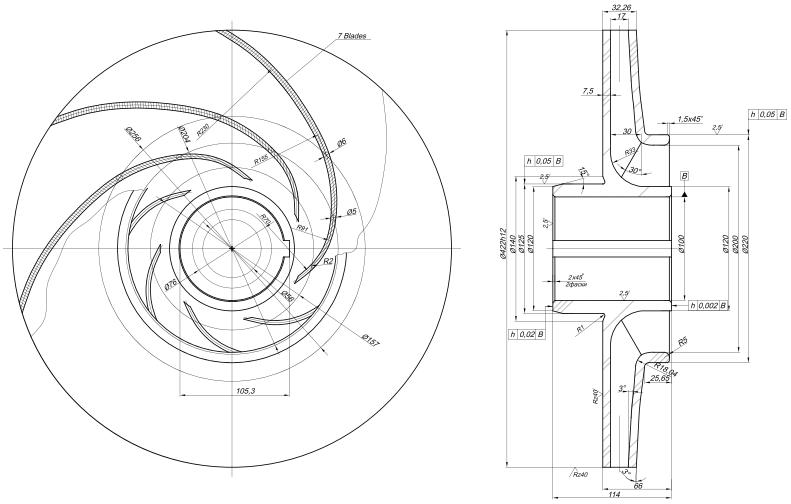
Proportional Views of Oblique Projections

DRAFTERS AND DESIGNERS create proportional views of oblique objects to quickly show a client the proposed design of an object. Proportional views are useful and quick drawings to produce front, top, side, and receding surfaces. To create an oblique projection, determine the most important views, the type of projection that works best, and the appropriate scale.



Objective:

Create proportional views of oblique projections.

Key Terms:

front surface
horizontal axis
proportional views
receding axis
receding surfaces
side surfaces
top surface
vertical axis

Understanding Proportional Views

Proportion is the relationship between different items with respect to size, quantity, degree, or number. It is ratio, balance, and symmetry. Proportion uses a mathematical factor with a constant ratio. Technical drawings are always produced to a scale (a proportion between two sets of dimensions) between the drawing and the original object. The scale factor is a proportion of the actual size of the object.

MATHEMATICAL FACTORS

Proportional views are perspectives that use a mathematical factor with a constant ratio to illustrate an object while minimizing the distortion when it is illustrated. Creating a realistic image is part of the goal. Some objects are drawn larger than their actual size, and others are drawn smaller than their actual size due to space limitations on paper or for practical purposes (e.g., actual object is miniscule or enormous).

OBLIQUE PROJECTION

Some basic considerations must be resolved before you create oblique proportional views. First, you must resolve the scale. Use a scale-reducing proportion if the part is large (e.g., 1:10 scale) or a scale-increasing proportion if the part is very small (e.g., a 10:1 scale). Next, determine the type of oblique projection to use. Two common types are cavalier and cabinet projections. Cavalier projection uses an equal proportional scale for the front, top, and width (depth). It is used for common objects that are neither excessively long nor excessively deep. Cabinet projection reduces the width (or depth) by a proportional scale factor, typically by one-half. A three-fourths proportional scale can be used to reduce the width. The reduction is used to limit distortion in very long or deep objects.

VIEW POSITION

Finally, you need to determine the view position for each proportional drawing. The **front surface** is (should always be) a face of true size and shape; it is the main view of the object. Front surface views are not shortened as a top or side view in a cabinet projection would be and are not drawn at an angle. The front view is produced perpendicular to the surface. Usually, you want to draw the longest side or the most complex side in the front view. The point of view of the user (you) is considered to determine the front view.

PURPOSE

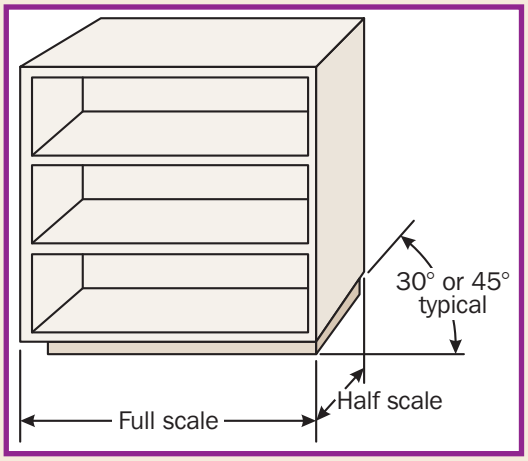
The top surface and the side surfaces are receding surfaces and are determined by the drawing's purpose. The **top surface** is the face considered the top of the object and recedes back into space at an angle from the front surface. The **side surfaces** are faces on the left or right side of the object and recede back into space at an angle from the front surface.

Remember, you can draw the receding surfaces either in the same proportion (or scale) as the front or in a smaller proportion. **Receding surfaces** are drawn at the same proportion as the front surface in cavalier drawings. Receding surfaces are reduced from the front proportion (or scale) in cabinet drawings.

FURTHER EXPLORATION...

ONLINE CONNECTION: How to Draw a Cabinet Oblique

Drawing a cabinet oblique may appear a bit harder than a cavalier oblique. However, the only thing you must remember is to make all the depth lines for a cabinet oblique at the same shortened scale. With some practice, the process becomes easier. To learn more about how to draw a cabinet oblique, view relevant videos on YouTube.



A cabinet oblique is a common projection choice for deep objects.

CABINET AND CAVALIER PROJECTIONS

The most complex or longest surface typically determines your choice of projection type. Also, the side with the largest dimension or the most complex surface is usually selected as the front surface. Use a cabinet projection when the longest side is not the front surface. This helps to avoid the appearance of distortion.

Horizontal Axis

The **horizontal axis** is the length of the front view in an oblique projection. Circles and arcs in the front plane are parallel to the front plane and are drawn to true size and shape. If the longest surface is drawn along a receding axis, the oblique projection should be a cabinet with a foreshortened distance.

Vertical Axis

The **vertical axis** is height in an oblique projection. The vertical center lines are parallel to the vertical axis. All the vertical distances are true size in all projections.

Receding Axis

The receding surface is located along the receding axis and is slightly distorted from the actual object. Use the common or natural front view of the object for the front surface and to determine which surfaces are receding. When beginning to draw the oblique, draw all the lines lightly on paper. These are the construction lines. You can darken them to represent actual visible edges of the object.

Center Lines

Center lines locate the centers for circles and arcs. They are drawn at the center of the circle or arc to locate exact placement and should be drawn thin and dark on your paper. Make short dashes that cross the center line at the actual center point of the circle or arc.

Not Shown

Some lines are not shown in oblique drawings. Any edges that are not visible from the view (or angle of the drawing) are not drawn. Again, use the front view to show the most important details. Dimensions and extension lines may be used to clarify the drawing. Dimension lines are always parallel to the lines that they measure. Then extension lines project from the objects perpendicular to the dimension lines. The dimensions you notate are the actual dimensions of the object, not the scaled dimensions. So if the real dimensions are 8 inches (even though you may have drawn it at 4 inches), you write 8 inches on the drawing.

Three Axes of an Oblique Drawing

On a square grid paper:

- The lines that run from the left to the right (or right to left) are the horizontal lines that identify the horizontal axis. All horizontal lines are drawn at their true length in oblique drawings. Horizontal lines indicate the top and bottom edges or edges parallel to the top and bottom edges.
- The lines that run from the top to the bottom (or the bottom to the top) are the vertical lines that identify the vertical axis. All vertical lines are drawn at their true length in oblique drawings. Vertical lines indicate the left or the right edges or edges parallel to the left or right edge.
- A line drawn diagonally between the corners of the square grid creates a **receding axis**. All lines drawn at an angle are located on the receding axis. You must use the same angle for all parallel receding lines. In cavalier oblique drawings, the receding axis lines are drawn in true length. In cabinet oblique drawings, the receding axis lines are usually drawn at one-half their true length. You can use scales other than one-

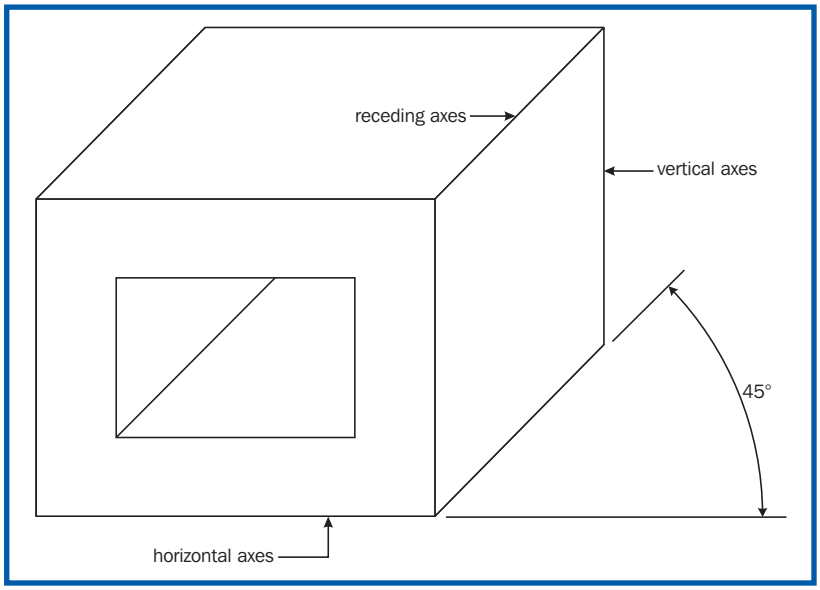


FIGURE 1. The three axes of an oblique drawing are horizontal, vertical, and receding.

half. The scale is determined by which scale creates the least amount of distortion. Commonly, the receding axis is drawn at 45 degrees off the horizontal axis, but it can be drawn at other angles. Another common angle is 30 degrees off the horizontal; you can adjust the angle if necessary to help the appearance.

Summary:

Proportion uses a mathematical factor with a constant ratio. Proportional views attempt to minimize distortion in illustrations. You must resolve the scale and determine which type of projection to use for all oblique projections. The front surface is the main view of the object and is drawn in true size.

Usually the most complex or longest surface determines the type of projection used. The side with the largest dimension or the most complex surface is usually the front surface. In oblique projections, the horizontal axis represents the length of the front view, and the vertical axis represents the height. Use center lines when you draw circles or arcs.

The three axes of an oblique drawing are horizontal, vertical, and receding. Horizontal lines run from the left to the right (or right to left) and identify the horizontal axis. Vertical lines run from the top to the bottom (or the bottom to the top) and identify the vertical axis. The receding axis line is drawn at an angle, and you must use the same angle for all parallel receding lines.

Checking Your Knowledge:

1. How is a receding axis identified?
2. What does the vertical axis represent?
3. What does the horizontal axis represent?
4. Describe a cavalier oblique drawing.
5. Describe a cabinet oblique drawing.

Expanding Your Knowledge:

Many tutorials—books and videos—demonstrate ways to create oblique proportional projections. Stop by your local or school library to check out some books and videos. You can quickly develop your skills by practicing some of the examples in the tutorials. To view other tutorials, use online sources.

Web Links:

Cabinet Oblique

http://www.youtube.com/watch?v=OlUqDs7LmEg

Oblique Cavalier

http://www.youtube.com/watch?v=_BRv5Jz6Fcs

Oblique Axes

http://www.engineeringessentials.com/ege/pic/pic_page6.htm

Oblique Drawings

http://www.youtube.com/watch?v=1XApthNElAA