Chapter 7
Pictorials

Topics
Exercises
Pictorials: Topics

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Pictorials

Summary
Summary

What will we learn in Chapter 7?
→ How to create isometric pictorials.

Key points
→ A pictorial is a pseudo 3-D drawing.
→ They are used to aid visualization.
Pictorials

7.1) Pictorials Introduction
Introduction

- Pictorials are pseudo 3-D drawings.

Drawn in 2-D. Looks 3-D.
Introduction

- Pictorials are often used to help the print reader visualize the part.
Introduction

- Pictorials are very effective at illustrating assemblies.
Introduction

➢ The two most common types of pictorials are:
→ Isometric
→ Oblique
Pictorials

7.2) Isometric Pictorial Axes
Isometric Pictorial Axes

- Isometric pictorials are drawn in a coordinate system where the axes are 60 degrees apart.
The linear features on or parallel to these three axes are drawn at 80% of full scale to represent true size.
Isometric Pictorials Scale

Isometric pictorials may be drawn at any scale as long as the scale is uniform on all axes.

Length = 80% of full scale

30°

Isometric axes

Height

Depth

60°

60°

Width
7.3) Drawing Linear Features
Drawing Linear Features

How do we draw an isometric pictorial?
Drawing Linear Features

Step 1) Draw the three construction lines that represent the isometric axes.
Drawing Linear Features

Step 2) Draw a defining box.

→ Sides = maximum height, width and depth dimensions of the object.

![Diagram showing steps to draw a defining box for linear features.]
Drawing Linear Features
Step 3) Draw the lines of the object that are parallel to the axes.
Step 4) Add the lines of the object that are not parallel to one of the axes.
Drawing Linear Features

Step 5) Erase or remove the construction lines.

Step 6) If the drawing is produced in a 2-D drawing package, it should be scaled by 80%.
Exercise 7-1

Creating an Isometric Pictorial 1
Exercise 7-1

Create a **half scale** isometric pictorial of the following object. (Use a pencil.)
Step 1) Draw three construction lines that represent the isometric axes. (Done)

The grid spacing is 0.25 inch.
Step 2) Draw a box whose sides are parallel to the three axes and whose lengths are $\frac{1}{2}$ the maximum height, width and depth dimension of the object.
Step 3) Draw the lines of the object that are parallel to the axes.
Step 4) The lines of the object that are not parallel to one of the axes are added by connecting the ends of existing lines.
Step 4) Erase or remove the construction lines.
7.4) Drawing Circles and Radii
Drawing Circles and Radii

Circular features of an object appear as ellipses on an isometric pictorial.
Drawing Circles and Radii

Step 1) Draw the linear features of the object using the procedure previously described.
Step 2) Draw a box whose diagonals meet at the center of the circle and the length of the sides are equal to the circle’s diameter.
Drawing Circles and Radii
Step 3) Draw an ellipse in the box whose major axis is aligned with the long diagonal of the box.

→ The ellipses touch the box at the midpoint of its sides.
Circles in Isometric

- Circles appear as ellipses when drawn in an isometric sketch.
- To sketch an isometric circle, locate the center and then sketch the box that would enclose the circular shape. Draw the ellipse tangent to the lines of the box.
Four Center Ellipses

To sketch an isometric circle, proceed as in the following figures.

1. Determine the 4 centers and the use the compass to construct the ellipse.

   **4 center ellipses**

   - Sketch rhombus 1, 2, 3, 4 on the pictorial.
   - (Use correct radius for each ellipse).
   - Fig 1:
     - Locate mid-point for each side A, B, C, D.
     - Sketch line from obtuse angle to opposite mid-point. (2 lines).
   - Fig 2:
     - Sketch a small arc at corner 1 and 3 using intersection of 2-A : 4-B and 2-D : 4-C.
   - Fig 3:
     - Sketch long arcs using 4 and 2 as centers.

Similar constructions for top or side ellipses.
Circles in Isometric
Circles in Isometric
Circles in Isometric
Drawing Circles and Radii

- The same procedure is used for creating **radii** except that the unwanted part of the ellipse is erased or trimmed.
Pictorials

7.5) Drawing Cylinders
Drawing Cylinders

Drawing cylinders in an isometric pictorial is just a matter of drawing two circles and adding some connecting lines.
Drawing Cylinders

Step 1) Draw a defining box.

→ The height is equal to the height of the cylinder and the width and depth are equal to the diameter of the cylinder.
Step 2) Draw diagonals and ellipses in boxes that define the beginning and end of the cylinder.
Step 3) Draw two lines that connect the two ellipses.

→ The lines will start and end at the intersection between the ellipse and the major axis diagonal.
Drawing Cylinders

Step 4) Erase all construction lines and any lines that fall behind the cylinder.
Exercise 7-2

Creating an isometric pictorial 2
Exercise 7-2

Create a full scale isometric pictorial of the following object. The grid spacing is 10 mm.
Step 1) Draw the linear features of the object using the procedure previously described.
Step 2) Draw a box whose diagonals meet at the center of the radius and the length of the sides are equal to the 2R.
Step 3) Draw an ellipse in the box whose major axis is aligned with the long diagonal of the box. The ellipses touch the box at the midpoint of its sides.
Repeat for the bottom radius.
Use a vertical line to connect the ellipses.
Draw the defining boxes for the cylindrical feature on the top of the part.
Draw and connect the ellipses.
Draw the ellipse that represents the thru hole.
Draw the defining box and cylinder that defines the counterbore.
Draw the ellipse representing the drill. Only a small piece shows.
Step 4) Erase all construction and unwanted lines.
Pictorials

7.6) Oblique Pictorial Overview
Oblique Pictorials

What differences can you see?

Oblique Pictorial

Isometric Pictorial
In the oblique pictorials coordinate system only one axes is at an angle. The angle may range between 0 and 90 degrees; however, the most commonly used angle is 45 degrees.
Oblique Pictorials

- The features drawn on the plane defined by the vertical and horizontal axes are drawn at full scale and true shape.
Oblique Pictorials

- The linear features drawn on the angled axis may be full scale (cavalier projection) or may be drawn foreshortened. 
  → The most common, is half scale (cabinet projection).
Pictorials

The End