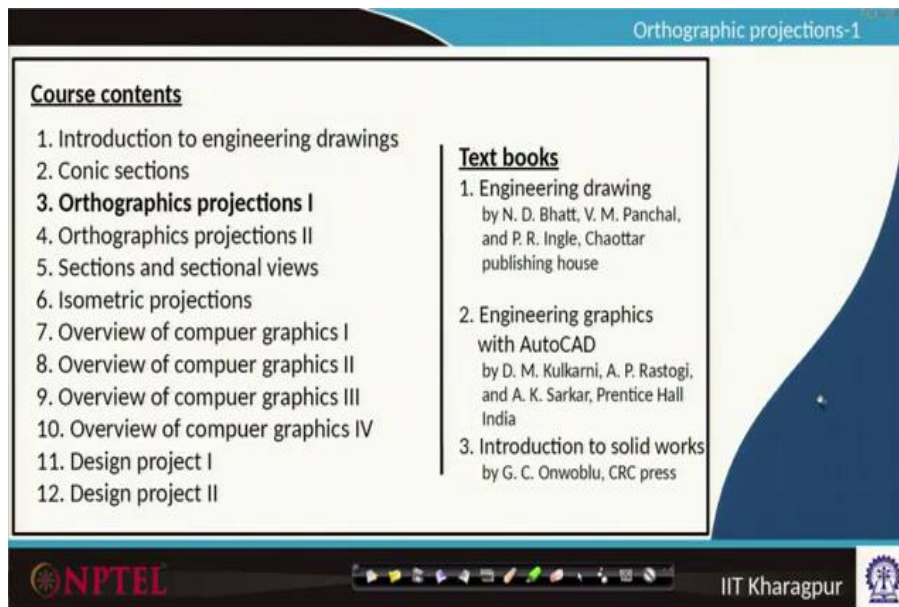# Engineering Drawing and Computer Graphics

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Module – 03
Lecture – 26
Orthographic Projections I (Part-6)

Hello all, welcome to our NPTEL online certification courses on Engineering Drawing and Computer Graphics, we are covering Module number 3 and Lecture number 26 on Orthographic Projections.

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So, now we will have hands-on experience for these orthographic projections. Here, we have a 3-dimensional object and this we would like to produce it on the drawing sheet for different views, to do that first of all let us look at the object.

The object has particular features something like a block and something like a slot where the material is removed by ah creating slotting kind of operation and there is something like an inclined plane again cut. So, this part of the material is not perpendicular that is in an inclined way one has removed that material also.

Similarly, this block goes all the way up, this comes all the way there and goes via in that direction and this comes all the way there and there is something like a triangular kind of portion which is increasing is more like a wall inclined wall which is going all the way up. So, that it becomes tangent to this arc.

So, there is something like a cylindrical kind of portion this is the cylindrical kind of portion and there is inclined slope comes to touch that in a tangent direction. So, there is no material here at these locations is empty and again we have a hole inside of that.

So, through drilling operation, this part of that material is removed and this is more like an arch tangent to that there is an inclined portion, this is the object what we would like to construct. There are certain dimensions like this slot supposed to be 40 units here and this length is 80 mm from here to there and this is something like 50 mm and so on different dimensions are given.

When we are looking at that this centre is at 35 mm above and this arc when we are looking this entire thing comes at R 35 R35 arc because this height is 35 and from there 35 mm we have it. And the diameter of the circle mentioned is 50 and there is a width of 30 mm here and this one also 70 mm. There are other dimensions like this is 70 and that is 20, this object we would like to pictorially view draw it on the drawing sheet.

For example like, here the front view is given by arrow direction. The arrow direction always represents in the drawing sheets as the direction of view. So, front view if we are going to construct it, for example, this is the thing what I would like to construct front view.

So, using the first quadrant thus also we would like to project it; that means, this entire thing projected onto that opaque plane and this top view entirely projected onto bottom opaque plane and side view entirely projected onto profile plane opaque one and we have to flip in such a way that front view top view comes at the bottom level. So, something like that we are going to construct.

Let us just, first of all, visualize it what might be the front view, because the direction is this. So, this entire rectangular block if let us assume that in this we would like to construct approximate front view after that we will do it on the graph sheet. Something like there is a rectangle which comes all the way there and there is an inclined slot somewhere here.

So, there might be ah this projection and somewhere this one begins at 70 mm. So, at 70 mm this supposed to be some kind of line goes in that direction and from here there is 70 mm. So, there is something like that goes via up to this level somewhere before that. So, up to this level something supposed to go here, there is a circle and above that, there is something like that curve arch.

And this line supposed to go parallel to each other something like that we will be in a position to construct and there is something like an arc also we will see in the vertical line. So, when we are looking at that this one comes there and we start seeing some kind of inclined line there, this is the way at least it first friend it looks like. There always be hidden lines and dash lines that we are going to draw it.

So, to do that, first of all, let us look at step by step. The first step is always to be identify surfaces perpendicular to the inclined view, the inclined view is in this direction. So, what we have to visualize is, in that direction we have to project. So, your object supposed to be in that direction.

So, first, we have to align it. Then surfaces parallel to the view would not be visible in that view; that means, this is one surface and this is another one, we may not be in a position to visualize this one when we are visualizing that; that means if this is the surface what we want to visualize we cannot

see visualize this surface or perhaps that surface. The third one is the first to draw horizontal and vertical reference planes to easily identifiable drawings.

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For that purpose if it is box kind of thing first quadrant we have to identify is my front plane here, here inbox method we will straight away project it on to that. If it is first quadrant method by light if we are projecting it the opaque is this one opaque plane on which this entire object will be projected. So, this will be our front plane.

Similarly, for the first quadrant when light is falling on that this will be my horizontal plane. So, for constructing this becomes the top view or top plane. Similarly, for profile plane, this becomes the projected one. So, this becomes side view, then we open it becomes something like, front view, side view and top view.
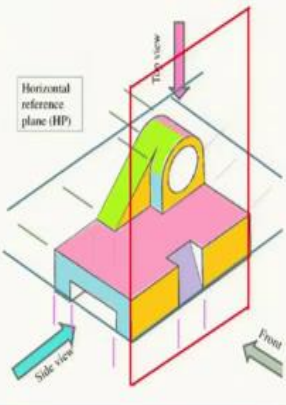
And the next one essential thing; start drawing from the reference planes, we should never draw a picture later we will learn a computer graphics there we will see this issue when we are drawing after constructing reference plane, we will be in a position to draw any picture.

Any surface parallel to reference plane we cannot straight away construct it, first, we have to construct a reference plane pass the information from there again construct one more plane on that only we can construct any drawing, we will see that later.

With those observations for this drawing let us identify the surfaces. The front plane we have decided to have this one in the direction normal to that we have to identify the surfaces, especially identify that reference plane perhaps my reference plane.

I would like to identify this on that plane, I will be in a position to visualize this part, I will be in a position to visualize this part, I will be in a position to visualize that part, I will be in a position to visualize that part, some other parts I cannot visualize.

For example, this surface I cannot visualize it on that plane. Similarly, on that plane I cannot visualize this surface, though I can visualize these lines bounding this surface I cannot visualize these surfaces, similarly, I cannot identify these surfaces when I am looking from the front view.

For example, let us look at these reference planes like front view, side view and top view kind of things. Once we identify this one as the front view direction, let us pick the colour also proportionately yellow one, this is the front view direction front view. The thing what is visible in the front view shown by that colour that is this this this and that.

Now let us look at from top view the top view direction is magenta this is the top view direction, in that top view direction what is visible is shown by this colour. So, when we are looking from top view what is visible is that portion, again we will see this portion the remaining portions we cannot visualize. For example, we cannot visualize this similarly we cannot visualize that.

Let us pick the side view location the side view may be the blue colour this is the side view direction, when we are observing this portion we will be in a position to sense that, we cannot see this surface, we cannot see this surface and also we cannot see the internal part, but we can see this portion along with that also we will be in a position to see, this one also we will be in a portion to see. There are certain surfaces which can be visible on both the reference directions.

For example; if we are picking this colour this greenish one let us pick green, when we are looking from this direction this is visible and also from top view this portion is visible, from side view this portion is visible, from top view also this portion is visible, such kind of surfaces what we have shown visible from both top view and side view.

There are certain surfaces which are visible both on the front view and top view, let us pick that something like this one visible from front view on top view, the front view is this direction so this is visible, the top view is this direction this part also visible.

Some of the things not at all visible from any of these views. Let us look at that, let us use black colour, for example, this internal white colour we cannot visualize it from any direction this one this is also behind this one. So, I cannot visualize this part, similarly, I cannot visualize this part from any of these views. Now let us construct this entire object using first angle first quadrant projection.

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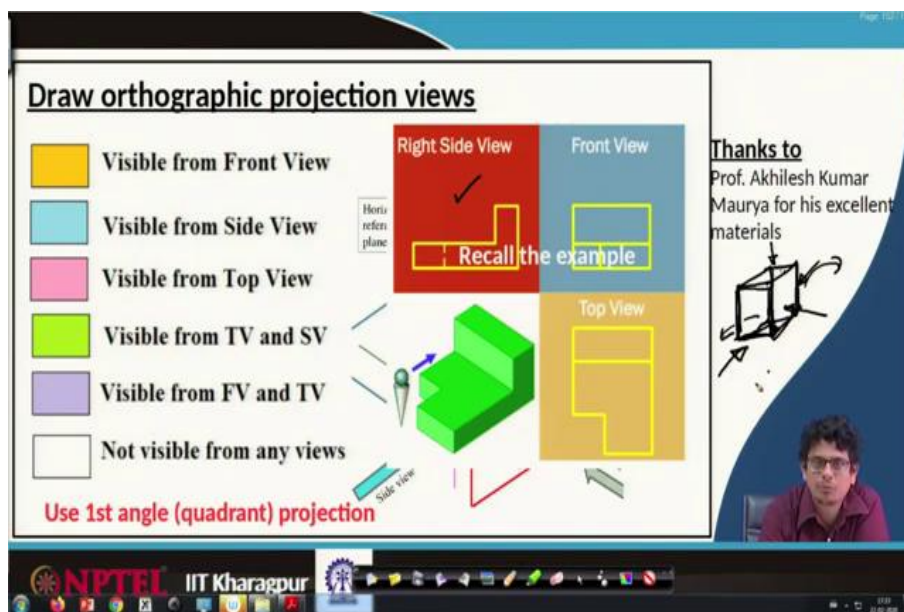
Let us recall our example, in the first example if we have an object in the first quadrant once we have decided this is my front view on the opaque plane, we have that front view, maybe if I am visualizing it from this direction this part projection opaque plane will be this. So, this will be flipped. So, we will have the right-side view.

In case if we have a view is from left side direction to right side direction the opaque plane will be that. So, our view will be on that side, on the other side we will have it. From the top, if we are looking at it in the first quadrant on the opaque plane, we will have projection. So, that comes at the bottom level. So, just recall that using that we will construct the object.

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So, the object is shown here and the direction is this. The steps what we have to follow are 1 2 3 4, first, we have to construct a front view this is the one what we have to construct, let us begin on our drawing sheet parallelly looking at this 3-dimensional object.

So, use our scale using the drawing sheet, first of all, draw 200 lengths the 200 length here we can see this one is 80 units, this one is 40 units and this one is 80 units. So, 80 plus 40 plus 80 is equal to 200 units we have to draw a line. So, pick 200 mm on top view. So, somewhere begin here. So, we go ahead mark these endpoints this supposed to be 200 mm, then vertically we have to go by 50 mm.

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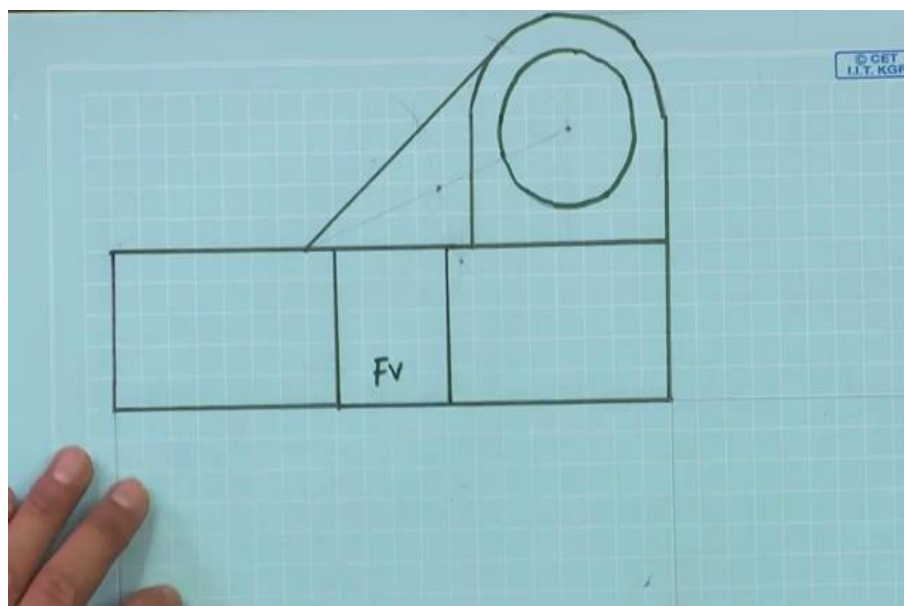
So, let us use our protractor mark 50 mm, first of all, we will construct the front view 50 mm object here 1 2 3 4 and 5 up to this part, then we have to construct a rectangle from the view.

So, we will go ahead used our roller scale construct a line up here then connect this one this portion this is the 50 mm thing what we have and we would like to construct a semi-circle one a cylindrical portion is supposed to be 70 units from here.

So, from here at 70 units we have to construct a vertical line at 35 mm we have this circle. So, located 35 mm from here ah that is also especially from the centre it is passing so, 75 mm 70 mm. So, we have to locate 35 mm.

So, 10 20 30 35 mm here, we have to draw a perpendicular line where our circle may pass through that our circle is at a centre of 35 mm so, locate 35 mm here. So, our circle may be there and the circle radius supposed to be 35 mm the diameter. So, let us construct at this level pick 35 mm.

So, this is out of paper. So, let us do that down. So, here if we are making construct that the remaining portion, we can just eliminate this, once that is done we have to move in that direction to construct one more circle and that is diameter 50 mm we have it. So, this diameter is 50 mm we already know which we will get it from this.

So, from the same centre located 25 mm. So, 25 mm draw a circle in that way, after that, we have the object something 40 mm we have to construct a slot starting with 80 mm distance. So, located 80 mm from one of the edges 80 mm on this scale, this is the edge to 40 mm we have to locate a slot. So, let us begin 40 mm, 10 20 30 and 40 this is the location is supposed to go all the way up.

So, join that similarly join that, at 70 mm we have to locate, for example, let us look at this picture. There is a point there which is a certain distance from here to there that is 70 mm, we already know this part we have that incline cut going by 70 mm. So, first, locate a point then we have to construct a tangent from this point to that point. So, recall from external point how to construct a tangent.

So, from here first of all locate the point where this 70 mm is present. This is the point because if we can draw this line constructing midpoint and the point through which it is passing through it first one has to construct a perpendicular bisector to this point, something there join these points.

So, this is the perpendicular bisector and recall drawing tangent from this circle. So, it is supposed to be this point. So, this is the way we construct a tangent and this is the front view.

Now, immediately if we are projecting these lines, in this direction similarly in this direction if we are projecting the other views will be constructed. So, please practice this problem in terms of constructing the other view and also the bottom ones. So, as of now name this one as front view ok.

Thank you.