

Fundamentals of Drafting - Oblique Projection

Objectives:



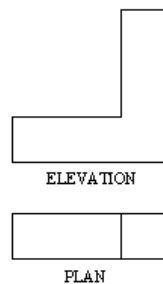
1. To distinguish between cavalier projection and cabinet projection.
2. To illustrate the principle of oblique projection for rectilinear objects and curved objects.
3. To draw oblique views from given orthographic projection drawings

Defining oblique projection

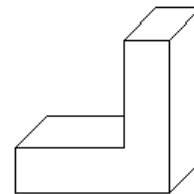
Oblique projection is a method of producing a pictorial view of an object. The projectors from the object to the projected plane are parallel but oblique to the plane, and the object is positioned with a face parallel to the plane.

Example

The object in orthographic projection

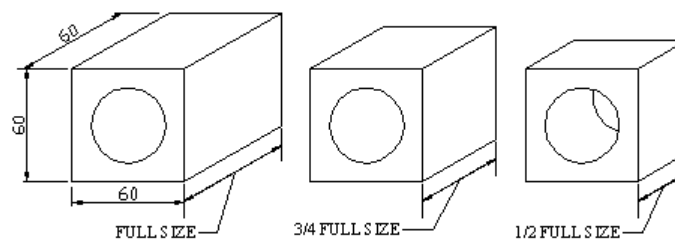


The object in oblique projection



Oblique projection with reduced scale

Considering a cube with the receding lines drawn with scales of full size, 3/4 full size and 1/2 full size respectively,



it is noted that the distortion is less apparent when the scale on the receding axis is reduced. The views drawn are still true projection whatever the scale used on the receding axis, since the scale may be changed merely by altering the angle which the projectors make with the projection plane.

Common scales used for the receding axis:

- i) full size, then the view so drawn is called **cavalier projection**
- ii) half full size, then the view so drawn is called **cabinet projection**
- iii) three quarter full size, no specific term is applied to

Positioning of view

When making an oblique projection, the following factors should be considered:

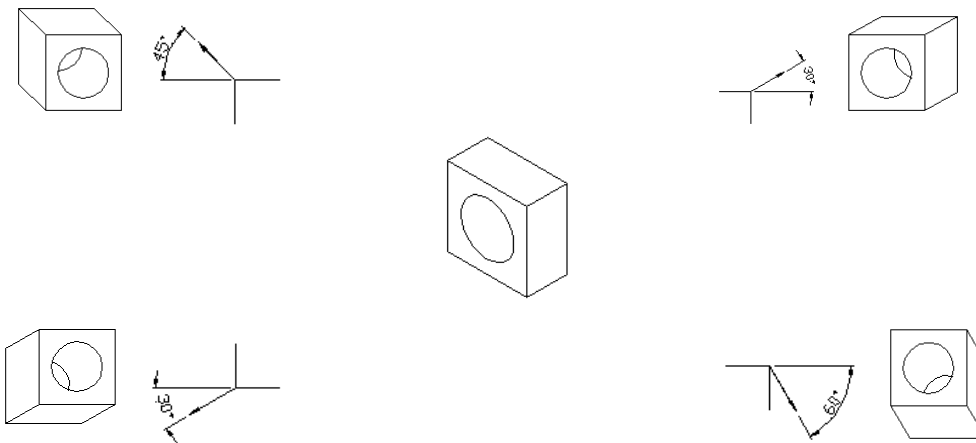
- i) faces of the object to be shown
- ii) keeping distortion to a minimum
- iii) saving time

General rules:

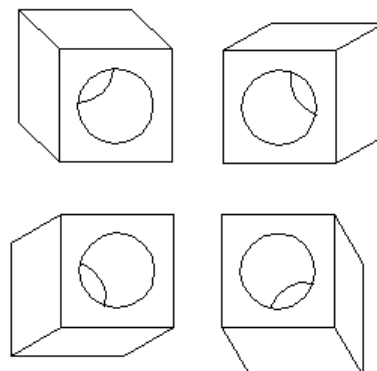
- i) variation of angle of receding axis to show the appropriate faces
- ii) placing the longest dimension of the object parallel to the projection plane
- iii) placing the face of the object containing circles or arcs parallel to the projection plane

Variation of angle of receding axis

Oblique projection of an object can be made showing different faces by altering the angle which the receding axis makes with the horizontal. The variation of angle of receding axis can be denoted by three axis: two are drawn at right angle while the third is at any angle to the horizontal.



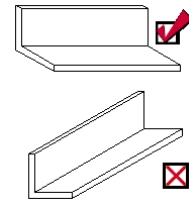
Comparing these variations of angle of receding axis, the face which parallel to the projection plane is always visible. The other two faces of the oblique projection depend on the variation of the angle of the receding axis.



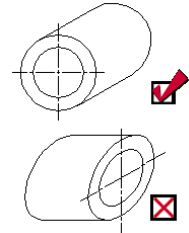
Minimising distortion in positioning

One of the ways to minimise distortion of an oblique view is to use a reduced scale for the receding lines. There are still two other methods that can be observed to avoid distortion:

- i) place the longest dimension of the object parallel to the projection plane
comparing two angle bars of equal length positioned differently



- ii) place the face of the object containing circles or arcs parallel to the projection plane
comparing two hollow cylinders of equal size positioned differently



When the above two methods are in conflict, it is recommended that the long objects take the precedence over the objects with circular cross-section.

Time factor in positioning of view

Objects with contours formed by circular arcs or irregular curves are to be positioned parallel to the projection plane. This can save drawing time because the circular curves can be drawn with a pair of compasses and the irregular curves can be produced in their true size and shape as in the orthographic view.

Basic drawing techniques

Similar to most pictorial projections, the general rules for constructing an oblique projection are:

- i) suitable only for relatively simple objects
- ii) hidden lines are omitted, unless they are necessary
- iii) centre lines are omitted, unless required for dimensioning

For beginners, it is advisable to follow the steps described below:

- i) visualise the objects
- ii) identify the positioning of the oblique projection by considering
 1. *variation of angle of receding axis*
 2. *minimising view distortion*
 3. *time factor in drawing the oblique view*
- iii) draw a box into which the object will just fit
- iv) build up the shape of the object inside the box

Drawing techniques

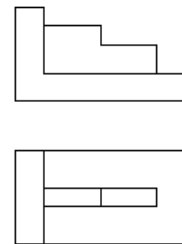
i) object drawn in cavalier projection with no angular features

Drawing techniques - Cavalier projection

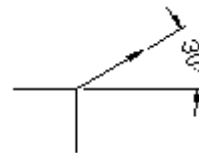
Cavalier projection refers to the use of full size scale, i.e. all dimensions of the oblique drawing needed to be scaled directly from the orthographic projection.

Example 1

The object in orthographic projection



Angle of receding axis given



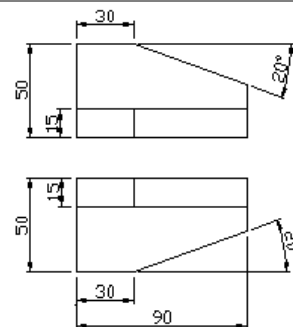
ii) object drawn in cabinet projection with angular features oblique to the projection plane

Drawing techniques - Cabinet projection

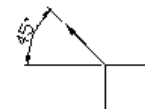
Cabinet projection refers to the use of a scale of half full size on the receding axis. An oblique drawing drawn in cabinet projection usually has the front face more important and complicated than its sides, and the depth is much less than the length or height. Angles not lying parallel to the projection plane will not appear as its true size in the oblique drawing. Additional dimension or ordinate defining the angle can be measured from the orthographic projection, halved it in Cabinet projection, and transferred it to the oblique drawing.

Example 2

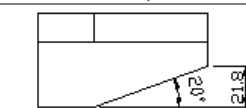
The object in orthographic projection



Angle of receding axis given



Constructing the angle lying not parallel to the projection plane and taking an additional dimension (halved it in Cabinet projection) defining the angle



additional dimension measured and halved, 10.9

iii) object with circular features drawn oblique to the projection plane

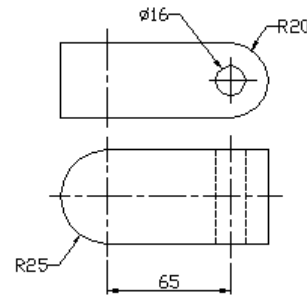
Drawing techniques - circular features

In oblique drawing, circles on the plane parallel to the projection plane are drawn directly with compasses. Circles on other planes will project as ellipse alike and can be constructed in two different methods: construction by ordinates (same as that used in isometric projection), or using an approximate circle construction.

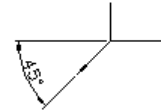
When Cabinet projection is used, *circles cannot be drawn using the approximate circle construction* and the ordinates laid off parallel to the receding axis should be *halved*.

Example 3

The object in First Angle orthographic projection



Angle of receding axis given

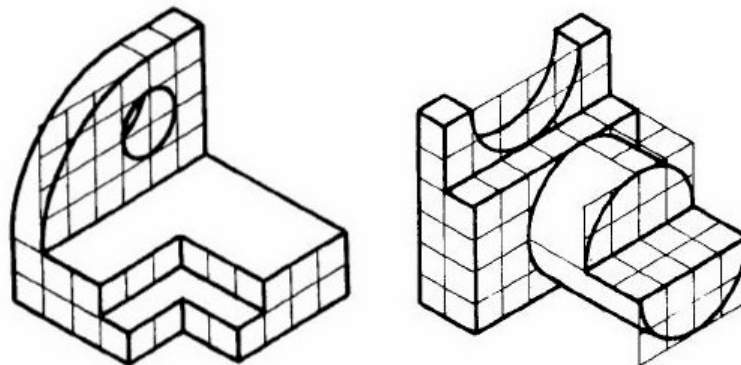


Drawing practice

Textbook
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Question No. 1 (Referring to Figure 4.31 and Figure 4.32)

Redraw in oblique projection the objects shown below (extracted from Figure 4.31 and Figure 4.32), remembering that measurements can be taken only along the basic axes. Each construction square represents a 10 mm measurement.

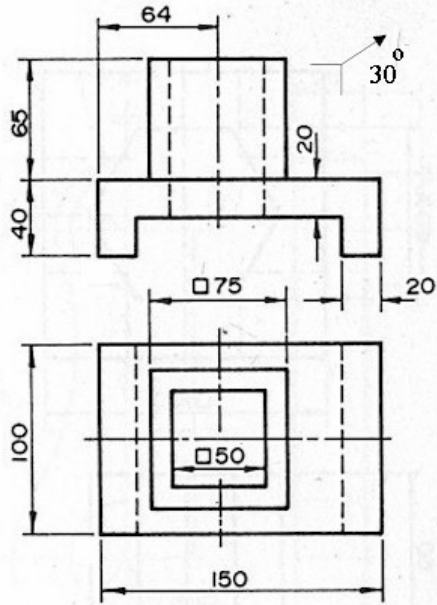


The angle of the receding axis and the scale used for the projection will be advised by your tutor.

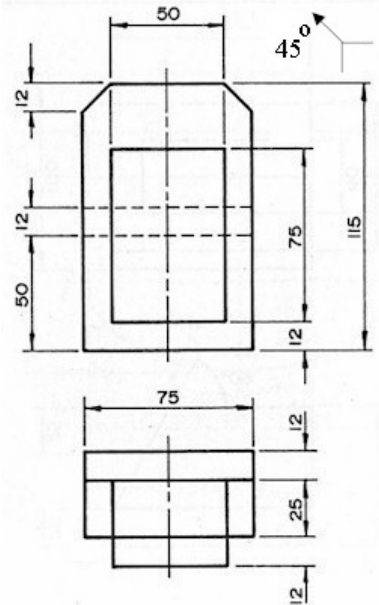
Assignment 5

No. 1 - 4 Referring to the objects shown below, Parts 1, 2 and 4 are drawn in First Angle projection while Part 3 is drawn in Third Angle projection. Make oblique drawings of the objects in Cavalier or Cabinet projection, position the drawing according to the receding axis given.

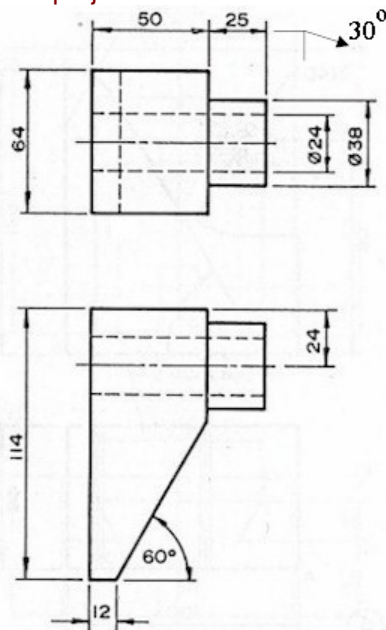
1. Cabinet projection



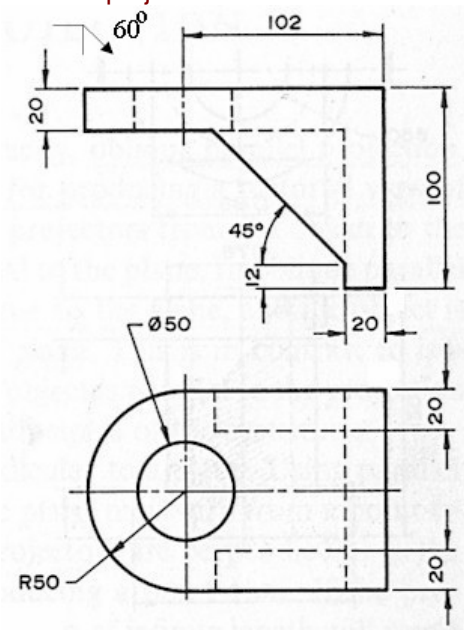
2. Cavalier projection



3. Cabinet projection



4. Cavalier projection



You may download the assignment sheet from the "ACTION MENU".