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STRATEGIES FOR CREATING MULTIVIEWS FROM PICTORIALS

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ABSTRACT:

A view of an object (actual or imagined) as it would be seen by an observer who looks at the object either in a chosen direction or from a selected point of view. Pictorial sketches often are more readily made and more clearly understood than are front, top, and side views of an object.

KEYWORDS: multi view, three-dimensional, pictorials, sketching techniques, isometric view, corresponding edges

INTRODUCTION:

To build up this aptitude, a few standards (and a lot of training) are required. Furthermore, you must recall that a pictorial picture contains 3-D data that must be extricated from the way the pictorial looks in a 2-D medium. A multiview portrayal is just an alternate, more exact method of introducing this data.

Few people think of an object in terms of its multiview representation [1]. If you are thinking about a pencil, for example, you probably do not imagine it in terms of a front, top, and side view. The image you have is likely to be three-dimensional, perhaps as a pictorial of some sort. Transforming that image into its multiview representation requires some skill. To develop this skill, some rules (and a great deal of practice) are required. And you need to remember that a pictorial image contains 3-D information that must be extracted from the way the pictorial looks in a 2-D medium. A multiview representation is merely a different, more accurate way of presenting this information. Exercises in converting pictorials to multiviews and multiviews to pictorials will help you develop practical skills, as well as improve visualization skills. Engineers should be able to quickly visualize 3-D objects from multiview drawings and quickly create multiview drawings for proposed or existing 3-D objects. You can begin developing these skills using the following step-by-step procedures. For the first few examples that follow, sketching techniques will be used because sketching, as opposed to drawing with instruments or CAD, is an excellent method for developing visualization skills. Later examples in this section will use more formal graphics so the drawings can be more clearly detailed.

MAIN PART:

Transforming a pictorial image into a multiview drawing usually involves keeping track of the vertices, edges, or surfaces of the object [2]. Regardless of which elements are tracked, the process starts the same way. An eight-step process is used to create the drawing. The first two steps are as follows:

Step 1: On the pictorial, specify the viewing directions that you intend to create (e.g., front, top, right side, etc.) and create a sheet with areas reserved (and labeled) for the appropriate orthogonal views based on the projection method used.

Step 2: Find the maximum size of the object in each of the three directions of your coordinate system and in each view, sketch the limits of a rectilinear box that will contain only the entire object in all three directions.

A typical problem of multiview creation is shown in Figure 1. An isometric image of an object is presented, and the goal is to create the necessary orthogonal views to specify all its features completely. Assume that all the hidden surfaces are flat and that there are no hidden features.

This object is basic, considering all its surfaces are perpendicular or parallel to each other. When this is the case, the edges of all the surfaces will appear to be horizontal or vertical in all the orthogonal views created. The true length of each feature must be shown in at least one view. For convenience in measuring the lengths of the edges on the object, an isometric grid has been placed on the isometric view. Placed on each of the orthogonal views is a corresponding rectangular grid that in each plane direction represents the same grid spacing as the isometric grid, as shown in Figure 2. The edge lengths as seen in the isometric view then can be conveniently transferred to the corresponding edges on the orthogonal views.

As an alternative to creating grids, you also can measure the edges in the isometric view using drafting instruments or CAD and transfer these measurements to the corresponding edges on the orthogonal views [3]. When the edge lengths are otherwise specified, such as with notes, the specified edge lengths should be used in the orthogonal views. Carefully note the viewing directions for each view on the orthogonal views and the pictorial and make sure these directions are consistent.
You need to make clear from which point to which other point you are measuring any line in the pictorial —that is, the direction of your measurement—so you can incor-porate the same information (direction of point-to-point measurement) in any of the orthogonal views.

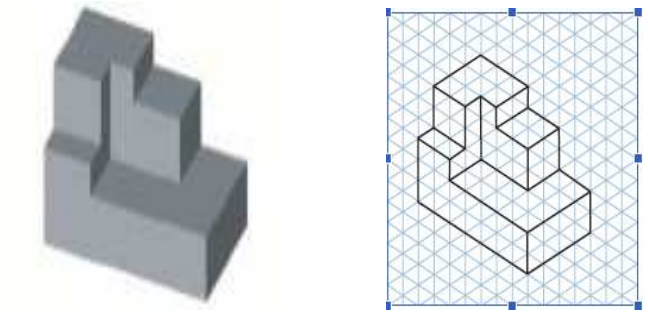

FIGURE 1. How would you create a multiview drawing of this object? The isometric grid is to be used for sizing.

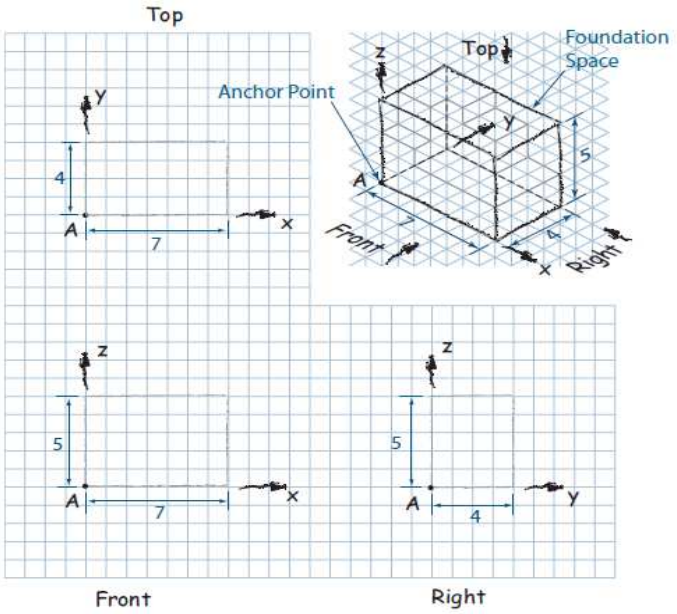

FIGURE 2. Defining the foundation space, axes, viewing, directions, and anchor point A.

For example, in Figure 2, as you measure from one point to another in the pictorial, you must be able to follow the same direction of measurement in the orthogonal views. For this purpose, it may be convenient to use a set of coordinate axes initially to help you with the directions of measurements until you become more familiar with the directions in the orthogonal views in your drawings. In Figure 10.28, a right-handed Cartesian coordinate system is placed with the origin coincident to one of the corners of the object in the pictorial. This same coordinate system is placed in all three orthogonal views. Make sure you maintain

alignment of the origin of the coordinate system in each of the three views (step 1).

For this point to be in the same place in each view, it must be aligned on a vertical line between the top and front views and on a horizontal line between the front and right-side views. The top view looks straight onto the xy plane, so the z-axis points out of the page. The front view looks straight onto the xz plane, so the y-axis points into the page. The right-side view looks straight onto the yz plane, so the x-axis points out of the page.

The next step in creating the multiview drawing is to mark the limit of the size of the object in all three directions (step 2). These limits define a foundation space, which represents the rectilinear limits occupied by the object in each view. Although the foundation space is not the outline of the object itself, it helps you visualize the object in each view by delineating the volume that the object can and cannot occupy. If in the process of creating the orthogonal views you start creating lines or points for the object outside its foundation space, you will know you are doing something wrong. The foundation space for the object in Figure 1. is shown in Figure 2. Examine the foundation space on the pictorial. It extends 7 units in the x-direction, 4 units in the y-direction, and 5 units in the z-direction. Make sure these limits are marked off properly in each of the orthogonal views.

Once the foundation space is defined, there are different ways you can proceed. Students who have practiced and completed many problems in drawing orthogonal views from pictorials are able to proceed intuitively. Most beginners need a little help getting started before intuition kicks in.

One way of continuing beyond step 2 is to label each vertex on the pictorial as a point, keep track of each point on every orthogonal view, and then connect the points in the views to form an image of the object in these views. (Keep in mind that all of an object's points may not be visible on the pictorial.) This process is called the point tracking method. Here is how it works.

After you have established the viewing directions and foundation volume in step 1 and step 2, you are ready to follow the next six steps to complete the drawing. The general procedure is outlined below. Each step is explained in detail in the paragraphs that follow.

Step 3: Define an anchor point.
Step 4: Locate a vertex adjacent to the anchor point and draw that edge.
Step 5: Successively locate other vertices and draw the edges between those vertices.
Step 6: Convert hidden lines.
Step 7: Add internal features.
Step 8: Check model validity.

A point on the object must be selected as an anchor point (step 3). There is an anchor point in each of the orthogonal views, and it is the same point in space as is seen from the different views. An anchor point is a point whose location you feel certain you can identify on each of the orthogonal views. Such a point is commonly a vertex located on one of the bottom corners of the object. Call this point A; then locate and label the point on each of the orthogonal views and on the pictorial. Remember, point A in views that are left or right of each other must be aligned horizontally; and in views that are above or below each other each, point A must be aligned vertically. In this case, but not necessarily in all cases, point A also is the origin of the coordinate axes.

Select another point on the pictorial (step 4) near point A, which can be located by traveling along one edge of the object, as shown in Figure 3. Call this point B; then locate it with respect to point A in each orthogonal view. You do this by noting on the pictorial the direction and distance from point A to point B. From the measurements on the pictorial, you can see that to reach point B from point A, you need to travel 7 units in the positive x-direction. In the top

view, the location for point B is 7 units to the right on a horizontal line from point A, which is the x-axis in that viewing plane. In the front view, the location of B also is 7 units to the right on a horizontal line from point A, which is the x-axis in that viewing plane. In the right-side view, the x-axis points out of the page; so point A and point B appear coincident in that view, although point B would actually be closer to you. Finally, connecting point A and point B in each orthogonal view creates an edge in each view.

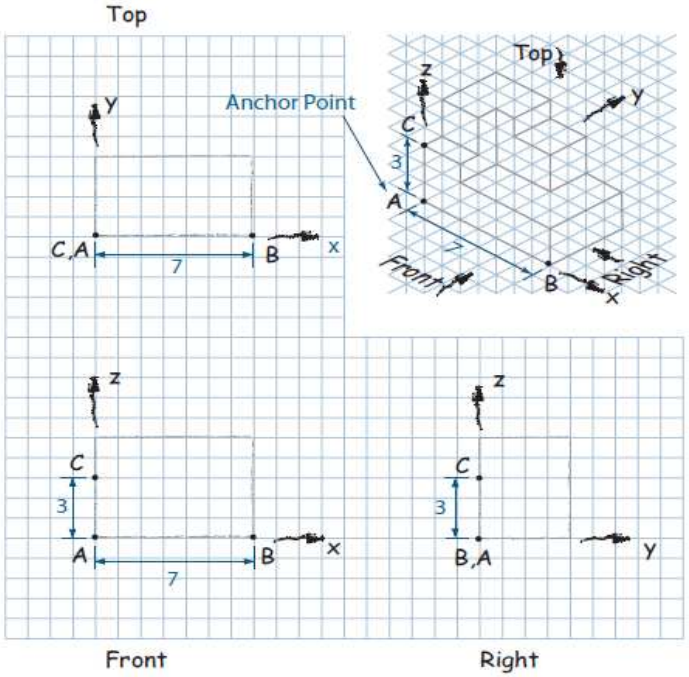

FIGURE 3. Defining and tracking points on the same surface near the anchor.

RESULTS:

When the establishment space is characterized, there are various ways you can continue. Understudies who have rehearsed and finished numerous issues in drawing symmetrical perspectives from pictorials can continue naturally. Most apprentices need a little assistance beginning before instinct kicks in.

CONCLUSION:

Architects ought to have the option to rapidly picture 3-D objects from multiview drawings and rapidly make multiview drawings for proposed or existing 3-D objects. You can start building up these aptitudes utilizing the accompanying bit by bit methodology. For the initial not many models that follow, portraying strategies will be utilized on the grounds that outlining, rather than drawing with instruments or CAD, is a phenomenal technique for creating representation aptitudes.

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