

## 6.1 AUXILIARY VIEW PROJECTION THEORY

There are times when one of the six principal views will not completely describe an object. This is especially true when there are inclined or oblique planes or features on an object. For these cases, a special orthographic view called an auxiliary view can be created.

An **auxiliary view** is an orthographic view which is projected onto any plane other than the frontal, horizontal, or profile plane. An auxiliary view is not one of the six principal views. To show the true size and shape of surface ABCD an auxiliary view can be created by positioning a line of sight perpendicular to the inclined plane, then constructing the new view.

In **fold-line method**, the object is suspended in a glass box to show the six principal views, created by projecting the object onto the planes of the box. The box is then unfolded, resulting in the six principal views. However, when the six views are created, surface ABCD never appears true size and shape; it always appears either foreshortened or on edge.

The object suspended inside a glass box, which has a special or auxiliary plane that is parallel to inclined surface ABCD. The line of sight required to create the auxiliary view is perpendicular to the new projection plane and to surface ABCD.

The auxiliary glass box is unfolded with the fold lines between the views shown as phantom lines. In the auxiliary view, surface ABCD is shown true size and shape and is located at distance M from the fold line. The line AB in the top view is also located at distance M from its fold line.

Changing the position of the object, such as moving it closer to the frontal plane, changes distance M, the distance from the nearest edge of the object to the fold line.

The **reference plane method** is a technique that locates a plane relative to the object instead of suspending the object in a glass box.

When using reference planes or fold lines always remember the following:

Reference or fold lines are always drawn perpendicular to the projection lines between the views.

Transfer measurements are always taken parallel to the projection lines and perpendicular to the reference or fold lines.

Reference planes always appear on edge as a line in the views adjacent to the central view but never in two adjacent views.

Distances from the object to the reference or fold lines in the auxiliary view and the measuring view are the same.

## 6.2 AUXILIARY VIEW CLASSIFICATIONS

Auxiliary views are created by positioning a new line of sight relative to the object. It is possible to create any number of auxiliary views, including a new auxiliary view from an existing auxiliary view. Therefore, auxiliary views are first classified as: primary, secondary, or tertiary.

A **primary auxiliary view** is a single view projected from one of the six principal views.

A **secondary auxiliary view** is a single view projected from a primary auxiliary view.

A **tertiary auxiliary view** is a single view projected from a secondary or another tertiary auxiliary view.

The labeling convention for the reference or fold lines in auxiliary view construction can vary. However, the labels are normally descriptive in nature. For the example in Figure 6.7, the fold line located between the front and top views is labeled T–F, where the F means *front* and the T means *top*.

A *depth auxiliary view* is projected from the front view, and the depth dimension is shown true length.

A *height auxiliary view* is an auxiliary view projected from the top view, and the height dimension is shown true length.

A *width auxiliary view* is an auxiliary view projected from the profile view, and the width dimension is shown true length.

In auxiliary views, it is normal practice *not* to project hidden features or other features that are not part of the inclined surface. When only the details for the inclined surface are projected and drawn in the auxiliary view, the view is called a **partial auxiliary view**.

Symmetrical objects can be represented as a *half auxiliary view*.

When cylindrical part that is cut by an inclined plane, the resulting surface is an ellipse and can only be shown true size and shape with an auxiliary view.

## 6.2 AUXILIARY VIEW APPLICATIONS

Auxiliary views are used to determine the true size and shape of features that would appear foreshortened in any of the principal views. The applications for auxiliary views can be grouped into the following five areas:

- Reverse construction
- True length of a line
- Point view of a line
- Edge view of a plane
- True size of a plane

For some objects, an auxiliary view must be created before a principal view can be drawn, using a technique called *reverse construction*.

Auxiliary views can be used to draw a view in a specified direction. *To create a view of an object in a specified direction, find the point view of the line of sight.*

A **dihedral angle** is the angle between two planes. Determining the true measurement of a dihedral angle is a common application for auxiliary views.

**Successive auxiliary views** are multiple auxiliary views of an object created by projecting from previous auxiliary views. Successive auxiliary views can be used to draw an oblique surface in true size and shape.

## 6.4 SUMMARY

Auxiliary views are a type of orthographic projection used to determine the true size and shape of inclined and oblique surfaces of objects. Normally, auxiliary views are projected from existing principal views. However, auxiliary views can also be drawn first and then used to create a principal view. This is done when a true measurement can only be obtained by an auxiliary view and that measurement is needed in order to create a principal view. This technique is called reverse construction. Any number of auxiliary views of an object can be created. Successive auxiliary views can be created by projecting from an existing auxiliary view.