

Analysis and Implementation on the Projection of Vertical Plane

Huang Gui yun

beijing 100176 china

com.263@163.com

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Abstract: The body is surrounded by the surface. These surfaces include parallel plane, vertical plane, oblique plane. The projection feature of Vertical plane is "a slash, two similar shape", the looking and drawing of the similar shape is difficult to understand and easy to make mistakes. This article analyzes the projection, and puts forward the method of "point - drawing a line - Intercept - Connection", which is clear, easy to understand, operate, accurately.

Shape is an entity that is surrounded by various surfaces, the surface is parallel, vertical or general position plane[1].

The projection characteristics of the parallel plane are the real and the accumulation, easier to master. The projection characteristics of the general position plane is similarity, also easier to understand when reading and drawing. The projection characteristics of the vertical plane are accumulation and similarity, the similarity is difficult to understand, easy to make mistakes when reading and drawing, This article mainly analyzes the projection of this kind of plane, and puts forward a simple and practical method to complete the projection drawing.

The Basic thinking of Reading and Drawing

That is the primary basis of thinking that analysis and judgment of the spatial meaning and relative position of the point, line, and line frame of the view[1].

A Point in the View

- (1) The intersection between lines, or other lines, the point a in Figure 1;
- (2) The accumulation projection of a straight line of perpendicular to the projection plane, the point b in Figure 1;

A Line in the View

- (1) The accumulation projection of surface;
- (2) The projection of the intersection line of surface and surface, the line a'a1' in Figure 1;
- (3) The projection of the contour line of the curved surface, the line c'c1' in Figure 1;

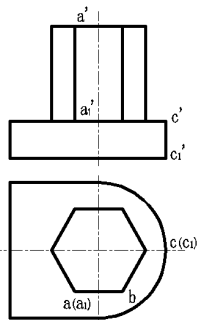


figure 1 point and line in the view

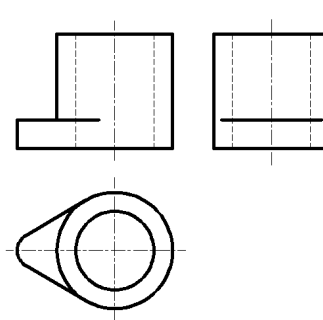


figure 2 line frame in the view

Line frame in view

(1)The projection of shape surface(closed line frame),as shown in Figure 2 ,the two circle line frames are the projection of the cylindrical surface and the circular hole surface;

(2)The projection of tangent surface,closed frame or not closed frame, as shown in Figure 2 ,when the sides of the bottom plate and the side surface of the cylinder are tangent, because the projection of tangent line does not draw in the main view and the left view, there is not-closed line frame in the main view and the left view.

Projection analysis of single vertical plane

Theoretical analysis

In the following three views as shown in Figure 3, the shape contains a plane of perpendicular to the vertical in Figure a, the shape contains a plane of perpendicular to the width in Figure b, the shape contains a plane of perpendicular to the horizontal in Figure c, In each view, the other two projections of the vertical plane are similar (the red line frame), and the number of edges is equal, and position is the same. It can be concluded the projection characteristics of vertical plane is "a slash, two similar shape [2]". That is to say, the projection on the vertical projection plane is accumulated into a straight line, and the projection of the other two plane is similar. The similar shape projection is difficult to understand, easy to make mistakes.

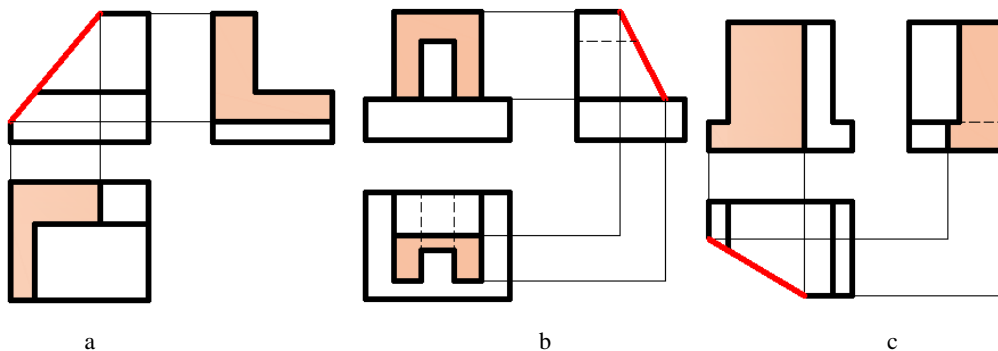


figure 3 projection analysis of the vertical plane

Drawing analysis

The projection of the view is based on the "three equal" and "Spatial orientation" of the three view. The projection principles of the three view is: Alignment in length, Height, and equality in width. Spatial orientation of the three view: the length direction (X direction) reflect the left and right, the height direction (Z direction) reflect the upper and lower, the width direction (Y direction) reflect the front and back, and the side near the main view is the back[3].

Example: the front view and left view are known, to draw the top view, as shown in Figure 4.

Analysis:

1) There is a vertical plane in the shape, the projection is accumulated into a straight line in the front view, as shown in Figure 4, and is similar in the left and top view.

2) According to the alignment in height of the front view and left view, the closed line frame corresponding to the vertical plane is shown in Figure 5.

3) The bottom surface of the shape is accumulated into a straight line in the front and left views, so the bottom surface is a horizontal plane, and the projection of the top view is the true shape, which is a rectangle, as shown in figure 6.

When drawing the top view, starting from the accumulation of projection, application of "three equal" and "Spatial orientation" of the three view, with triangle ruler, compasses and other tools, we can accurately complete the three views [4].

Drawing method

The bottom surface of the shape is a horizontal plane, and the projection in the top view is a rectangle, as shown in figure 6.

Application "take point - draw line - measure - connection" four steps to complete the drawing, it is easy to understand, to operate, and it is the accurate.

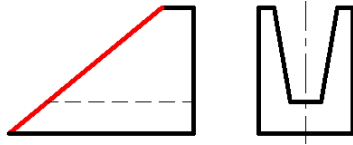


figure 4 the front view and left view

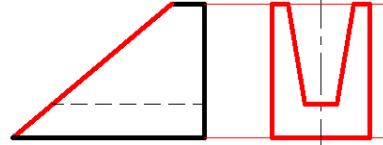


figure 5 the closed line frame of the vertical plane

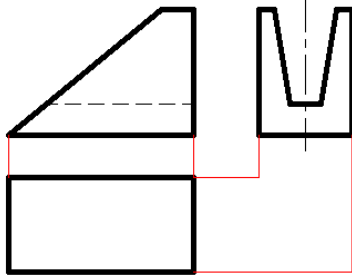


figure 6 maximum line frame of the top view

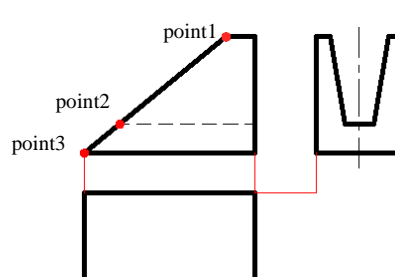


figure 7 the point of the vertical plane

(1)Take point

We mark intersection of the accumulated projection line and other lines in the front view, as shown in figure 7, point 1, point 2, point 3.

(2)Draw line

According to alignment in length, we draw the projection line of three points to the top view, as shown in figure 8, Alignment in height, we draw the projection line of three points to the left view, as shown in figure 8.

(3) Measure

Measuring projection line length of point 1 in the left view, we measure the same length and position to the projection line of point 1 in the top view. Measuring projection line length of point 2 in the left view, we measure the same length and position to the projection line of point 2 in the top view. Measuring projection line length of point 3 in the left view, we measure the same length and position to the projection line of point 3 in the top view, as shown in figure 9.

(4)Connection

According to the shape of the left view, we connect the various points in the top view, the pattern of the top view is similar to that of the left, as shown in figure 10.

Drawing the intersection line of a slot position and projection drawing is completed, as shown in figure 11.

The other vertical projection can also use the same method.

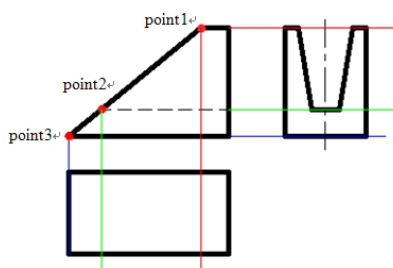


figure 8 the projection line of three point

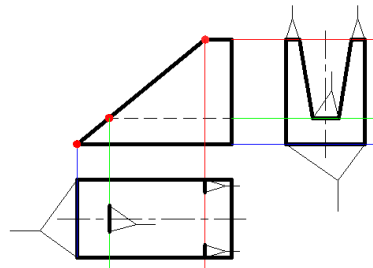


figure 9 measure line in the top view

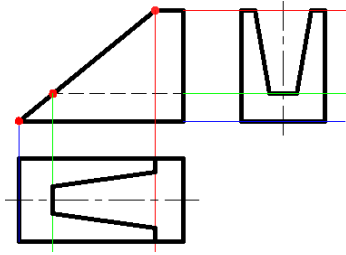


figure 10 the similarity of top view and left view

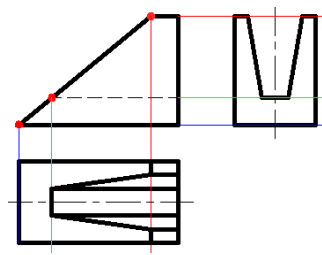


figure11 finished top view

Conclusion

It can be concluded the projection characteristics of vertical plane is "a slash, two similar shapes. The similarity is difficult to understand, easy to make mistakes when reading and drawing. Application "take point - draw line - measure - connection" four steps to complete the drawing, it is easy to understand, to operate, and it is the accuracy.

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