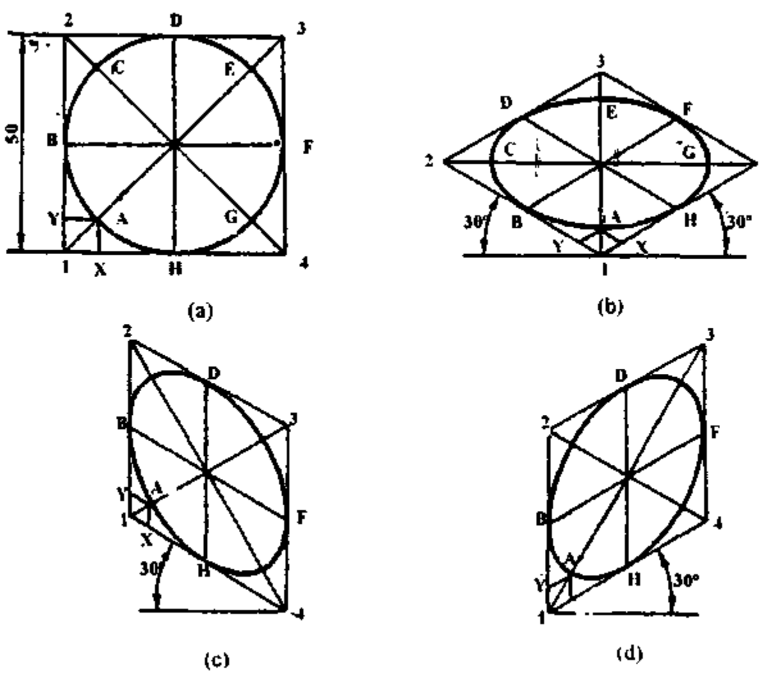


Fig. 9.15

1. Enclose the circle in a square 1-2-3-4 and draw diagonals, as shown in Fig. 9.15a. Also draw lines YA horizontallly and XA vertically.

   To draw the isometeric view of the square 1-2-3-4 as shown in Fig.9.15b.
2. Mark the mid points of the sides of the square as B D F and H.
3. Locate the points X and Y on lines 1-4 and 1-2 respectively.
4. Through the point X, draw A X parallel to line 1-2 to get point A on the diagonal 1-3. The point A can be obtained also by drawing Y A through the point Y and parallel to the line 1-4.
5. Similarly obtain other points C, E and G.
6. Draw a smooth curve passing through all the points to obtain the required isometric view of the horizontal circular plane.
7. Similarly obtain isometric view of the vertical circular plane as shown in Fig.9.15c and d.

Problem : *Draw the isometric projection of a circular plane of diameter 60mm whose surface is (a) Horizontal and (b) Vertical-use four-centre method.*

Construction (Fig.9.16)

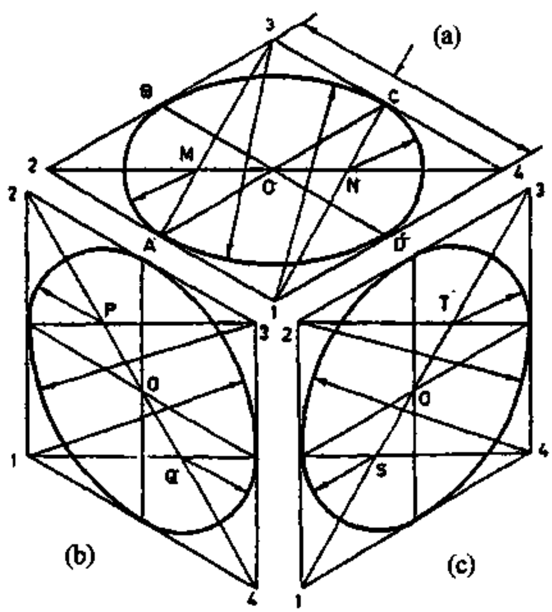


Fig. 9.16

1. Draw the isometric projection of the square 1-2-3-4 (rhombus) whose length of side is equal to the isometric length of the diameter of the circle = 0.82 x 60.
2. Mark the mid points A', B', C' and D' of the four sides of the rhombus. Join the points 3 and A'. This line intersects the line 2-4 joining the point 2 and 4 at M'. Similarly obtain the intersecting point N.
3. With centre M and radius = MA draw an arc A B. Also draw an arc C D with centre N.

4. With centre 1 and radius = 1C, draw an ace B C. Also draw the arc A D.
5. The ellipse A B C D is the required isometric projection of the horizontal circular plane (Fig.9.16a).
6. Similarly obtain the isometric projection in the vertical plane as shown in Fig.9.16b & c.

Problem : *Draw the isometric view of square prism with a side of base 30mm and axis 50mm long when the axis is (a) vertical and (b)horizontal.*

Construction (Fig.9.17)

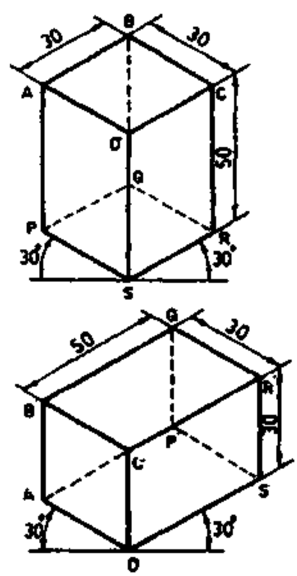


Fig. 9.17 Isometric drawing of a square prism

(a) Case 1 when the axis is vertical

1. When the axis of the prism is vertical, the ends of the prism which is square will be horizontal.
2. In an isometric view, the horizontal top end of the prism is represented by a rhombus ABCD as shown in Fig.9.17a. The vertical edges of the prism are vetical but its horizontal edges will be inclined at 30^0 to the base.

(b) Case II when the axis is horizontal

When the axis of the prism is horizontal, the end faces of the prism which are square, will be vertical. In the isometric view, the vertical end face of prism is represented by a rhombus ABCD. The isometric view of the prism is shown in Fig.9.17b.

9.5 Isometric Projection of Prisms

Problem : *Draw the isometric view of a pentagonal prism of base 60mm side, axis 100mm long and resting on its base with a vertical face perpendicular to V.P.*

Construction (Fig. 9.18)

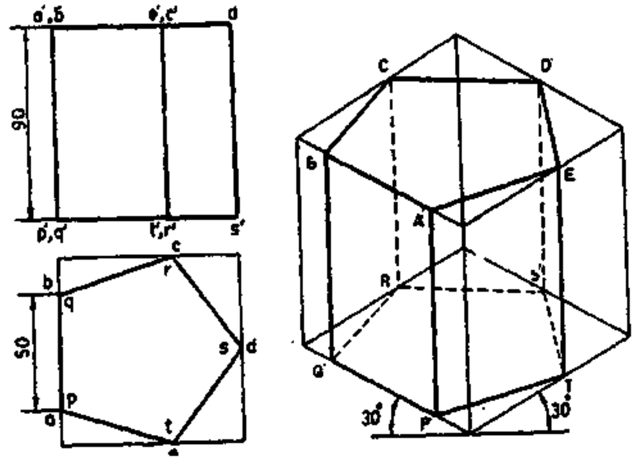


Fig. 9.18 Isometric Drawing of a Pentogonal Prism

1. The front and top views of the prism are shown in Fig.9.18a.
2. Enclose the prism in a rectangular box and draw the isometric view as shown in Fig.9.18b using the box method.

Problem : *A hexagonal prism of base of side 30mm and height 60mm is resting on its base on H.P. Draw the isometric drawing of the prism.*

Construction (Fig.9.19)

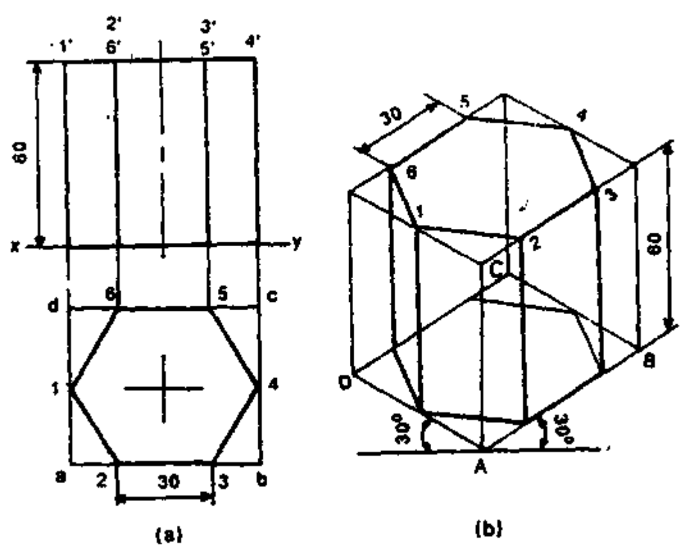


Fig. 9.19 Isometric Drawing of a Hexagonal Prism

1. Draw the orthographic views of the prism as shown in Fig.9.19a.
2. Enclose the views in a rectangle (ie the top view -base- and front views).
3. Determine the distances (off-sets) of the corners of the base from the edges of the box.
4. Join the points and danken the visible edges to get the isometric view.

9.6 Isometric Projection of Cylinder

Problem : *Make the isometric drawing of a cylinder of base diameter 20mm and axis 35mm long.*

Constructon (Fig. 9.20)

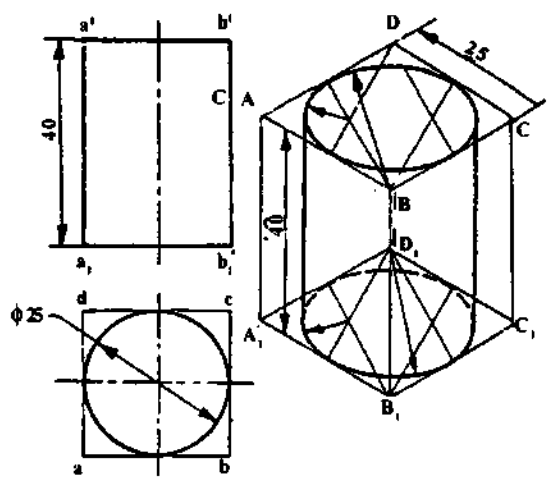


Fig. 9.20 Isometric Drawing of a Cylinder

1. Enclose the cylinder in a box and draw its isometric drawing.
2. Draw ellipses corresponding to the bottom and top bases by four centre method.
3. Join the bases by two common tangents.

9.7 Isometric Projection of Pyramid

Problem : *A pentagonal pyramid of side of base 30mm and height 70mm is resting with its base on H.P. Draw the isometric drawing of the pyramid.*

Construction (Fig. 9.21)

1. Draw the projections of the pyramind (Fig.9.21a).
2. Enclose the top view in a rectangle **abcde** and measure the off-sets of all the corners of the base and the vertex.
3. Draw the isometric view of the rectangle ABCD.
4. Using the off-sets locate the corners of the base 1,2, etc. and the vertex o.
5. Join o-1, o-2, o-3, etc. and draken the visible edges and obtain the required view.

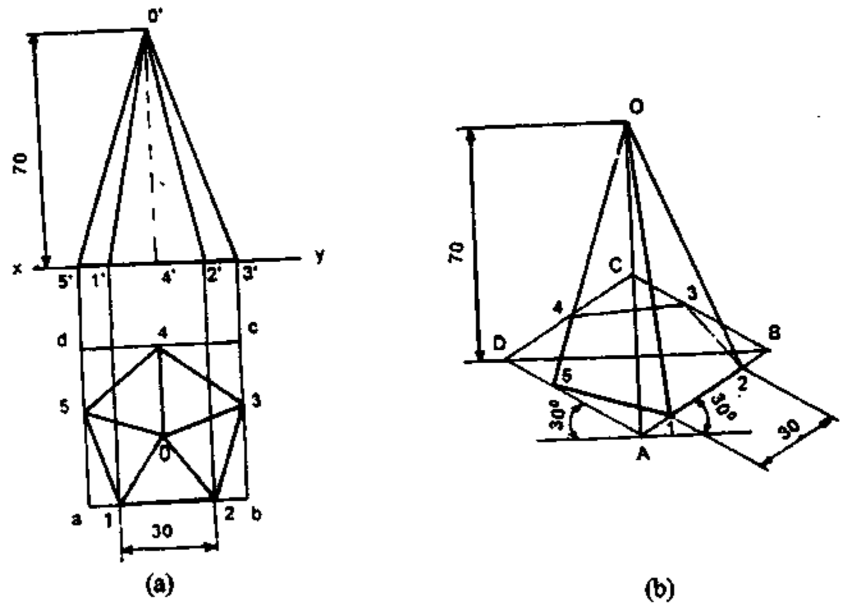


Fig. 9.21

9.8 Isometric Projection of Cone

Problem : *Draw the isometric drawing of a cone of base diameter 30mm and axis 50mm long.*

Construction (Fig.9.22) off-set method.

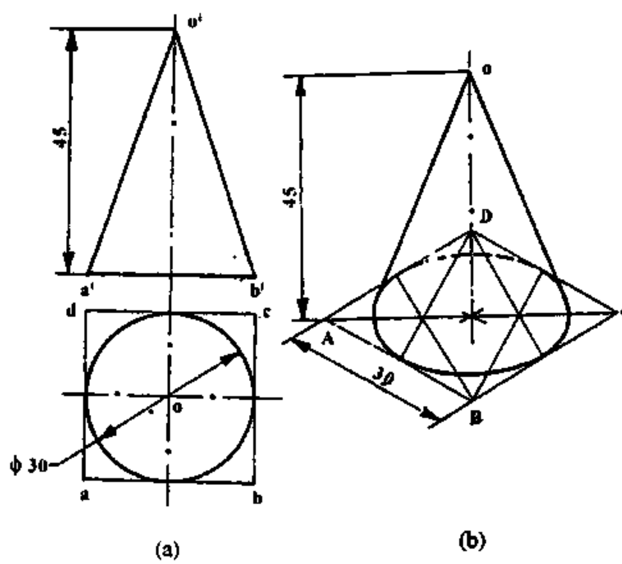


Fig. 9.22 Isometric Drawing of a Cone

1. Enclose the base of the cone in a square (9.22a).
2. Draw the ellipse corresponding to the circular base of the cone.
3. From the centre of the ellipse draw a vertical centre line and locate the apex at a height of 50mm.
4. Draw the two outer most generators from the apex to the ellipse and complete the drawing.

9.9 Isometric Projectin Truncated Cone

Problem : *A right circular cone of base diameter 60mm and height 75mm is cut by a plane making an angle of 30⁰ with the horizontal. The plane passes through the mid point of the axis. Draw the isometric view of the truncated solid.*

Construction (Fig.9.23)

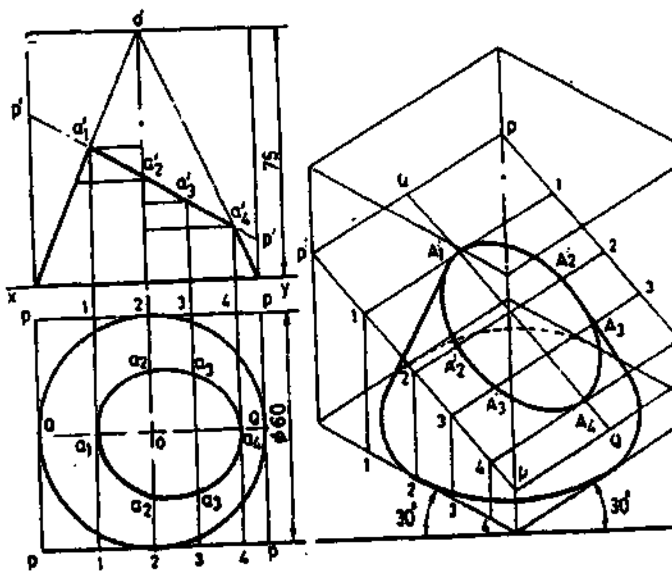


Fig. 9.23 Isometric view of a trauncated cone

1. Draw the front and top views of the cone and name the points (Fig.9.23a)
2. Draw a rectangular prism enclosing the complete pyramid.
3. Mark the plane containing the truncated surface of the pyramid. This plane intersects the box at PP in the front view and PPPP in the top view.
4. Draw the isometric view of the cone and mark the plane P P P P, containing the truncated surface of the pyramid as shown in Fig.9.23b.
5. Draw the isometric view of the base of the cone which is an ellipse.
6. It is evident from the top view that the truncated surface is symmetrical about the line qq. Hence mark the corresponding line Q Q in the isometric view.

7. Draw the line 1-1, 2-2, 3-3 and 4-4 passing through the points a_1, a_2,a_3, and a_4 in the top view. Mark the points 1,2,3,4 on the corresponding edge of the base of the cone and transfer these points to the plane P P P P by drawing verticals as shown.

8. Point a^1 is the point of intersection of the lines qq and 1-1 in the top view. The point A_1 corresonding to the point a_1 is the point of intersection of the lines Q Q and 1-1 in the isometric view. Hence mark the the point A_1 Point Q_0 lies on the line 2-2 in top view and its corresponding point in the isometric view is represented by A2 on the line 2-2 such that $2a_2 = 2A_2$. Similarly obtain the remaining points A_3 and AA. Join these points by a smooth curve to get the truncated surface which is an ellipse.

9. Draw the common tangents to the ellipse to get the completed truncated cone.

Examples

The orthographic projections and the isometric projections of some solids and machine components are shown from Fig.9.24 to 9.34.

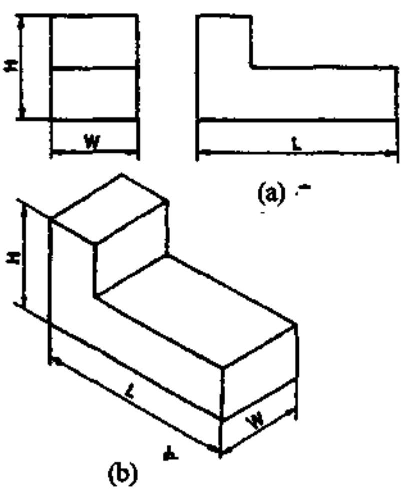


Fig. 9.24

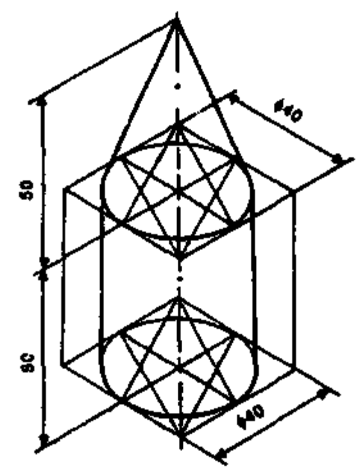


Fig. 9.25

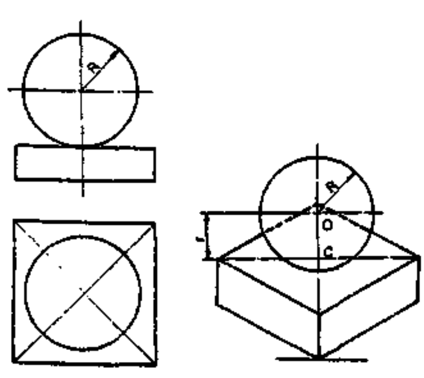


Fig. 9.26

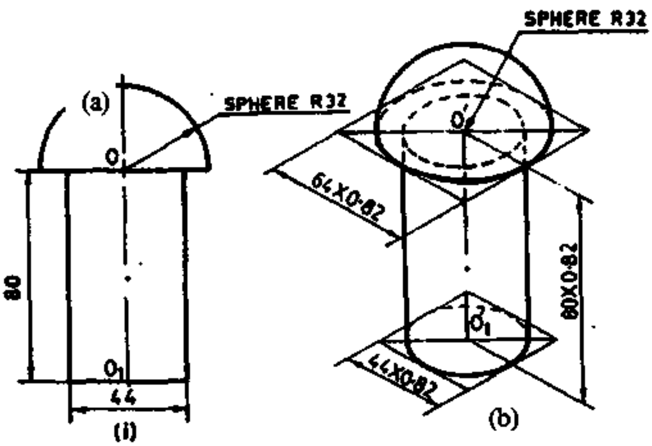


Fig. 9.27

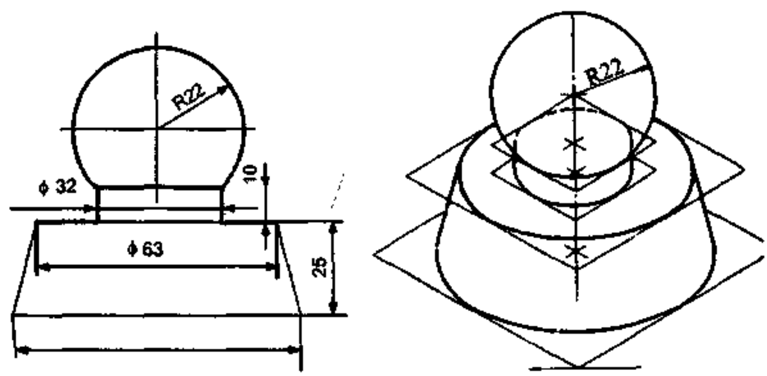


Fig. 9.28

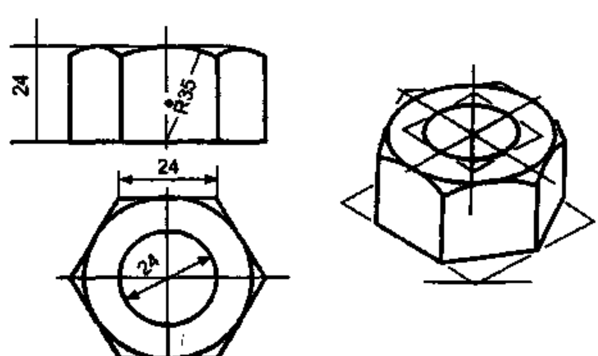


Fig. 9.29

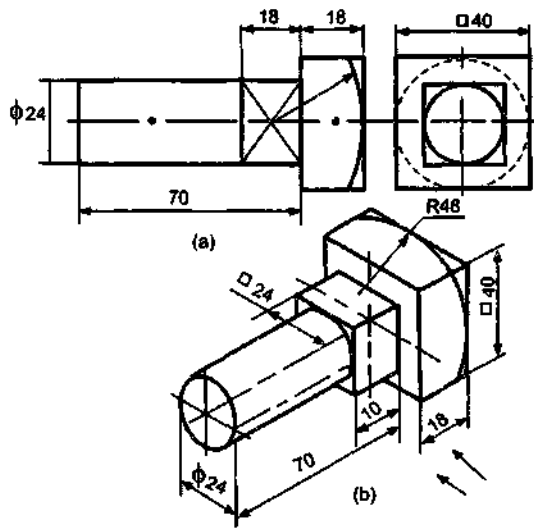


Fig. 9.30

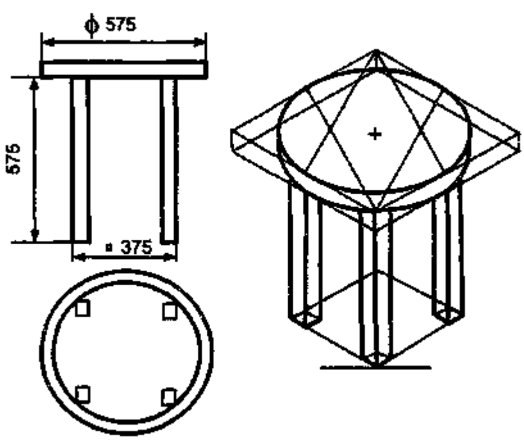


Fig. 9.31

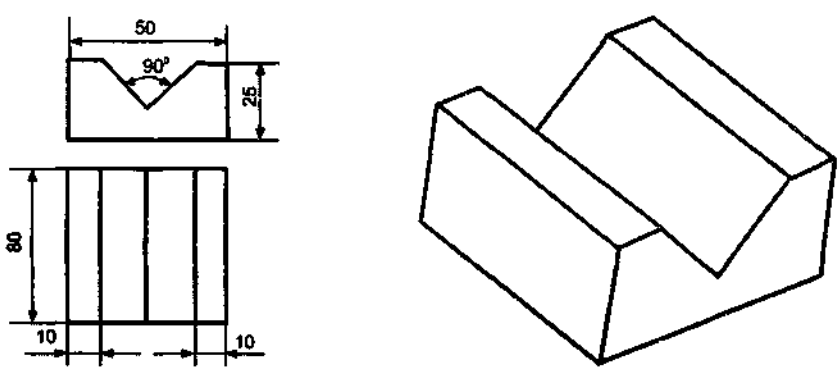


Fig. 9.32 V- Block

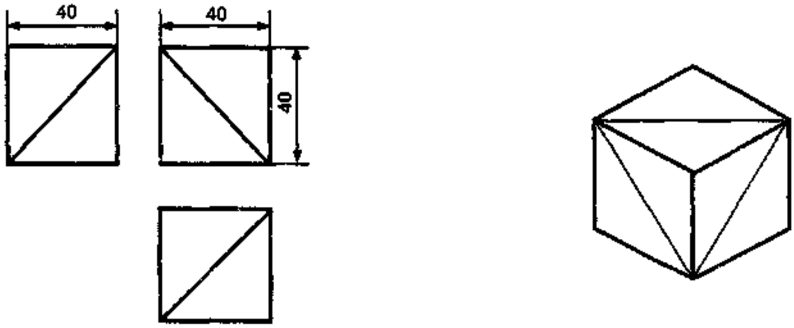


Fig. 9.33 Wedge Piece

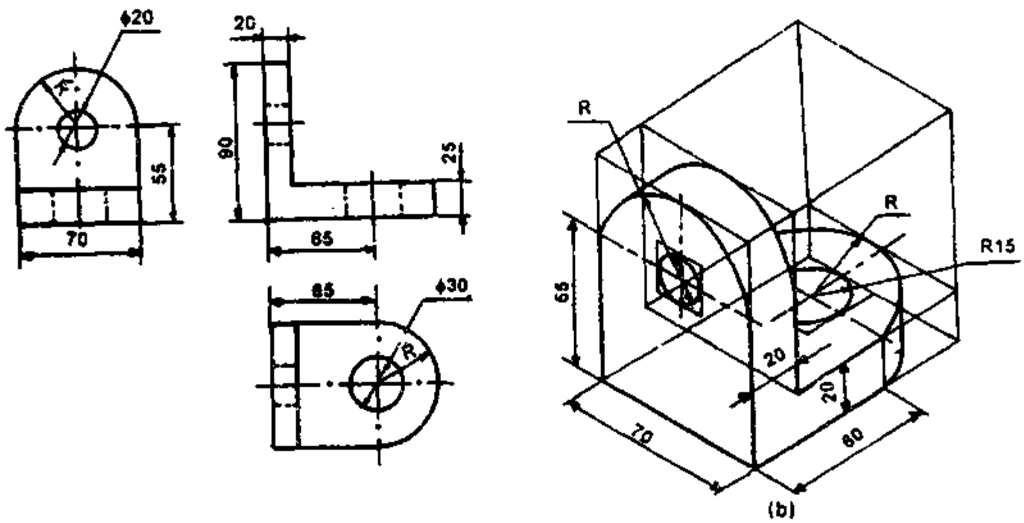


Fig. 9.34 Angle Plate

Problem : *The orthographic projections and their isometric drawings of a stool and a house are shown in figures 9.35 and 9.36.*

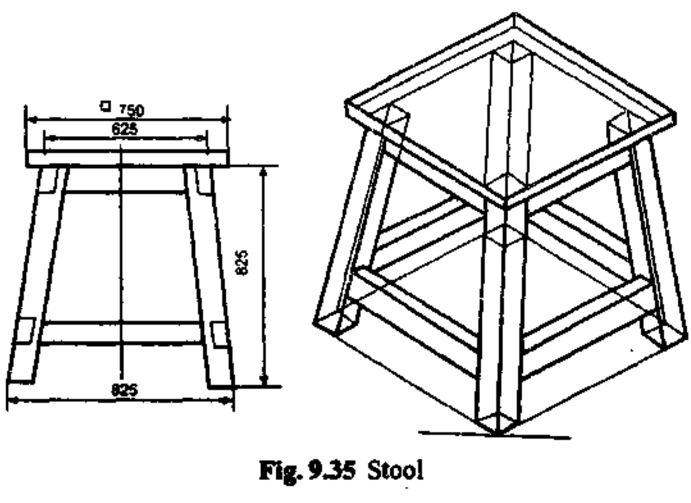


Fig. 9.35 Stool

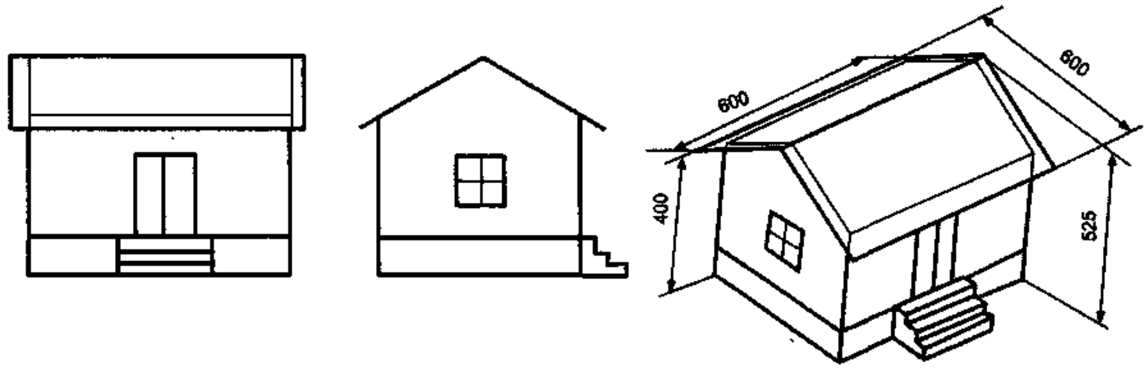


Fig. 9.36 House

CHAPTER 10

Oblique and Perspective Projections

10.1 Introduction

Pictorial projections are used for presenting ideas which may be easily understood by all without technical training. They show several faces of an object in one view, as it appears to the eye approximately. Among the pictorial projections, Isometric Projections are the most common as explained in previous chapter.

10.2 Oblique Projection

Oblique Projection of an object may be obtained by projecting the object with parallel projections that are oblique to the picture plane (Fig 10.1)

In oblique projection, the front face of the object appears in its true size and shape, as it is placed parallel to the picture plane. The receding lines representing the other two faces are usually drawn at 30°, 45° or 60° to the horizontal, 45° being the most common practice.

As in the case of isometric projection, in oblique projection also, all lines that are parallel on the object appear parallel on the drawing and vertical lines on the object appear vertical.

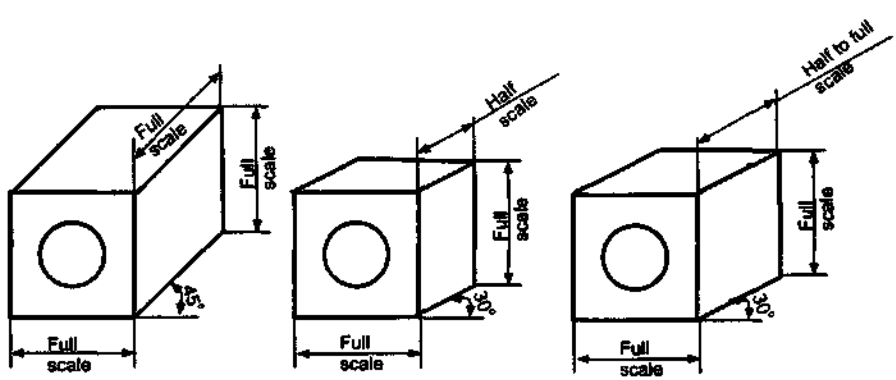


Fig. 10.1

10.3 Classification of Oblique Projection

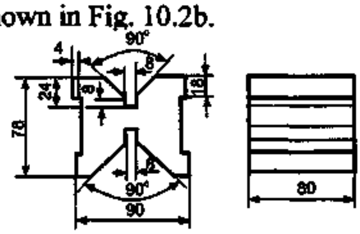
Oblique projections are classified as cavalier, cabinet and general, depending on the scale of measurement followed along the receding lines, as shown in Fig 10.1. The oblique projection shown in Fig 10.1a presents a distorted appearance to the eye. To reduce the amount of distortion and to have a more realistic appearance, the length of the receding lines are reduced as shown, either in Fig. 10.1b or as in Fig 10.1c. If the receding lines are measured to the true size, the projection is known as cavalier projection. If they are reduced to one half of their true lengths, the projection is called cabinet projection. In general oblique, the measurement along the receding lines vary from half to full size.

Note: Oblique projection has the following advantages over isometric drawing:

1. Circular or irregular features on the front face appear in their true shape.
2. Distortion may be reduced by fore-shortening the measurement along the receding axis, and.
3. A greater choice is permitted in the selection of the position of the axes.

10.4 Methods of Drawing Oblique Projection

The orthographic views of a V-block are shown in Fig. 10.2a. The stages in obtaining the oblique projection of the same are shown in Fig. 10.2b.



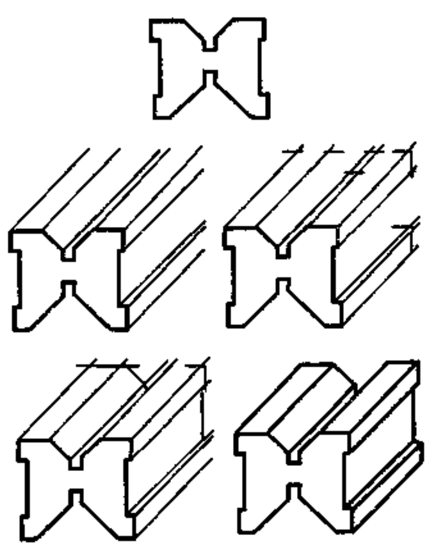


Fig. 10.2

1. After studying the views carefully, select the face that is either the most irregular one or the one with circular features if any. Make that face parallel to the picture plane to minimize distortion.
2. Draw the face to its true size and shape
3. Draw the receding lines through all the visible corners of the front face.
4. Mark the length of the object along the receding lines and join these in the order.
5. Add other features if any on the top and side faces.

10.4.1 Choice of Position of the Object

For selecting the position of an object for drawing the oblique projection, the rules below are followed.

1. Place the most irregular face or the one with circular features parallel to the picture plane. This, simplifies the construction and minimizes distortion.
2. Place the longest face parallel to the picture plane. This results in a more realistic and pleasing appearance of the drawing (Fig. 10.3)

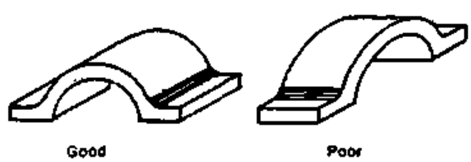


Fig. 10.3

10.4.2 Angles, Circles and Curves in Oblique Projection

As already mentioned, angles, circles and irregular curves on the surfaces, parallel to the picture plane, appear in true size and shape. However, When they are located on receding faces, the construction methods, similar to isometric drawing may be followed.

For example, th e method of representing a circle on an oblique face may be carried out by off-set method and the four centre method cannot be used. In case of cabinet oblique, the method and the result is the same as that of isometric drawing, since the angle of the receding axis can be the same as that of isometric axis. Figure 10.4 shows circles of same size in both isometric and oblique projections using 45° for the receding axis for oblique projections.

Curved features of all sorts on the receding faces or inclined surfaces may be plotted either by the off-set or co-ordinate methods as shown Fig 10.5

Figuers 10.6 to 10.8 show some examples of oblique projections.