

ISOMETRIC DRAWINGS

Introduction

Isometric drawings are a type of pictorial drawings that show the three principal dimensions of an object in one view. The principal dimensions are the limits of size for the object along the three principal directions. Pictorial drawings consist of visible object faces and the features lying on the faces with the internal features of the object largely hidden from view. They tend to present images of objects in a form that mimics what the human eye would see naturally. Pictorial drawings are easy to understand since the images shown bear resemblance to the real or imagined object. Non-technical personnel can interpret them because they are generally easy to understand. Pictorial drawings are excellent starting point in visualization and design and are often used to supplement multiview drawings. Hidden lines are usually omitted in pictorial drawings, except where they aid clarity.

An isometric drawing is one of three types of axonometric drawings they are created based on parallel projection technique. The other two types of axonometric drawings are dimetric and trimetric drawings. In isometric drawings, the three principal axes make equal angles with the image plane. In dimetric drawing, two of the three principal axes make equal angles with the image plane while in trimetric drawing; the three principal axes make different angles with the image plane. Isometric drawings are the most popular.

Isometric Projection and Scale

An isometric projection is a representation of a view of an object at $35^{\circ} 16'$ elevation and 45° azimuth. The principal axes of projection are obtained by rotating a cube through 45° about a vertical axis, then tilting it downward at $35^{\circ} 16'$ (35.27°) as shown in Fig. 1a. A downward tilt of the cube shows the top face while an upward tilt shows the bottom face. The 45° rotation is measured on a horizontal plane while the $35^{\circ} 16'$ angle is measured on a vertical plane. The combined rotations make the top diagonal of the cube to appear as a point in the front view. The nearest edge of the cube to the viewer appears vertical in the isometric view. The two receding axes project from the vertical at 120° on the left and right sides of the vertical line as shown in Fig. 1b. The three principal axes are therefore inclined at 120° and are parallel to the cube edges in the isometric view. These three principal axes are known as isometric axes. The two receding axes are inclined at 30° to the horizontal line while the vertical axis is at 90° to the horizontal line. The three visible faces of the cube are on three planes called isometric planes or isoplanes. The lines in an object parallel to the isometric axes are referred to as isometric lines while lines not parallel to them are known as non-isometric lines. Isometric projection is not the most pleasant to the human eye but it is easy to draw and dimension.

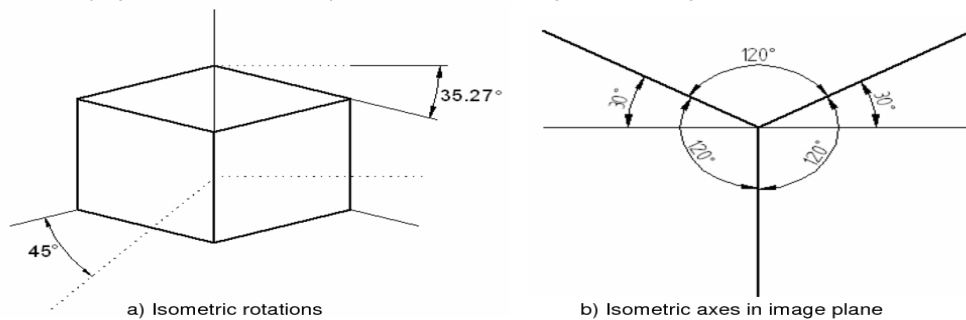


Fig. 1 Isometric projection

The regular axis is usually inclined at 45° but the receding axes in an isometric projection are inclined at 30° to the horizontal. Hence there is a difference in orientation between the receding isometric axis and the regular axis. These orientations of axes are shown in Fig. 2, where a measurement of 10 units along the regular axis projects to 8.16 units on the isometric axis. Thus one unit of measurement on the regular axis is equal to 0.816 on the isometric scale. This means that a regular length of one unit must be scaled to 0.816 units in an isometric projection.