Engineering Drawing and Computer Graphics
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Module - 03
Lecture – 28
Orthographic Projections I (Part - 8)

Hello all, welcome to our NPTEL Online Certification Courses on Engineering Drawing and Computer Graphics. We are in module number-3, lecture-28 on Orthographic Projections.

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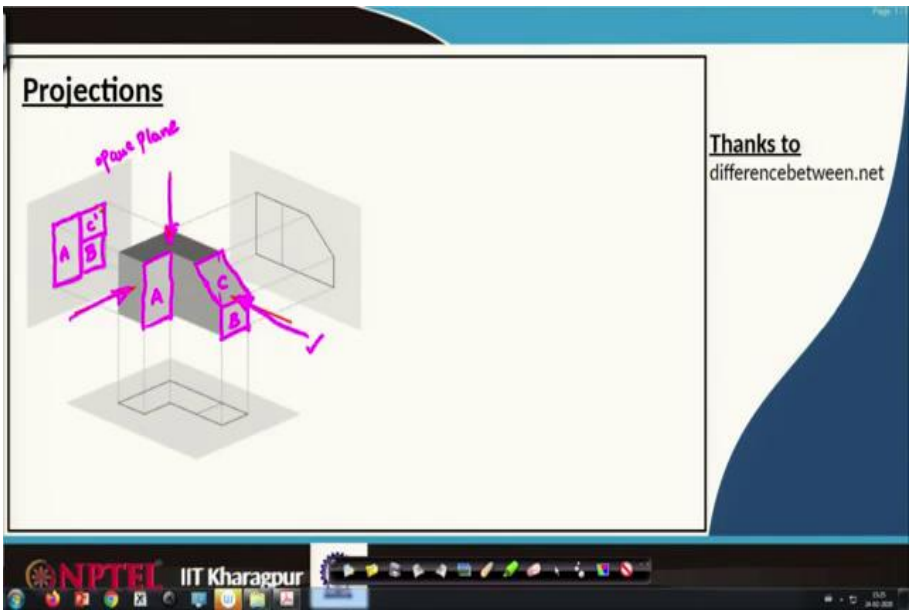

Just to begin with these projections as a summary, in the last classes we have learnt something about first angle projections and third angle projections. There we have learned about the views like front view, top view, and side views. For example, here we have a three-dimensional object. And this three-dimensional object, we would like to locate in different perspectives. One of them is in this direction; the other one is from this direction; the other one is from this direction. [vocalized-noise

When we are observing from this direction, the projected part is this line, and this line and there is one more line projector onto this opaque plane. Similarly, we will see this one, this line, and this line we will see, and this line we see it as the vertical projection of that line, so this entire line projected into the vertical plane. Again this line will be projected onto the vertical one, and this horizontal line and this horizontal line, we will see.

So, if we are comparing these boxes, this A part corresponds to A part of this line; and the B part; and C projected version so we will see as C prime whatever that big rectangle projected onto that plane.

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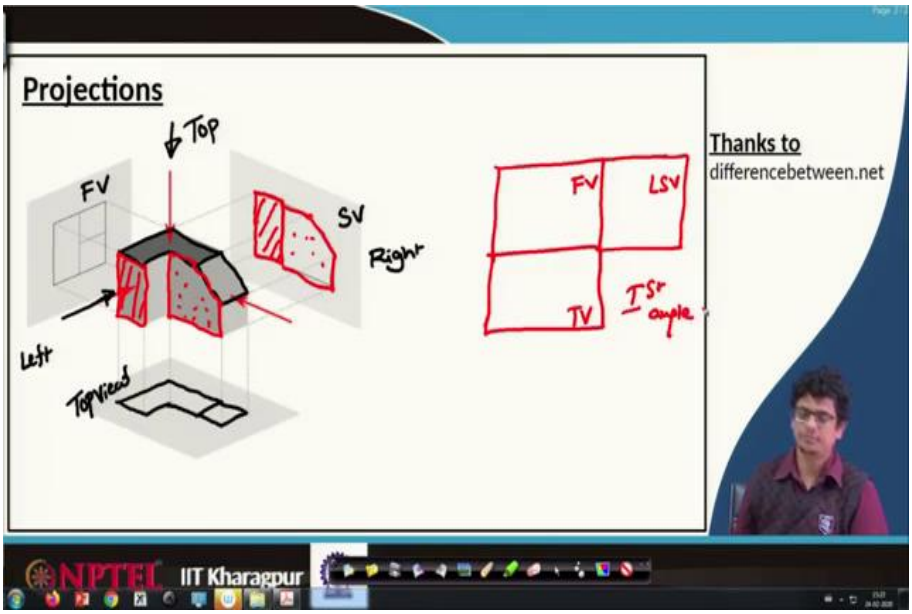

Similarly, let us look at other views. For example, if we are looking from the top view, this entire part we will be in a position to observe. This as it is like a rectangle. And this incline part we will see as projected version. So, this is the front view, this is the top view, and the side view is this. So, for side view, we are looking from this direction from left to right we are observing it.

So, the view what we will see is let us use some other colour. This vertical line and this one which is mapped with this line, these are the portions what we will see. So, the first one will be rectangle this part, this entire part we will see it here like a trapezium. If we are aligning these entire views, perhaps a front view, top view at the bottom, from the left direction we are seeing towards right direction so left side view. If we are getting that, we call the first angle projection technique.

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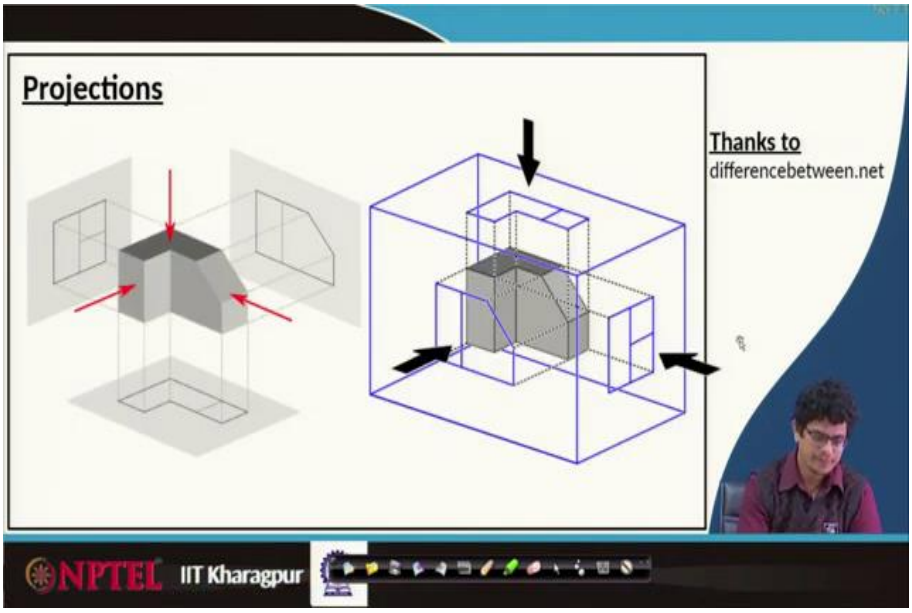

So, this is the thing what we will get it.

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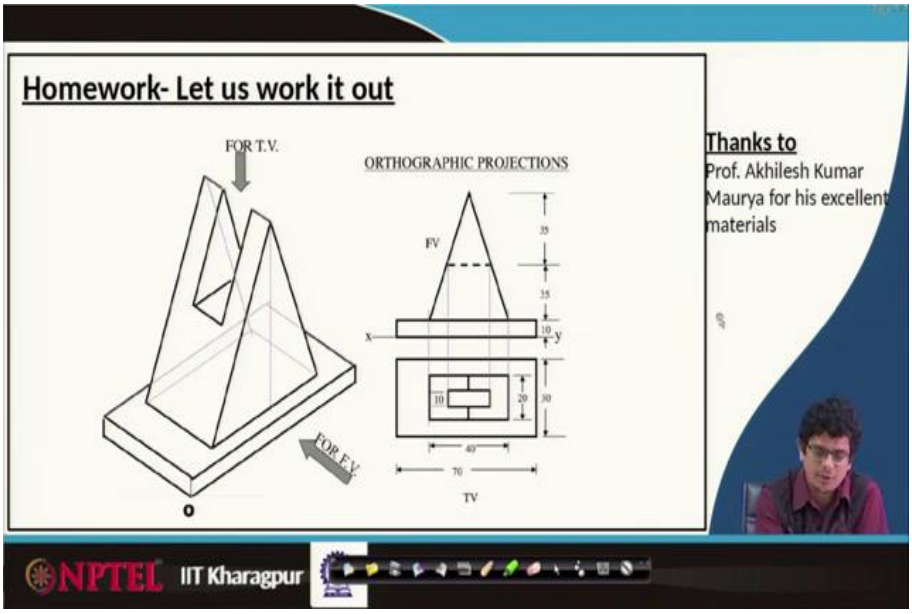

In the last class, I have asked you to construct this three-dimensional picture into projectional views. We have this kind of pin kind of structure. The answer for this pin kind of structure the views what we are going to get, this entire portion turns out to be this one, and this entire triangular one we will see it in that way. There is a dashed line at that, that portion is hidden from the backside.

So, if we are looking from front view this slot, we will not be in a position to see that there is a reason this is a dashed line. Similarly, if we are looking from the top view, it is a first angle projection what

we are trying to look at. So, this is the front view from top projected one this is the top view. This entire rectangle we will see, this entire rectangle that comes out like that. And this entire inclined lines projected in such a way that we see a line this entire thing, and this one we will see at the middle.

Again this part the backside of that - this entire part we will see as one more line that is this. This part we will see it like vertical. Similarly on backside whatever that vertical part.

Again this entire part we will see it like this one. And this one we will see it like that, and this part that we will see it in that way. And this entire line we will observe it in that way. And the backside parallel to that perhaps if that is the line again we will see it in that way. This is the way we look at these views and try to construct it.

If it is something like from left direction we would like to observe the right side, on to the vertical plane of the right side we have to project these points and so on. If we do that parallel to these lines, we are going to construct whatever this length we have that length here, and there is a height - that height we are going to see here.

So, this is the line. Let us use another colour. This part we will observe it in that way and there will be a middle line. So, the middle line from there. This is an entire incline one projected onto the vertical plane which goes all the way up here. Similarly, this one up here.

This distance, this distance will be equal like that we will get, let our vertical line. And this one like a pin-up to this level because here we will be in a position to see this slot and so on. And if we are erasing this part, so let us reshow that this is the view what we supposed to get ok. Let us move onto the next one after working out that example.

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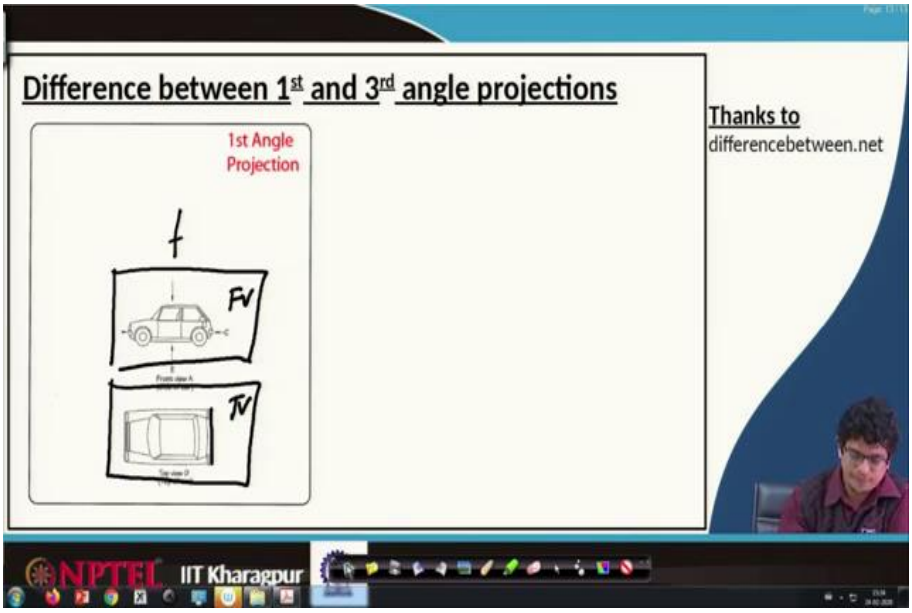

Let us quickly look at the difference between 1st and 3rd angle projections for a typical automobile car. Let us consider there is an automobile car that is this one having some wheels, something like the bonnet, and boot space and so on, so stuff ok.

This is the car what we would like to observe having projections, because projections are the ones which give you true lengths in terms of how many millimetres, how many centimetres and so on so things which we cannot straight away get it from three-dimensional because there will be a bit obscures.

So, from projections, first of all, we have to recognize which one is 1st angle projection which one is 3rd angle projection. For that example, we are picking this automobile car. On the front view, we would like to observe it in this direction. Perhaps the side view will be that, and the top view will be that. And from the bottom, if we are looking at what is that bottom view, these are the views what we are going to construct it now.

So, let us first of all look at the top view of a car. From this direction, we have to observe the top view of the car, that means, we cannot straight away see any wheels, we cannot straight away see anything like these inside of that parts. What we will see is the top portion of the car of that shape we supposed to see. So, let us observe those portions.

So, the top portion, if we are trying to look at, there are lights here something like this. This entire curved kind of portion, we will see that bonnet. And this top portion is this top portion of the car. The

windshield whatever we are observing from the top side that windshield we are going to see it here. The backside, viper, and other things that portion we will see it here.

Similarly, the bumper portion and other stuff here we will see from the top view because this is 1st angle projection when you are looking from the top the projection comes at the bottom level. So, if I am making this one as the front view, this one will be the top view.

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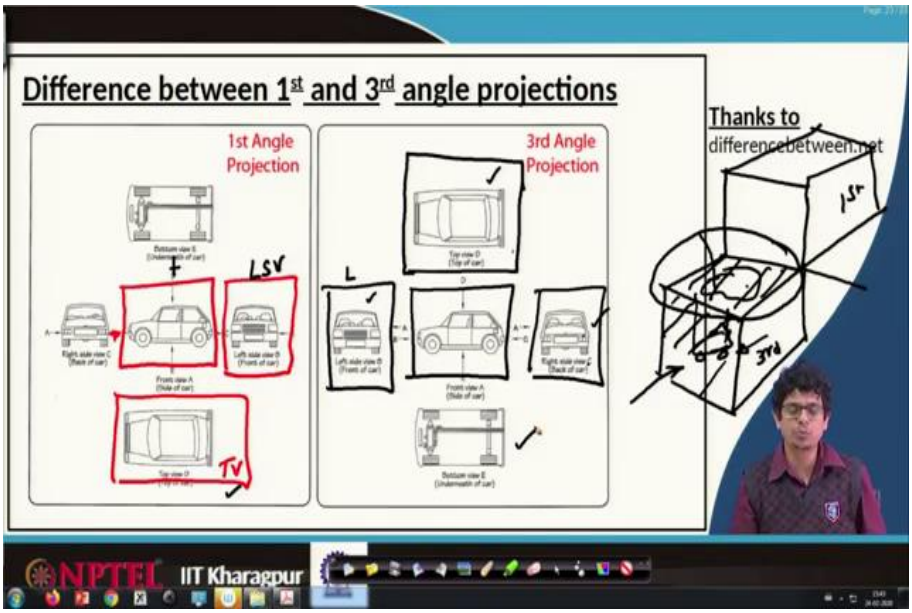

Let us observe one of the side views. If we are looking from left direction towards the right direction, having a plane whatever the projections we are going to get onto that plane if I flip that plane the way how it looks like is this.

So, we will be in a position to see these lights, perhaps the seat arrangement, steering, and other things, and some part of these tyres also will be visible, so that part of the tyres, the nameplate, and so on so forth. Because this 1st angle projection as a usual left side if you are looking it comes on to the right side. So, the essential parts are the projections.

The first thing what you have to observe front view, top view and left side view, they make 90 degrees thing. The other thing if we are joining these lines, they will co supposed to get coincided is projection. So, each point has to be projected onto that. Similarly, the extreme tangent, if we are going to draw is supposed to match with this line. Similarly, these extreme tangent suppose to go at that level. So, your entire view supposed to be bounded in between these lines.

If we are looking from the right side towards the left side that view what we call right side view. The right side view from this direction on to a plane we have to get. So, whatever the things if we are going to project, this entire thing because this part will be visible, this part is non-visible.

Let me tell you once again on to this plane when we are projecting what we will see is this mirror. Perhaps if it is transparent the steering that also will be visible. ah, this bumper, this tyres, this windshield, and other things we will see if we are looking from the right side towards the left direction. So, this is backside portion, the backside seats and other things ah the indicator lights and other stuff.

Let us look at the bottom view. For a car, if we are looking from the bottom side, the view whatever comes on to the top that is what we call bottom side view underneath the car which comes on the top side of this front view. So, if you are looking from the bottom side, the wheels, the shaft, differential and many other things we will see that, the Ackerman's mechanism and other things.

Let us look at how 3rd angle projection is different from 1st angle projection. In 3rd angle projection, the object supposed to be in the 3rd quadrant. And the 3rd quadrant bounded by transparent walls, we have to project these entire object onto those walls, opaque and transparent walls. Flip that rotate these things at suitable locations, fold, unfolding kind of thing, then we will have this complete picture on three ah 3rd angle projection. Let us carefully look at it.

The front view is not changing. In 1st angle projection, ah let us use two colours so that it will be clear for us. For 1st angle projection, the view let us show it by red colour; for 3rd angle projection, let us show it by black colour.

There is no difference between 1st angle projection and 3rd angle projection as long as ah front view is concerned. The top view we look from top construct the bottom one at bottom location say that one as the top view for the 1st angle projection.

In case of 3rd angle projection, when you are looking from the top, it will be projected onto that top plane in the 3rd quadrant it comes at the top level. So, it is more like a mirror you have it on the top side of the car in 3rd quadrant.

And whatever the projection you have it on that mirror that if we are looking at it, we will get that 3 rd angle projection. So, your walls are mirror kind of objects opaque from your side. But internally if you are looking that projection whatever we are getting on the 3rd quadrant that mirror if we flip it to see that we will get that projection.

So, it is more like let us consider this is the 3rd quadrant, that means, we have this wall goes all the way and goes. Your 1st quadrant is here, your 3rd quadrant is here, perhaps your car is located somewhere there.

Let us call this is a mirror. From the top, you cannot see it, but because it is a mirror whatever this object projected mirror that objects whatever we are going to see that we are straight away getting by flipping this entire 3rd one, open the 3rd one, keep it there.

So, it acts as a mirror. So, your top view straight away comes at the top side which is same as your top view in the 1st 1st quadrant projection. So, in 1st angle projection, the top view comes at the bottom. In 3rd angle projection, your top view goes at the top level.

Now, let us look at the side view. If if we observe it from the left side, the view will be projected on the right side, and we open that opaque plate which will be same as left side mirror because this is the mirror if we are observing it. If we are observing from this direction, this entire thing acts like a mirror.

So, whatever the projection from internally on that mirror happens if I flip whatever it comes that we will call as the side view in third angle projection. So, let us use black. So, your left side view comes on the right side in 1st angle; in 3rd angle is right away comes on the left side.

Similarly, the other views, 1st angle the bottom view goes at the top; in 3 rd angle, the bottom view comes at the bottom. In 1st angle, the right side view which comes on the left side comes as the right side for the ah 3rd angle projection.

So, the right ones will come on the right side; the left one comes at the left side; the top one comes at top side; the bottom one comes at bottom side is is more like many mirrors are bounding that surface. And you open those mirrors whatever those projections you already obtained there is the way you get it.

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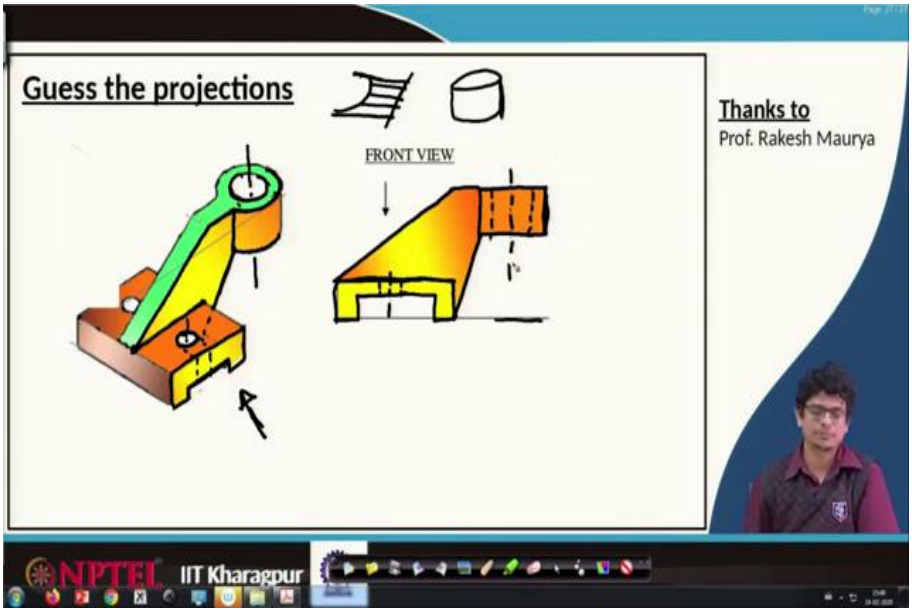

Let us guess a few more projections. For example, we have this 3D kind of stand. Usually, to suspend any shaft, for example, we would like to keep some shaft passing through that as support or mast, something like a pole we would like to ah hold it.

Instead of just digging the hole, having this mechanical element which one can bolt it at this level, so one can bolt it at this level bolt it this level having some kind of inclination, and one can suspend a pole. For that purpose, we use this kind of object.

If that is the case can, we draw these projections from this side because our terminologies wherever the arrow is there that is the direction for the front view, this is the first thing. So, what are the things we will observe from the front view, from the top view and side view? Think about it ok.

Let us work it out. The front view, so if we are observing in this direction, this part entirely will be visible, so that part will be that. There is a circular hole which we cannot see it, so that is the reason here dash lines which will be bounded by the diameter. So, those are the dashed lines. Mention it, it is a circle. So, we have an axis, so that axis is the dash-dot line, and this is the baseline.

Second this part, this part we will see. And further, this incline line goes all the way down. So, up to this part, we have to see a line. So, up to that part, we will see a line. And this part entirely goes all the way bottom touch that, so that the entire part goes all the way touch there. Similarly, this part goes all the way there, then there is a horizontal line; this part goes all the way there, and touch that. The exact dimensions based on the geometry we will construct it.

Then we will be in a position to see that line, we will be in your position to see that line, this entire semi-circle that will be projected as one line on a plane. So, this entire part, this part, this one, this one, this one entirely we will see it as a straight line. So, that entire straight line is that. Similarly, at the bottom of the entire semi-circle, we will see it in that way.

The edge, so it is more like such kind of object. So, this edge coincides with this edge. And there is a whole circular hole. So, there will be minimum, maximum kind of lines. So, dashed lines where this bolt extension we will see. And this is a circular hole. So, there is an axis line dash, dot, dash, dot lines. This is the way front view looks like.

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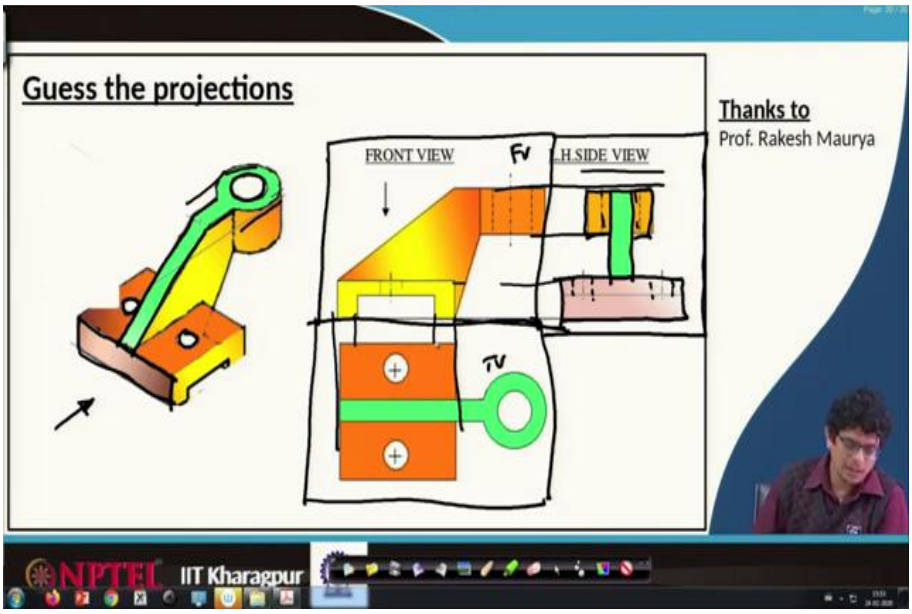

Let us look at the top view. Let us assume that is a first quadrant or first angle projection. In that, if we are looking from the top it goes to the bottom side of this front view. So, this is the front view bottom side we are supposed to draw this top view. For top view what are the things we will see?

There is a missing portion this filled by orange colour. Let us consider, let us consider this filled by this orange one ok. From the top view, we will see this line, we will see this line and this one. Similarly, it goes all the way there, it comes all the way there.

So, that line and there is a green patch. So, this line, and this, it stops it because we start seeing this green portion from here to there. So, the green portion from there to there, and again we will see this part. And these this is the way we will see.

And this entire part projected version of this inclined one, we will see all the way there. And there is an extension outside of this. So, if we are drawing something like that is the line this extension line, we will see it here. And the semi-circular circular portion, we will naturally see. And this circle we will see it in that way. And these holes also we will see on that projection. So, holes with a plus sign indicating that are the centre, again holds the plus sign. This is the way we observe it.

And if you are careful enough, here the centre line and centre line supposed to get matched. And these dashed aligns the whole thing that and this whole position supposed to get matched. And here whatever this whole thing, they are also supposed to get matched, and this axis line supposed to match this.

So, again this plus. This is the way the top view looks like. Our side view direction is this, first quadrant first angle projection. So, it comes on the right side, that means, is supposed to come here. So, the lines you extend it is supposed to be in between these lines.

So, if we are looking from this view, this entire rectangle, this banded line, and this one already projected. There is a circle. So, we will see in that way. And this entire circle line projected there. So, we will see it as a rectangle. And the remaining dash, dot lines coincides with this circular positions something like that. This is the way we will see these things.

Just be careful whenever you are showing projections you do not show these projections at random locations. You make three boxes. For example, first of all, one has to construct a front view below that with a certain gap which we have seen something like varying from 4 millimetres to 25 millimetres kind of range separated by top view, front view.

And again there is a perpendicular box which comes on the other side for your side view. And these projection lines supposed to get matched. Similarly, these lines such kind of things we are supposed to see. Like I said in the ah last class when you are looking from the top, these lines are hidden, the material is not there. So, it is a good practice to show that on that plane.

Thank you very much.