Engineering/Architectural Graphics – Part 1 Orthographic Projection

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Lecture – 16
Projection of Lines Parallel to Both the Reference Planes

Good morning. Welcome to the week 4 of this online ongoing course on architectural graphics or engineering graphics and in this week we are going to see how to draw the projections of different types of lines. So, not different types of lines, but lines in various different positions. So, in today's lecture which is the lecture 1 of week 4 we are going to see how to draw the projections of lines which are parallel to both the planes vertical plane as well as horizontal plane.

So, before I start to draw the projections and how do we draw it? Let us quickly take a recap of line parallel to both the planes is. So, a line which is parallel to both the planes is actually seen like this. Now, it could be parallel to both the planes and be in one plane or the other plane or it could also be in the reference line, a line which is merged with the reference line is also a line which is parallel to both the planes because reference line is parallel to both vertical and horizontal plane.

So, we could be having multiple variations here. So, we will quickly see how to draw these lines taking examples of various different conditions. We have to understand the conditions first and then start to draw. So, let us see how do we draw it.

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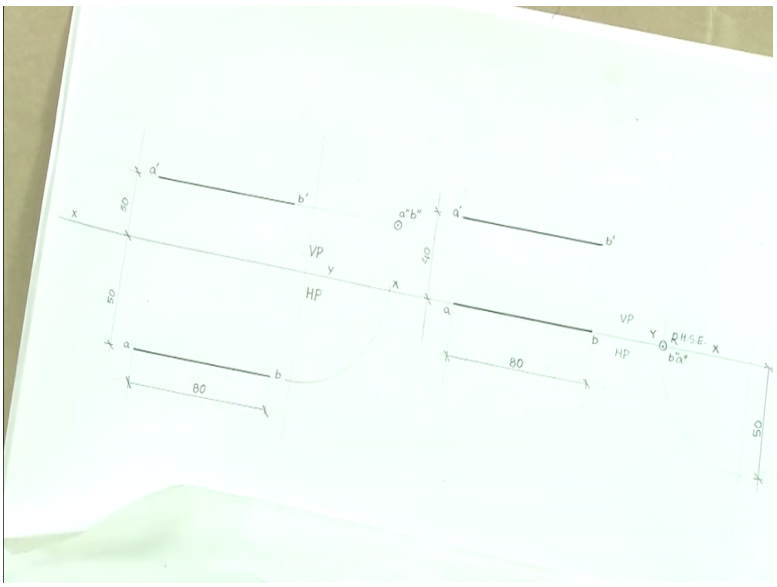

So, to start with let us draw an axis the XY axis and I am drawing it continuously because we will be drawing multiple lines parallel to both the planes. So, the condition 1 is where a line let us assume that the length of the line L is equal to 8 centimeters or 80 mm in all the cases. So, this is the length of the line which is constant and the other thing is that it is parallel to both the planes.

So, we are taking these two as the conditions and other conditions we will assume to be changing. So in case 1 which is case 1 this parallel line is at a distance of 50 mm from VP and 30 mm from HP. Now if a line is at 50 mm from VP where would we see it? We would be seeing it in horizontal plane or in the plan that we know. So, whatever is the relation of the line, the object, the plane from VP it will be reflected in HP.

So, let us draw a line at a distance of 50 mm from VP and this line will remain parallel. In this parallel line which is at a distance of 50 mm from VP we will mark a line segment of 8 centimeter or 80 mm. This is the horizontal trace or the plan of the line which is represented by this condition. So, we will darken this line. We should always be careful about the thicknesses of the lines that we are going to be using.

So, for darkening I have used a 2 B pencil. Ideally, we should not be darkening directly you should always draw the entire drawing in light pencil say 2 H first. This is 2 H in my hand. Once we have drawn we could start from the front elevation also or plan also simply because

in our case the line is parallel to both the planes and we will be seeing the true length of the line in both the views.

So, we could start from the elevation as well as the plan. I am starting from plan because it is easier a times to draw. Now, this distance is 50 because it was at a distance of 50 mm from VP. Now it is at a height of 30 mm from HP. So, we will measure 30 mm above HP. So, we mark 30 mm here and we draw a line which is parallel again. This is our front elevation of the given line.

Now you should try to get the final object which is the projection the plan and the elevation the darkest. The next darkest thing would be this XY line which will almost be similar to the dimension line. So, here we will write XY which is the reference writing most preferably you should be doing using an HB pencil. Here, we will write HP and VP. So, since we are doing this exercise in a first quadrant projection, we will be seeing the HP below and VP above the reference line.

Now this is our line now we also have to mark the dimension lines. So, the true length of the line will be represented only once. We do not have to draw it both in elevation and plan since the projections of the line continue we will be mentioning the dimension only once here. This is the dimension line. Now the length of the line was given as 80 mm. So, we write 80 here. The other thing that we have to mention here is the distance of line from VP and HP which is seen here.

So, this is the dimension line which will be mentioning the distance from VP and HP. Now the distance from VP is 50 mm and the distance from HP is 30. So, what all we have mentioned? We have mentioned the length of the line, we have mentioned the distance from VP, we have also mentioned the distance from HP and this condition which is parallel to both the planes is evident through the drawing.

So, we will now mark the final nomenclature of the line. So, if the line is say a b we write a b here and in elevation it will be mentioned as a dash b dash. This is our projection of the line which is represented given by the conditions defined here. This is a line which is parallel to

both the planes and is not contained by any of the planes. Now, just assume that we have a line which is parallel to both the planes.

So, we are now same length parallel to both the planes and there is a new condition which is that the line is in VP it is in VP and at a distance of 40 mm from HP. Now if the line is in VP and at a distance of 40 mm from HP we have to represent the same thing here. Let us quickly see how do we draw that. Since the line is in VP which means that if we see it from the top there is no distance between the VP and the line.

So, we will be seeing this line merging with the reference line which is the XY line. So, what would we have? We will actually have the top view of the line or the plan represented within the reference line. Now that is the reason why I emphasize that the thicknesses of the reference line, the final object, the dimension line, the projection lines they should all be in the desired order.

If you look at this particular drawing or the previous drawing you would see that we always take these projectors to be very thin. They should not be seen even these guidelines for writing your text should be very thin these are the guidelines. The dimension line should be the next dark one almost equivalent to XY is slightly thicker and the darkest is the object. The same thing we would follow.

And now we can see that XY is distinct and this line the projection of the line is distinct. Now, this is the top view. In the elevation, we would see this line at 40 mm from HP. So, we would mark a line parallel line 40 mm above the reference line. So, this is the elevation which is at 40 mm above the reference line which is the condition and now we will mark the dimension which is 40 mm from HP.

This is 40 mm above HP again it is VP and HP here and we would also write the nomenclature. Now this line which is contained in VP in reference line here is a b and this line here above is a dash b dash which is the elevation and the distance between these two is 40 and we would also have to mention the length of the line because that is another information which was given to us and we also have to represent it. This is 80.

Now look at this particular figure and match it with the condition here. So, we have a line of 80 mm we have given this information here line of 80 mm parallel to both planes. So, both the projections both in plan as well as in elevation we would see the true length of the line which is 80. It is in VP so it means that the distance of this line from VP is 0. So, we see this write here in XY line and at a distance of 40 mm from HP.

So, we have mentioned 40. So, we have actually represented all these conditions here in the image in the picture. So, this is another possibility. The third possibility could be that the line is in HP. So, the line is in HP and it is at a distance of 50 mm from VP. So, now the top two conditions remained the same and the bottom condition is that the line is in HP and it is at a distance of 50 mm from HP. Let us draw the third condition also.

So, now if the line is in HP and we are looking at it from the top. We would still see the line at this distance, but if we see it from the front we would actually not be able to see the line above HP. So, again here this line would merge. So, we will draw this line of 8 centimeters here which is seen in the elevation and since the line is in HP we would again be seeing it in the XY line reference line only.

Now the line is at a distance of 50 mm from VP. So, we would be seeing this projection in the plan. So, we will mark a line at 50 mm from VP that is from reference line. This is the projection in plan and let us now draw the dimension line here. So, the dimension was it was at a distance of 50 mm from VP the length of the line is 80 mm and it is the reference line, VP HP.

And again the nomenclature of the line this is the line in plan and this is the line in elevation. This is how we would see a line which is parallel to both the planes, but these three different set of conditions. So, this is what you will be seeing when the line is parallel to both the planes. Now one thing which we also have to understand here is what if we are seeing the line the projection of the line on the side planes in the elevation.

Now just imagine that this line the same line has to be projected in side elevations. So, what we have is this particular quadrant first quadrant and this line is in HP and it is at a distance of say 50 mm from the VP this is how it will be kept. Now, if I am seeing it from the side elevation what would I see this line is actually perpendicular to the side plane. So, if I see it from the left hand side.

So, I am holding the quadrant like this and I am seeing it from the left hand side. So, we see front from here and if I see it from the left hand side the projection will be cast on the right hand side and all I will see is a point which will be in XY. So, it will be projected and this is an elevation. So, we will be seeing this flap projected in XY. So, what do we see? We see a point and how do we mark this?

We have to take the same distance and this is the side elevation. Now since we are projecting it here this is the left hand side, this is the left hand side elevation and what is this point? This point is actually a b. So, we are actually seeing this a b. Now, if we write a b a b is the nomenclature that we use for the plan. So, we will either write a”b” double dash. So, which means that a is in the front and b is at the back.

You could also put a bracket here either of the two. If we have to draw the right hand side elevation it will be drawn on the left hand side and since we do not plan to draw the left hand side elevation we did all the writing here VP, HP and Y. If we are to draw this we will actually be drawing writing all these outside this when the drawing has completed where the drawing has completed. Also what we are assuming that the side plane is right here.

It is projected put up right up and then we are opening up the flap. If it was not that for example if the flap is slightly away if the projection plane the side projection plane is slightly away in that case we would actually be drawing the projection curve from where the flap of the side projection plane will be opening. This becomes in this case this becomes the left hand side elevation which is L H S E.

And the nomenclature which we use here for this point will be b“a“ because we are seeing it from this side right hand side sorry this is right hand side elevation. So, we are seeing it from

the right hand side and it is drawn on the left hand side and what we see first is this point b a. So, b double dash a double dash and this is the right hand side elevation drawn on the left hand side.

And this flap this projection screen on the side is starting slightly away. It is not mandatory it is not even required to mention the distance. The only thing that we need to know is that from where the projection screen is opening on to the elevation screen we have to take the projection lines straight. Here, we assumed that the projection screen the side projection screen is right here where the line is ending.

And so we took the projection from the end of the line. Similarly, you could draw the projections side projections for each of these cases. Now before I wind up, let us quickly draw the side projections of this line here. Now in this case what will we do? We would first project up to the side projection screen and then we will take the projection comes here, but the actual projection point always will be a line which is the intersection of projection line coming from the plan as well as elevation.

Now see the projection line of a is this and projection of a is this. So, this is the point a. Projection line of b is this and projection line of b is again this. So, this is the same point which is both a as well as b. Now depending upon which side you are looking at it from. So we were looking at it from left hand side. So, this becomes a double dash b double dash, but it will still be a point.

If we are drawing it on the other side we would still have taken up here. We could not have drawn it here because there is no projection line of b coming here. In this case, the projection line of b was coming from here and the other one coming here they intersect. So, we get a point b here. In this case the projection line of b came here, but the projection line of b was coming here.

So, we had to take it parallel and this is the point a double dash b double dash which is the side elevation for this given line a b. I hope with this you have clearly understood how to draw the projections of parallel lines and also to draw the side elevations of these given lines.

That is all in the lecture today. Thank you very much for joining me here. In the next lecture, we would be talking about the projections for lines which are parallel to one of the planes and perpendicular to the other plane. So, thank you very much for being here today. See you again tomorrow. Bye-bye.