Engineering Drawing and Computer Graphics
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Module - 03
Lecture - 25
Orthographic Projections I (Part - 5)

Hello all. Welcome to our NPTEL Online Certification Courses on Engineering Drawing and Computer Graphics. We are covering module number 3 lecture number 25 on Orthographic Projections.

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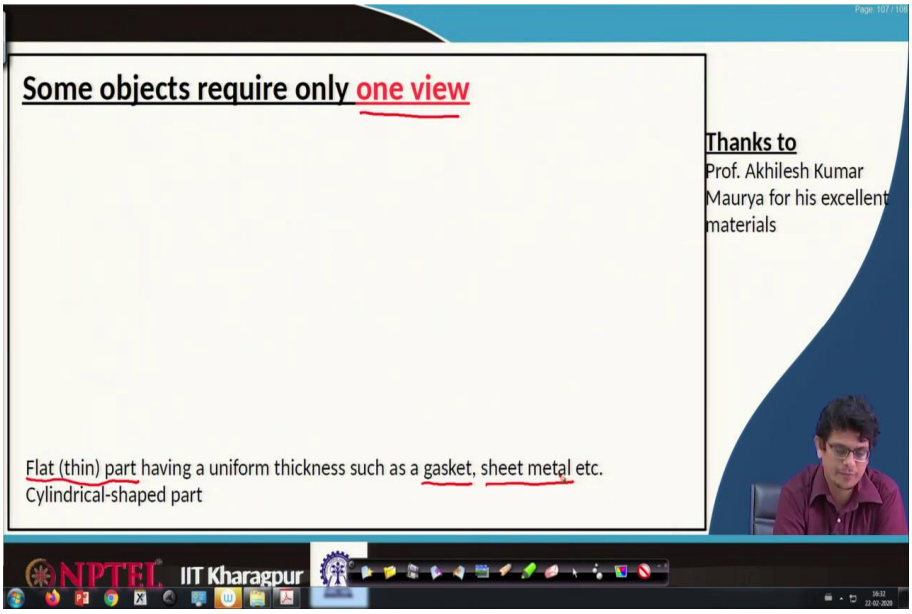

In the last classes, we try to have a feeling for what is a vertical plane, what is horizontal plane and what is profile plane and how an object in the first quadrant gives the projections and how an object in the third quadrant gives the projections we have seen.

There we try to construct different views like vertical plane projections, horizontal plane projections and also, we tried to have a feeling for cylindrical objects, the views created by that. In today's class, we look at a few more objects like only one view. If it is mentioned how it looks like, we are going to see only one view of how it looks like.

For example, a very flat thin part. If a mechanical component is of that kind of size, how it looks like. For example, the typical gaskets, sheet metals and other things fall under this flat thin part shapes and

also, cylindrical-shaped objects perhaps length and diameter are the essential components. So, one of the views might be good enough to plot it.

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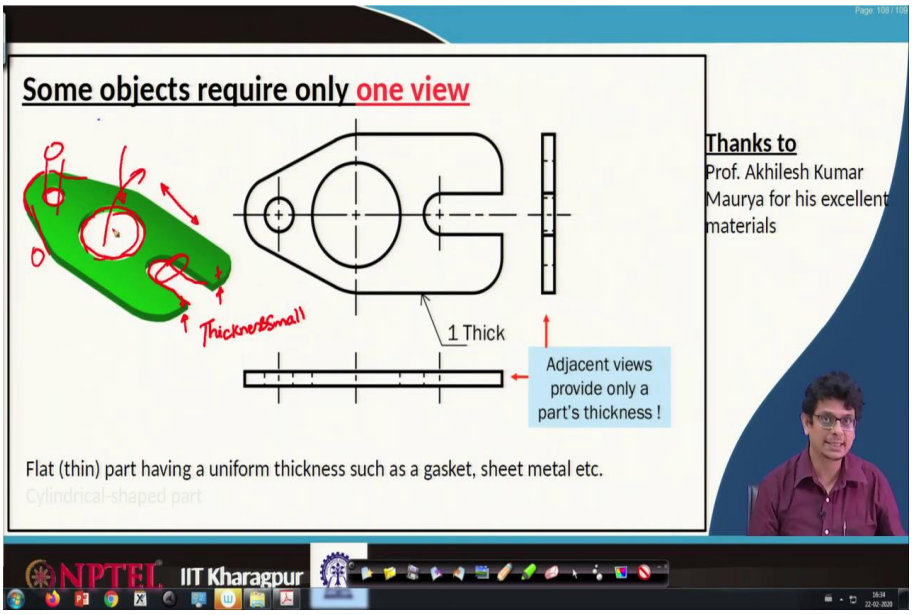

Let us look at this gasket. The metallic part having very small dimensions in terms of thickness, this is the thickness very small. However, the top portion having wider geometry, it has a circular hole, a tapered cut rounded into smooth corners. Another hole circular one to fix it on bolts using washers. We have this kind of slot also.

So, perhaps one bolt can be inserted and tightened. This is the inlet pipeline through which gas might be coming out and here also we will have a washer to slightly fix it so that these entire object can be slightly moved here and there to align with the geometry. Such kind of objects exists for mechanical engineering.

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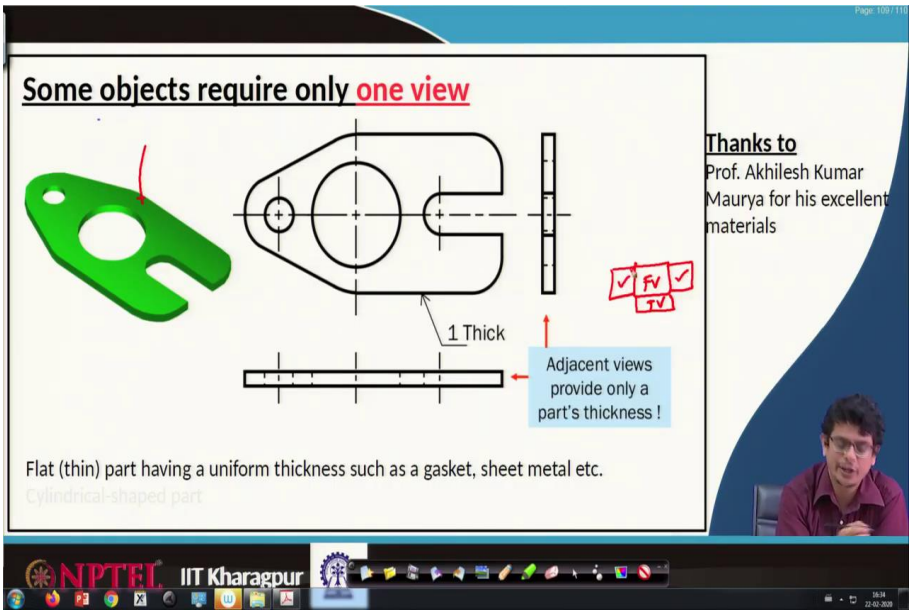

So, let us look at the various views of this. Gasket for example, if we are picking this one as the main view, that means if that is the front view, then we will have in the first quadrant projection something like a front view, there will be a top view and there will be a side view. Perhaps left side from the left side if you are looking on the right side, we will have a view here. If it is from the right side, on to left side we will have a view there.

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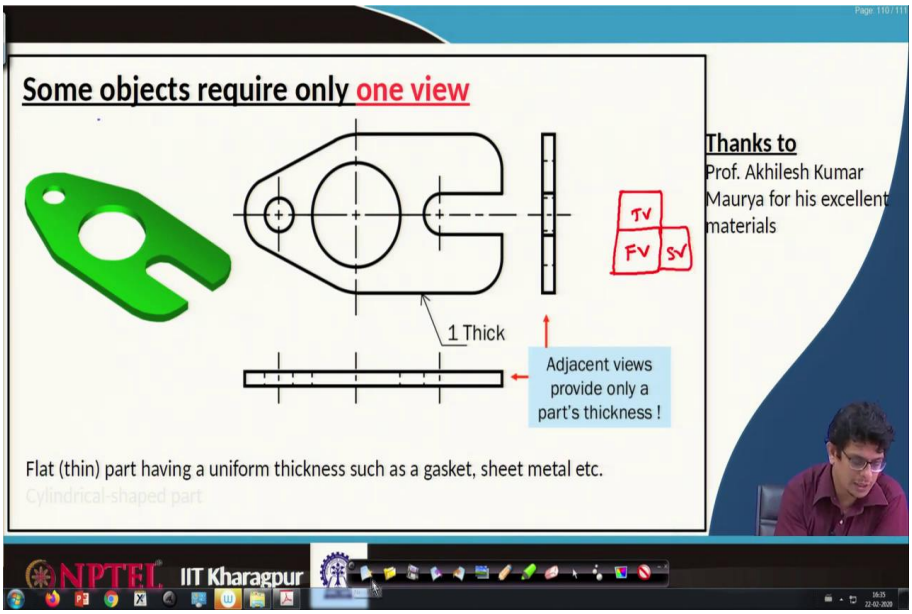

If we are using a glass box method, then the view will be something like front view and something like the top view and there will be something like a side view also we will get.

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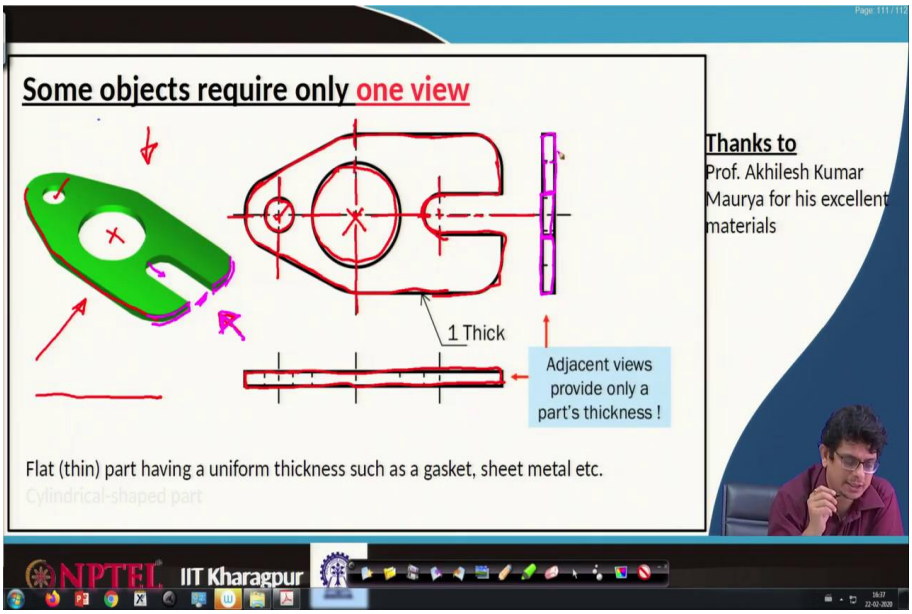

So, let us use the glass box method. The direction for this perhaps this is the front view if we are looking that, this entire round corner and the slant one and this one in the view direction makes a straight line. In terms of thickness, we will have this continuous rectangular portion.

In the top view glass box method, we will have this object which goes in this way having a circle matching with this one, another circle matching with that location and because these are the holes, we will have dash-dot kind of long dash, short dash, long dash, short dash, long dash, short dash kind of line similarly here because this is making a radius.

So, again we have long dash short, dash long, dash short, dashed line. Now the other view on the glass box method, if we are looking that we will have this entire shape, let us use another colour perhaps magenta, this entire one. Similarly, this is an entire one the curve this entire stuff comes out something like a slot a rectangular block we will see.

And this gap whatever we have there again, this projection comes into the picture. The green material that comes at this level and this hole we cannot see it. So, when we are looking from this direction for the view, the circular location where we have it we have these dashed lines.

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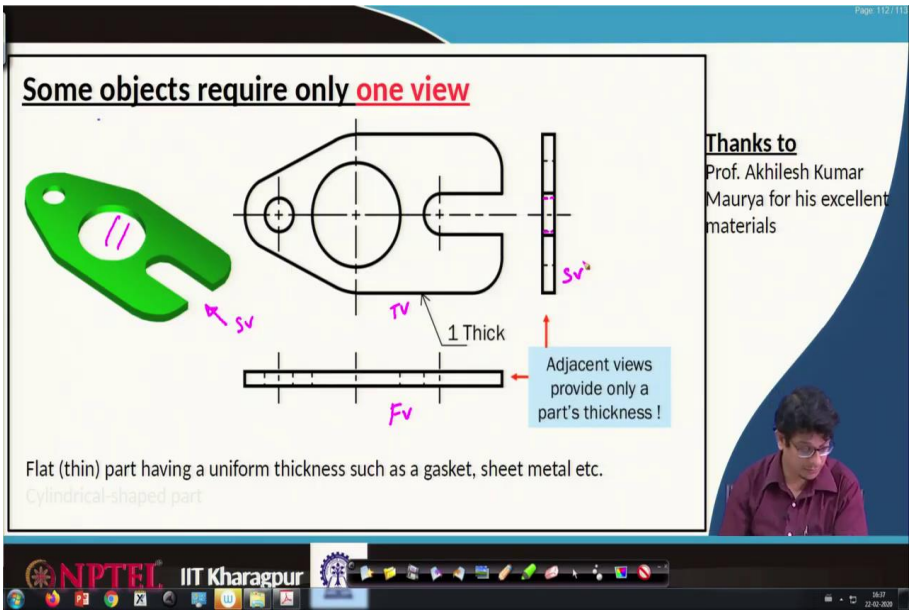

Similarly, this circle we cannot view it. When this side view if we are trying to make it there also, we have these dashed lines. This is the way using the block method box method, we will be in a position to get the front view, the top view and the side view.

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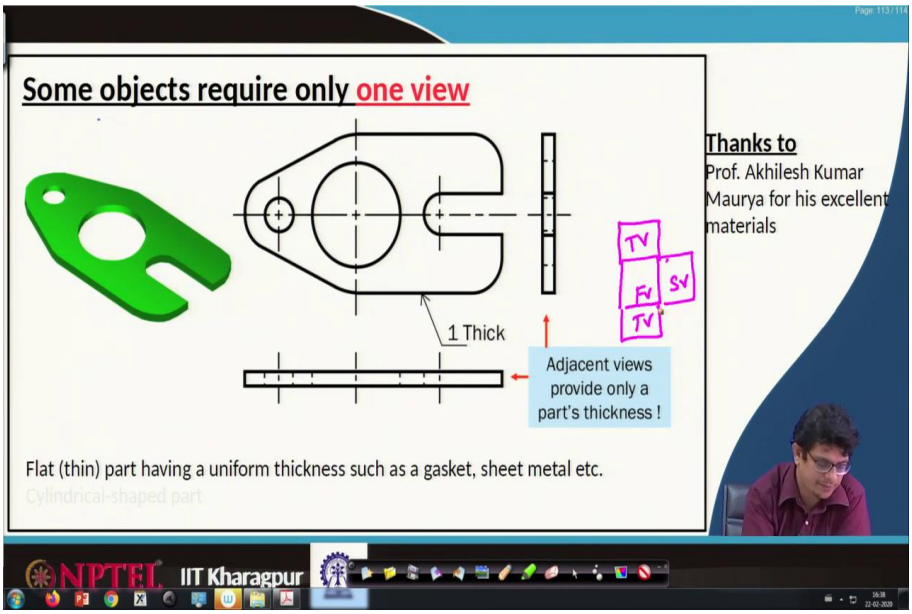

One thing we have to be careful always. Front view associated with our side views either top view, on this side or perhaps on this side based on the projection method, what we are trying to use it. So, in this case, by looking at this geometry, we can easily sense that this one accompanied by that.

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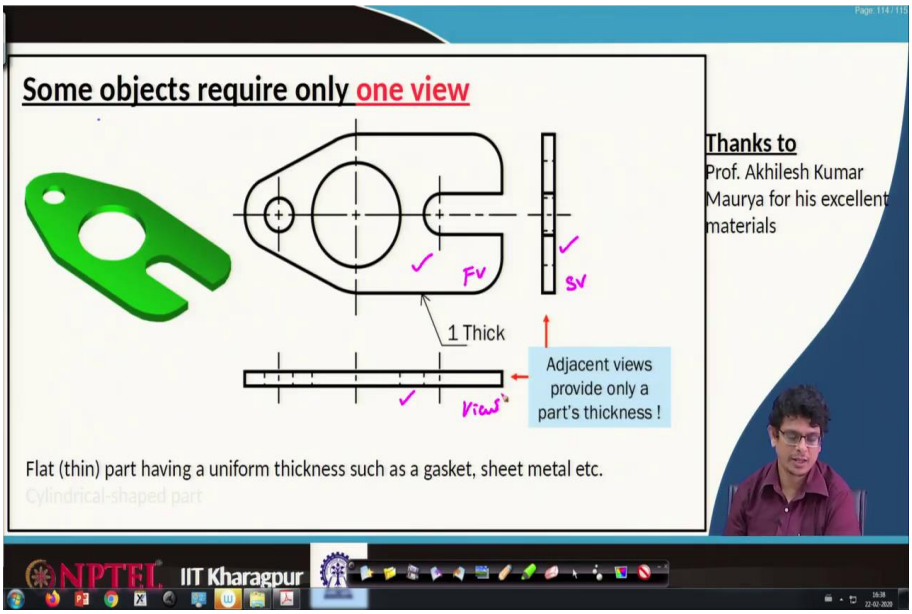

And this one accompanied by, that means this is supposed to be the front view, this supposed to be the side view and this supposed to be the top view or bottom view. Based on the method what we are trying to see, this is the way another view we will be having an already we have learned the maximum dimensions supposed to be given by that front view.

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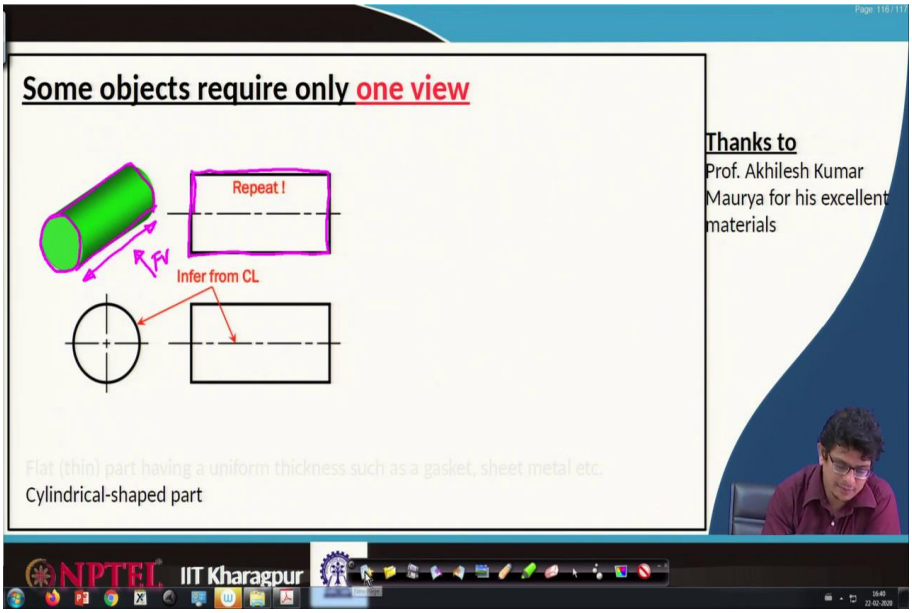

If it is only cylindrical kind of objects, how they view looks like. For example, let us look at this object. We have a cylinder here and we would like to visualize that maximum dimensions, what we are having is this length of that cylinder. So, we can pick the front view in this direction.

If that is the case, we will be having this one. If we would like to construct other views also, the easiest way is drawing one of the view front views.

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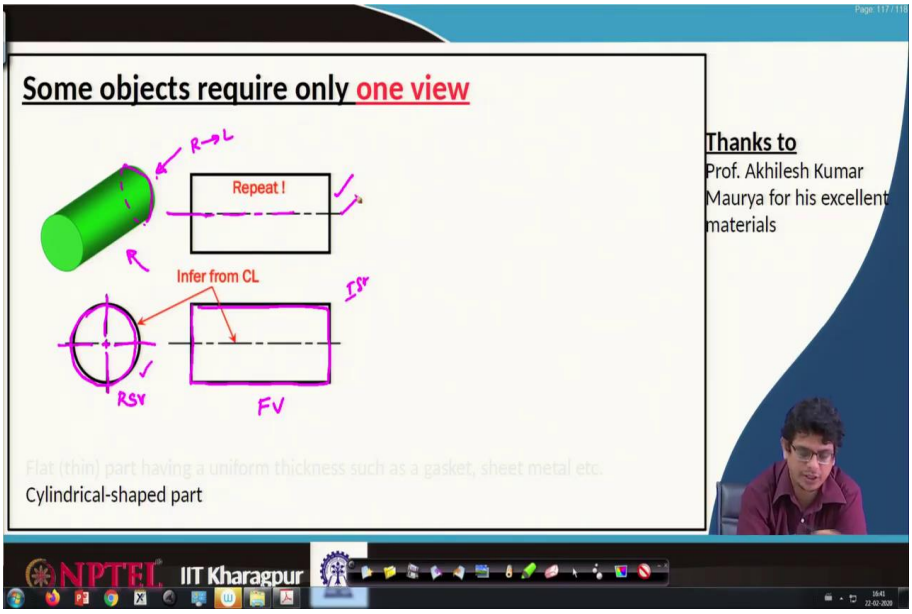

Let us call and we would like to visualize this in the first quadrant projection. If that is the case, then the right side to left side let us visualize, then this entire circular format whatever we are getting that we will see it as a circle on this side.

And there will be a long dash, short dashed lines and this one is the right side view which we are looking from the right side towards the left direction using the first quadrant. When we are looking at this kind of views if we already know cylinder of so and so ah diameter just representing something like a rectangular portion showing long dash, a short dash indicates that it is a cylindrical object. We do not require that view to represent that because axis will take care of that ah indication. It is a cylindrical object.

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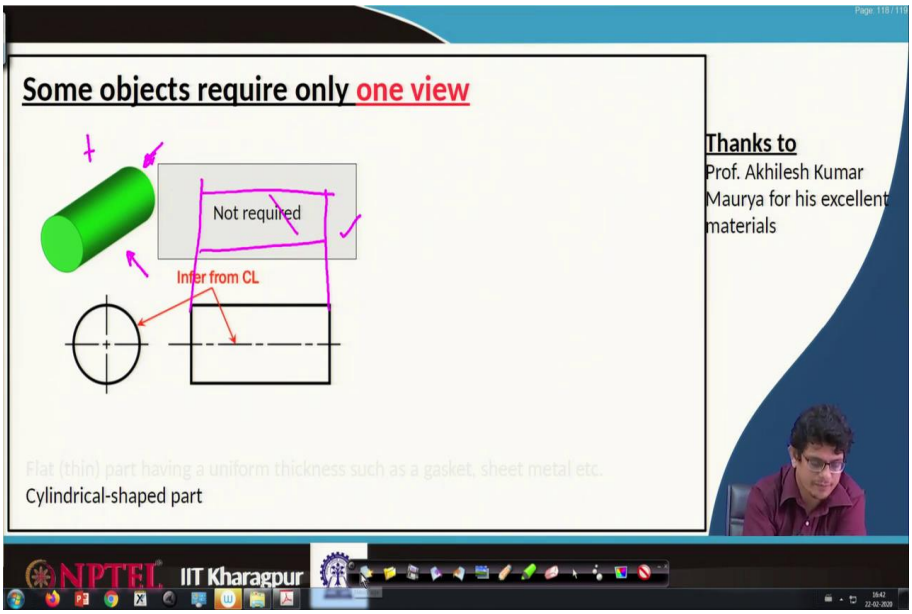

Similarly, because it is a cylindrical object, the other view if we are making if this one is the front view and from there if we are making side view, making top view, not necessary because that is anyway going to create the same rectangle within that portion. So, this one not required.

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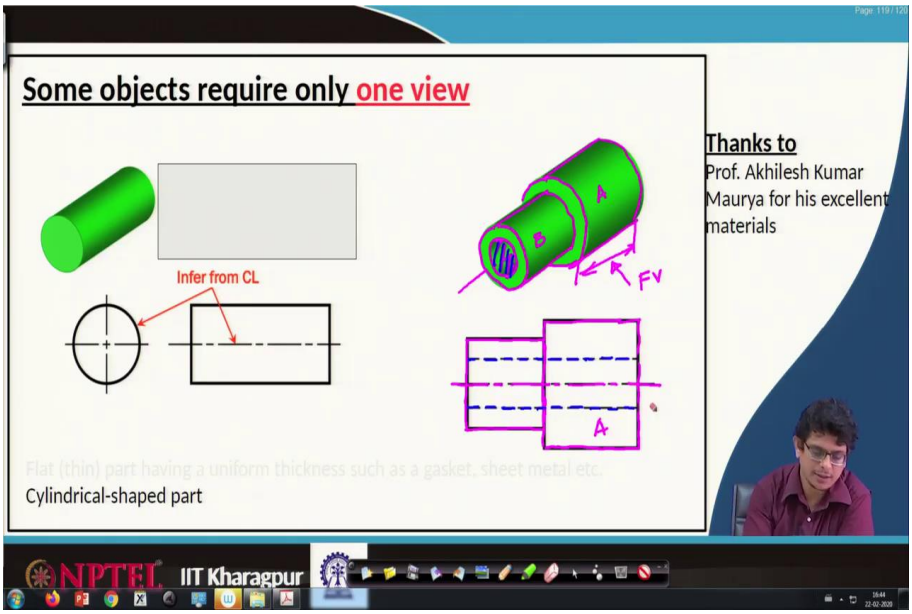

Let us look at another example. We have this concentric kind of cylinders step in turning operations using lathe one can construct such kind of steps. So, we have this removed portion which goes all the way down and this is the material portion we would like to draw it. So, let us construct because maximum dimensions what we are getting is from this direction. So, let us pick this one as the front view direction.

This much portion we will see a rectangle. So, if we are drawing this portion for the front view indicates this maximum diameter cylinder. This part A, let us call that part because it is a cylinder we always have a long dash, short dash, long dash, short dash and so on.

Now this B part, the step one having a lower diameter and is symmetrically placed around that axis. So, we have this small portion which is attached there and this one material has been removed. Let us use another colour inside of that material is not present. So, we have these dashed zones indicates that this entire material has been removed maybe by a drilling operation.

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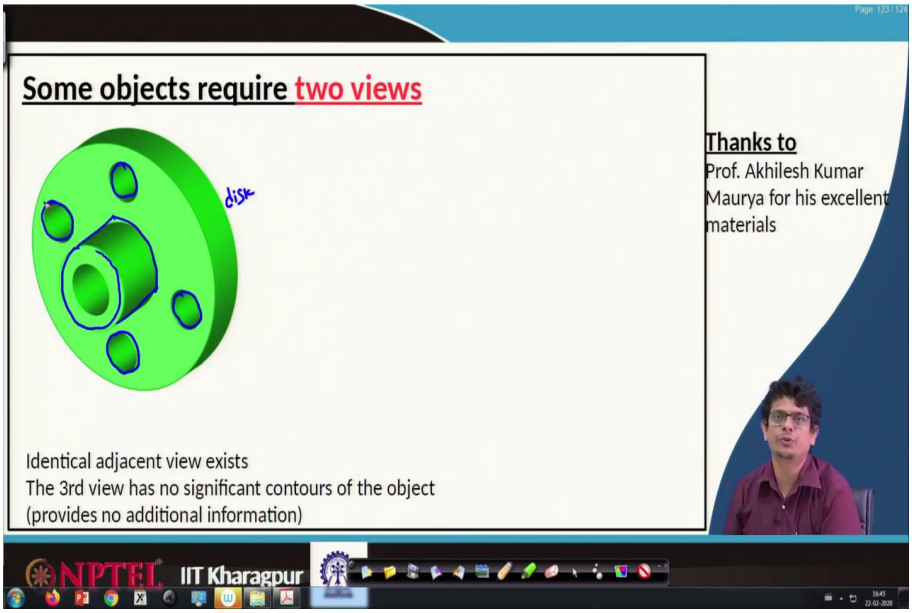

Let us look at other objects where two views are compulsory. For example, identical adjacent views exist the third view has no significant contours of the object and it provides no additional information. In that case, we just require two views only. Let us look at this object. It is a disk type ah object having a cylinder attached on top, this is the cylinder and it contains many holes. This object we would like to visualize.

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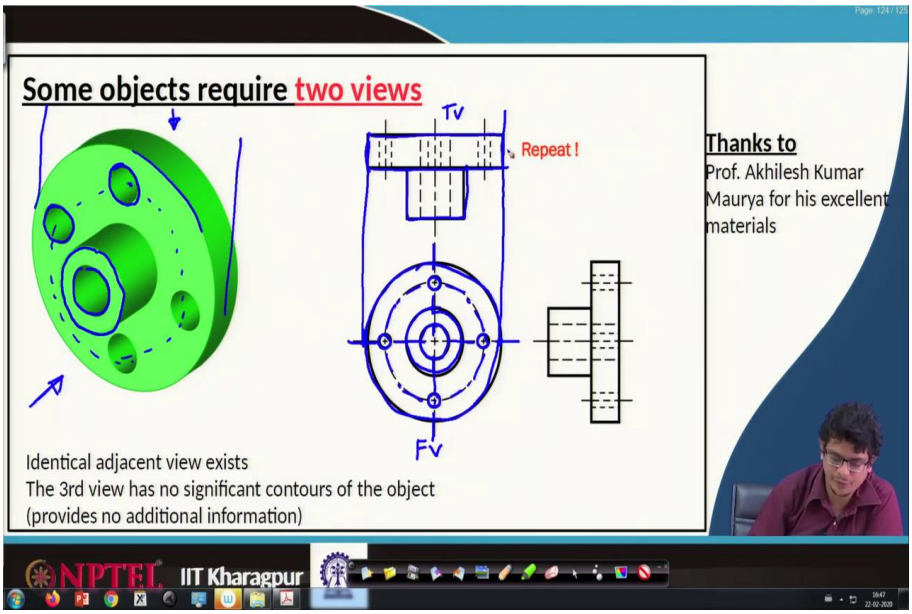

So, let us make the front view direction as this maximum information like cylinder diameters, the circular holes and so on the information we get it. So, let us use that one as the front view. So, whatever the radius we have with that first we have to make a circle, then internally there is one more circle and outside also there is one more circle. So, with that respective radius make the circle and these holes are located on one outer circle, the pitch.

So, we have that long dash, short dash lines on which these holes have been drilled and there are four holes. So, those holes represent this because this is a circular one long dash, short dash, long dash and short dash kind of representation. This is the way we construct front view. The immediate thing is to use top view on the box method when we are going to look at that this entire object is projected.

So, the projection lines bounded by this tangent lines, so here if we are constructing a tangent line, here also if we are constructing a tangent line the object view, for example, this top view will be bounded by these two diameter lines and when we are projecting it and opening that entirely by 90 degrees, then this object comes there. We will have such kind of view.

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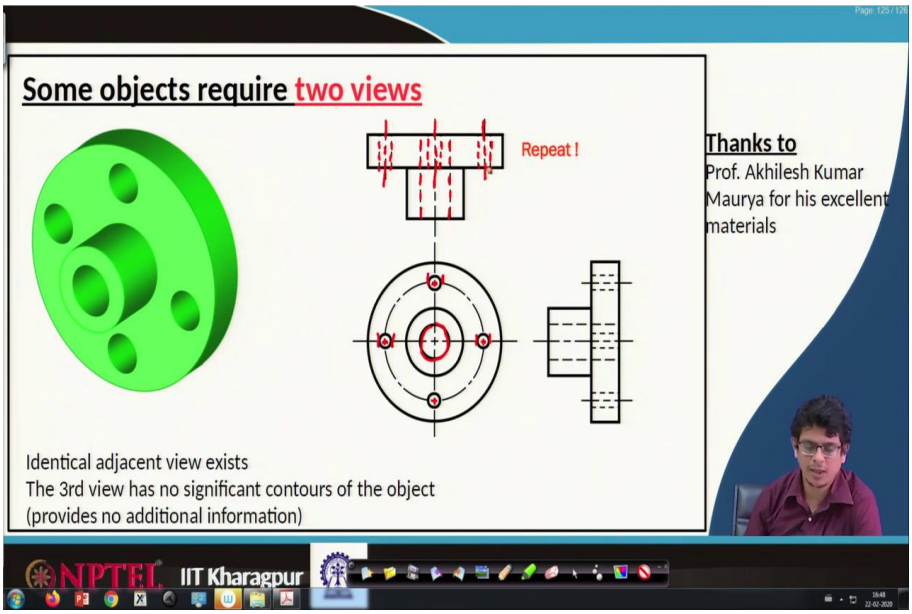

The holes this is the place where holes are located. So, we have those dashed lines, here we have one more circle. So, that indicates that we have dashed lines throughout that, this is another hole.

Similarly here one hole, one more at these locations. So, to represent that we have these dashed lines and this hole has a centre here and there to represent that we have a long dash, short dash, long dash, short dash lines similarly here.

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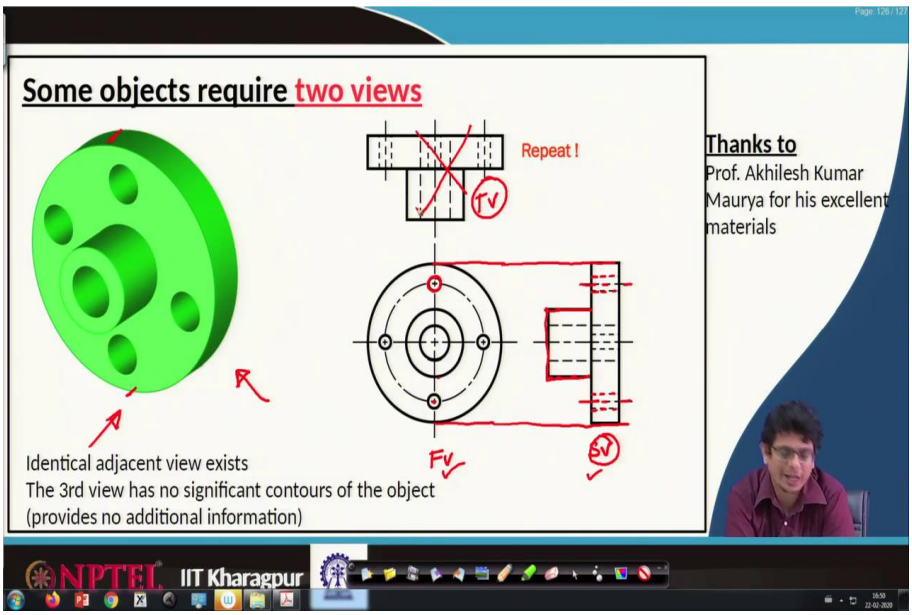

This is the front view and this is the side view. We would like to construct again side view bounded between this one and that one. So, here the entire side view is bounded by these tangent lines and

these lines are again bounding this extra portion. So, once that is constructed, we can just remove that there is a hole here. So, if we are having these tangent lines, again it's bounded by these lines and hole centre here.

If we are looking at front view side view and top view, the side view and the top view are repeating and in such kind of instances keeping front view and side view makes the purpose we do not require. This one it's more like repetition. So, we do not require that top view in this case.

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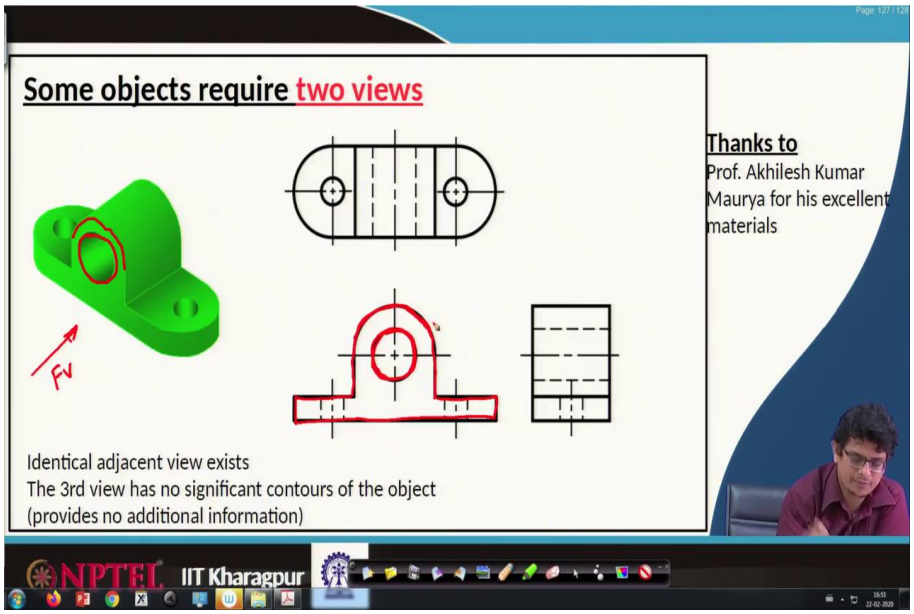

Let us look at one more object to understand this view construction. Maximum dimensions minimum hidden lines this is the direction we should choose for front view, then this entire thing turns out to be such kind of object, this circle corresponds to this circle and this curve corresponds to this one

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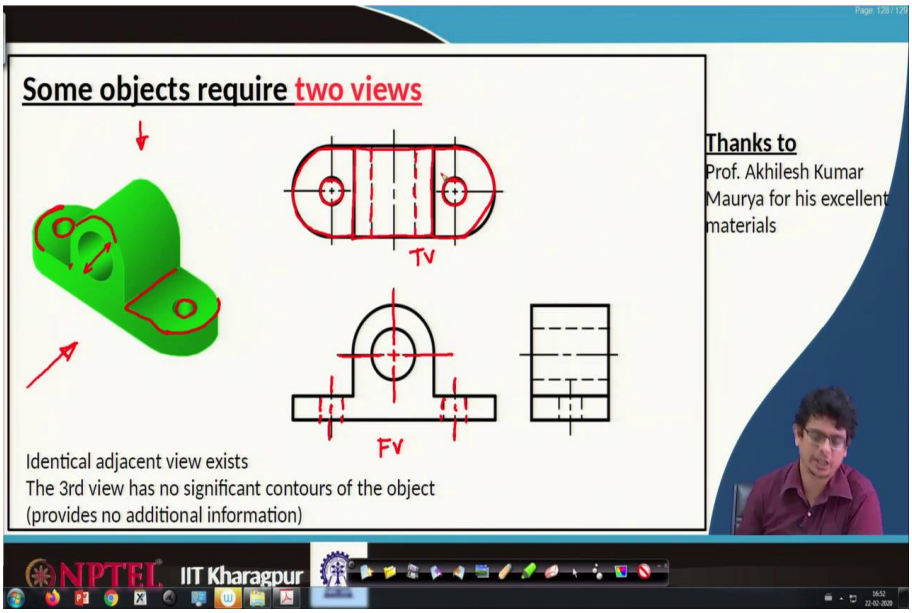

This hole corresponds to that and this one here because this is a hole and having a centre, so we show by long dash short dash lines and here we have one more radius.

So, to represent that a centre, we have this long dash short dash lines. This is the way we construct a front view. Let us look at the top view, this is the front view. Now top view when we are looking at these lines supposed to be visible.

So, we have those lines visible there, this entire semi-circular portion projected onto the bottom plane. So, it looks like a rectangle the whole lines to represent that we have these dashes and from top view when we are looking that we will be observing those curves.

So, we have those curves here the semi-circles. Similarly, this semicircle is visible from the top view. So, that will be visible and this portion as a line we will see that and this holes visible. So, we will have that. Remaining centre lines we will use long dash and short dash. This is the front view direction.

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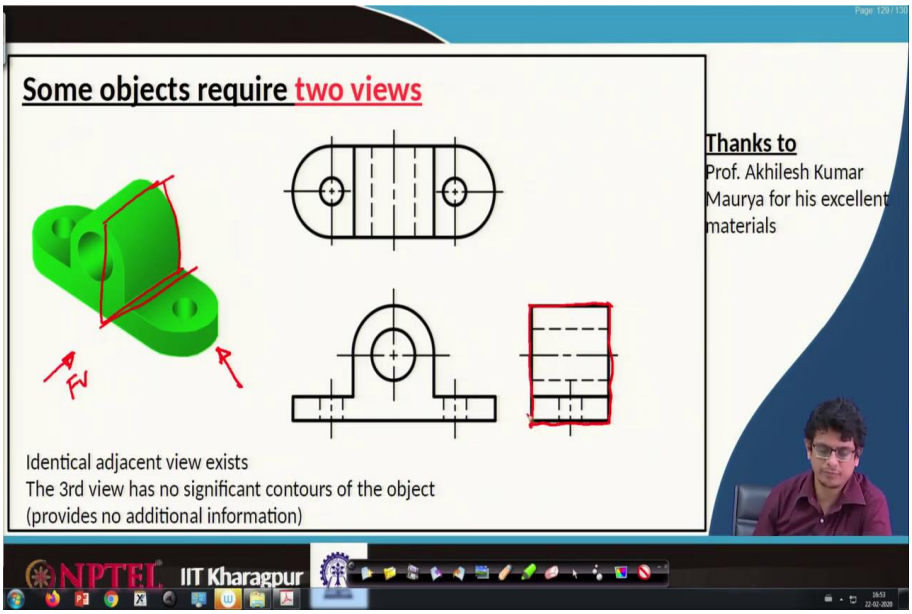

Let us look at from side view. When we are looking side view, this entire thing turns out to be a simple rectangular block. So, that simple rectangular block on the projection we are representing it here and a hole begin end there.

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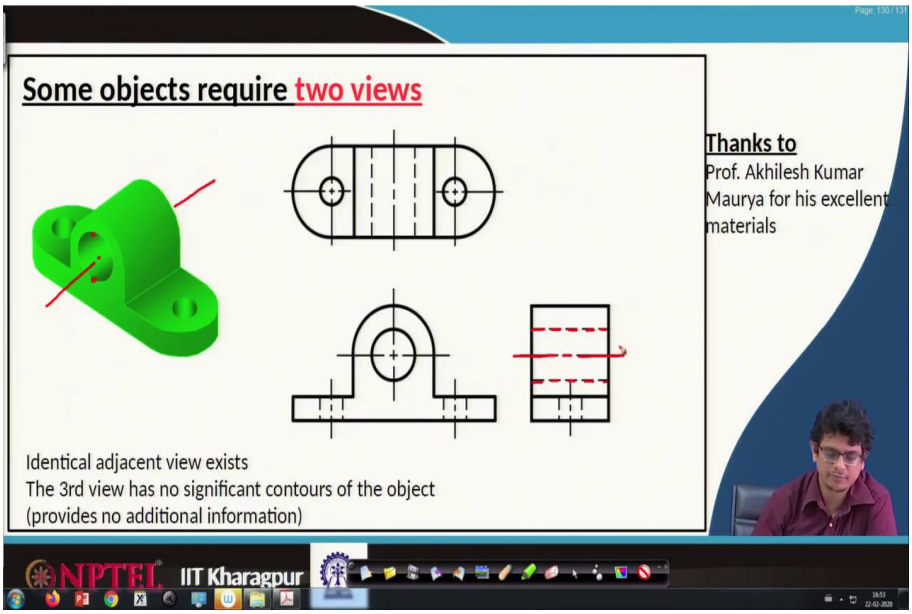

So, we have that dashed lines here axis pass through that. So, we have that long dash short dash line.

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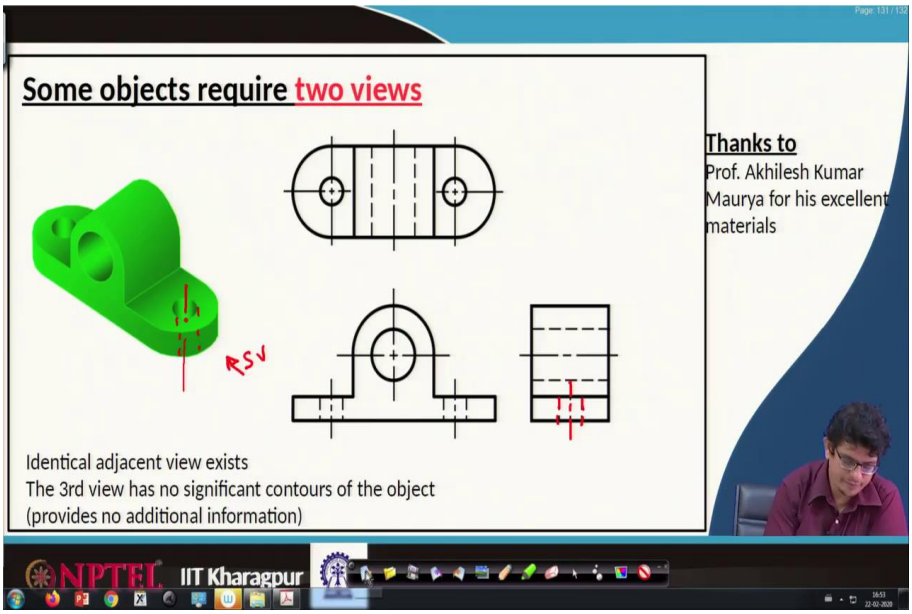

Here there are holes when we are looking from the side view, these lines will be visible. So, we have these dashed lines and an axis line pass through that hole. So, we have that long dash short dash line.

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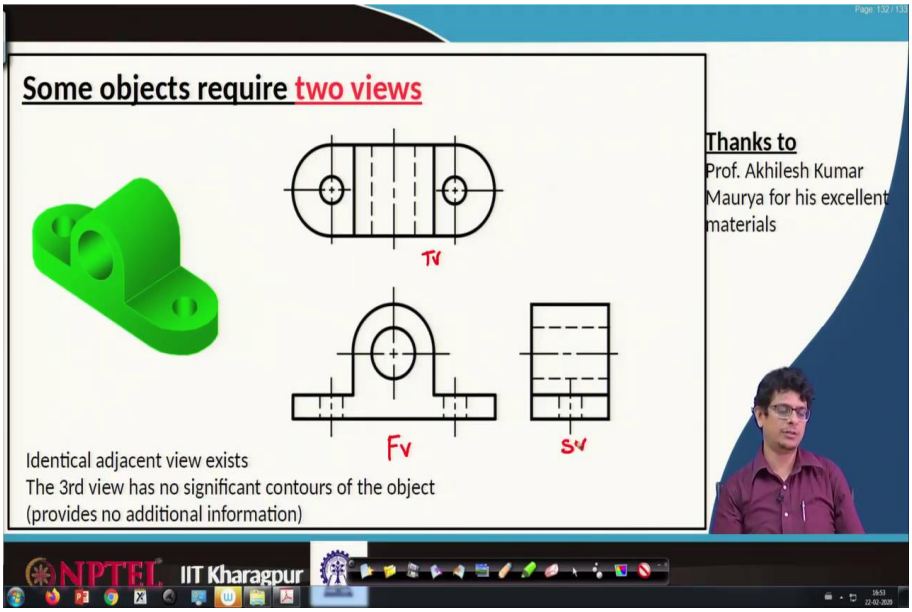

To represents this is the front view, this is the top view and this is the side view on the box using the box method.

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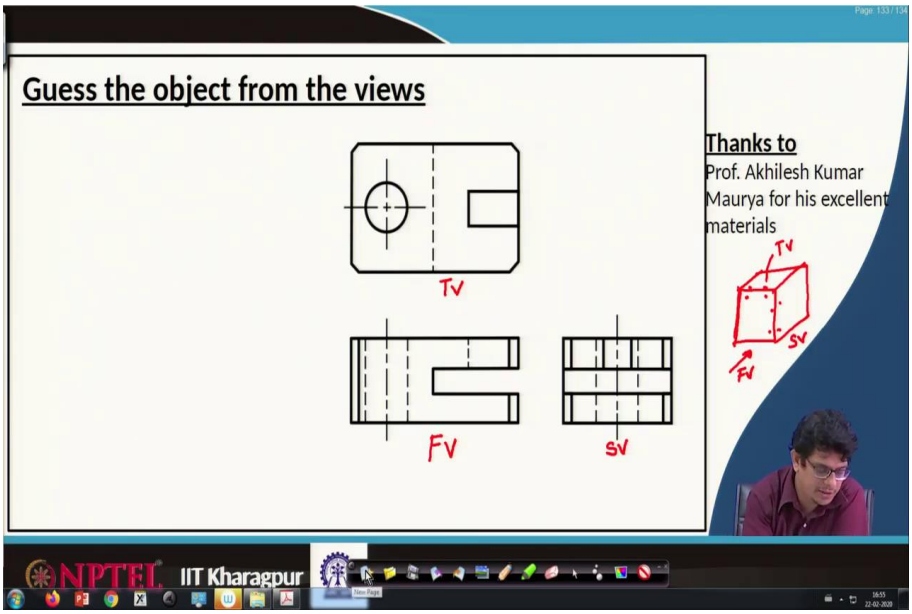

Now, let us guess an object from the views. All the time from the object we are trying to visualize what is the maximum size, maximum dimensions from there. Let us make front view, try to make projections out of it and represent it and connect the picture. Now can we visualize the object from the given views? This is the exercise what you should practice.

So, these are the views given if it is the box method where is the front view, how many views are there. First of all, three views are thereby using the box method. The bottom one always be front view and this is the top view and this is the side view.

That means whatever might be the object if we have something like a box, a front view supported by a side view supported by a top view. So, about that we are going to flip it, above these points, we are going to flip it. So, in that way we are going to sense this object.

So, let us look at those carefully. Can you guess the object front view? There is something like. So, wherever continuous lines are there looks like there might be an object like a protrusion or perhaps depression might be found.

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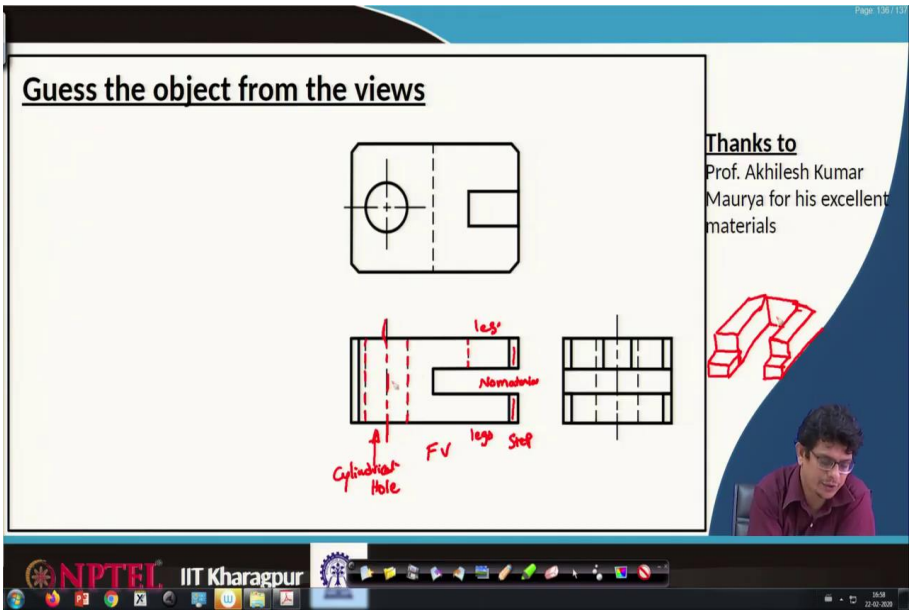

For example, this might be something like a step and there is no material here because this is not a continuous portion. That means, here there is a step kind of thing. No material is more like fork two ah joining kind of portions we have and looks like there is a hidden dashed line that means back side there might be some step kind of thing is happening and there are dashed lines in the front view, two parallel dashed lines perhaps it might be a circular hole kind of thing.

So, if we are again there is something like a step. So, here we might be going to have some cylindrical hole, here we have to see something like a step and it has two legs kind of thing because this axis is also there.

That means, it clear there should be cylinder one if we are looking from the top of that object. So, this is the front side of that object. So, at front side perhaps it is more like a kind of legs we might be seeing there, might be sudden jump and again perhaps we might have such kind of leg such kind of object.

A parallel thing here if we are drawing perhaps again it goes a step kind of thing in this way possibly and this material is removed into the vertical cut. So, perhaps it goes all the way in that way and is something like such kind of object we might be going to see two-leg kind of portion with the cut. So, can you visualize this part because it is supposed to be in the front view direction?

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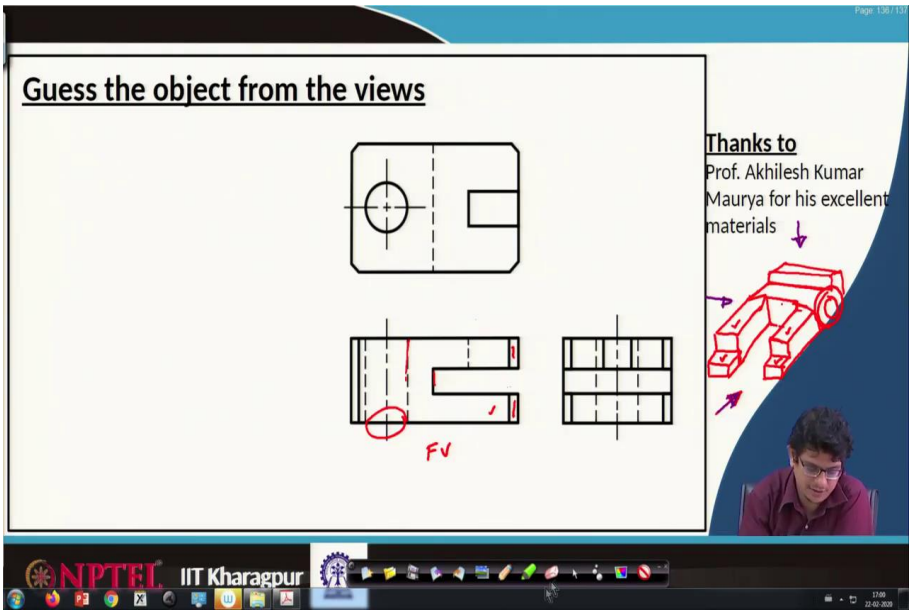

If we are looking that we are supposed to see these legs here and there is a sudden rise, sudden rise on that and it goes meets at this location after that looks like there might be something like a cylindrical kind of object. We might be going to see and this cylinder hole possibly it must have been made it there.

So, possibly if we are looking there here, there might be something like a hole we might be going to see it just a hole. So, it is supposed to be a cylindrical thing and looks like there might be a step passing in that direction. This is the way we may be guessing from the front view.

Let us look at the top view is this object. Whatever the thing we have constructed here is making sense from this top view. We have to see top view means from this direction we have to observe it looks like front view direction if we are observing in this direction, these two blocks supposed to come. So, this is not the right front view, possibly the front view might be in this direction. This is the first observation what we will get from this.

So, when we have such kind of thing possible if we are looking at this. This block, that block supposed to get matched. So, that can also not be a front view.

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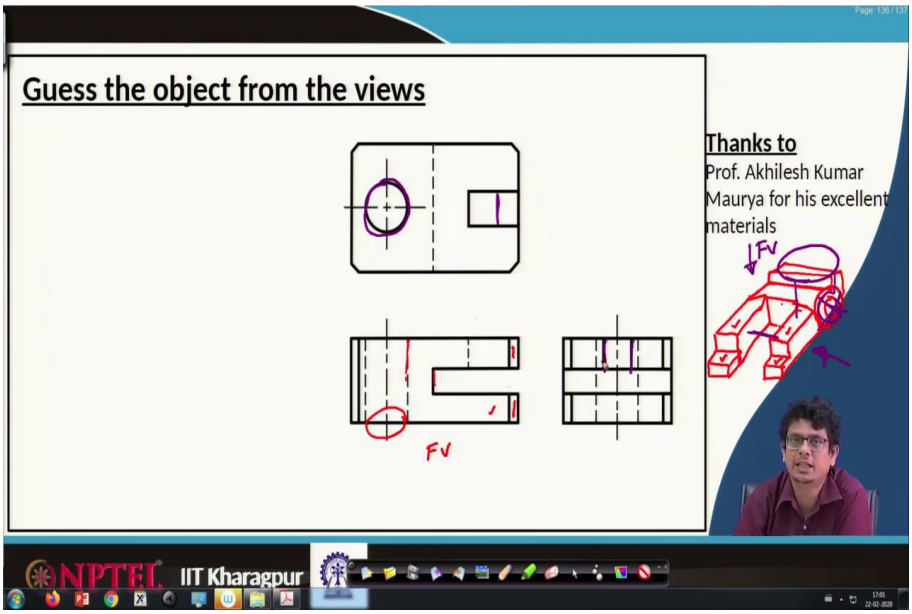

So, we have to look in this direction. This possibly a front view direction when we are making that front view kind of thing 90 degrees aligning it we may be getting this one. From top view is supposed to make this slot here, the slot here we are going to see, but on the top view, we are seeing something like a circle. That means, there must be something like a circle in that direction, but not in that direction.

Similarly, when we are looking from side view here we do not see anything like a circle. So, the circle should not be there in that direction but looks like a projection circle we might be going to sense it in that way. So, because of these reasons let us look at the complete object.

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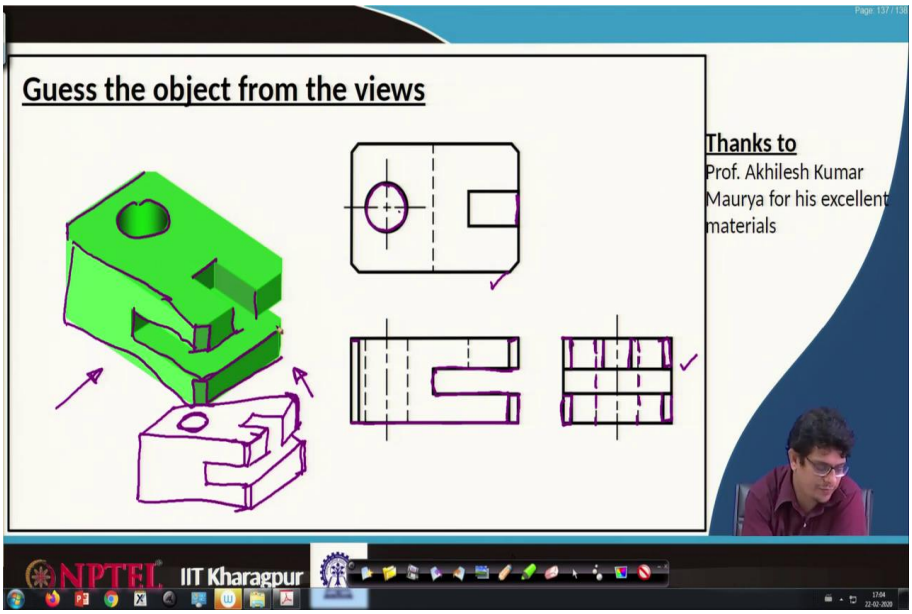

The object that front view having this one having step and this one goes matches, again there is a cut and goes. So, there might be a cut and goes and there is a block which is removed in that direction. So, that is the block. What has been removed, again it is a tapered one which goes in that plane.

So, if we are looking at this front view, it is quite easy for us to draw the picture something like this is the one having this additional part. So, once the front view is clear, top view supposed to make a circle at that location. So, top view supposed to make a circular hole at that location from here and this cut supposed to go all the way. So, when we are looking that that cut supposed to go all the way down also in that way and this is a closed one.

So, there should be a bottom one is supposed to be a closed one. In that way when we are looking from a side view, we have this open thing and closed one. So, that will be these portions and there is a tapered one small rectangle we are going to see there. So, the tapered one small rectangle is that on four corners we have to interpret and there is a circular hole having these dashed lines.

So, just looking at one front view side view, we will not be in a position to get. First of all, we have to visualize what is the front view. Can we reasonably guess is that consistent with a top view at the same time is it consistent with the side view?

Based on that one should be in a position to do these front and back iterations to construct visually these kind of 3D objects. So, looking at views also one should practice how the object looks like in an isometric way.

Thank you very much.