Indian Institute of Technology Kanpur
National Programme on Technology Enhanced Learning (NPTEL)
Course Title
Engineering Graphics

Lecture-07
Orthographic Projections-Part Interviewee:

by
Prof. Nihar Ranjan Patra
Department of Civil Engineering, IIT Kanpur

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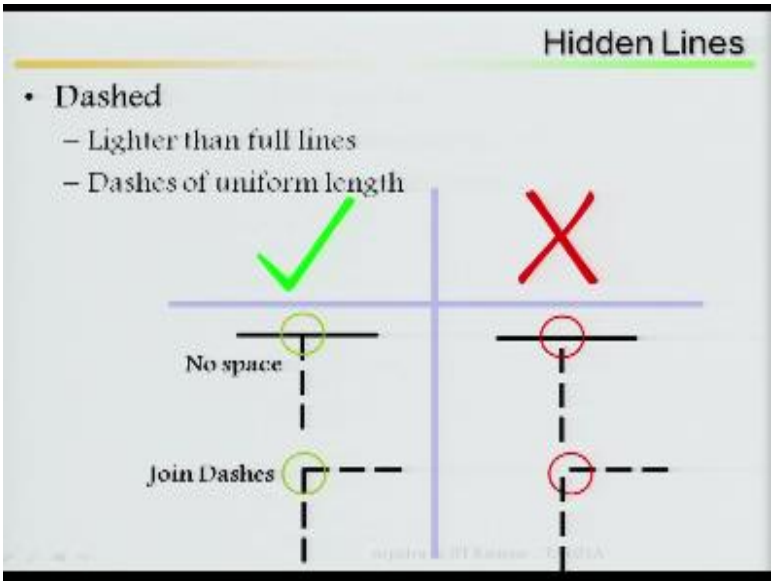

Last class I have finished different conventions in orthographic projections just a brief review, if there is a line as well there is a hidden line, you see if your mark it both these cases there should not be any gap between the joints and it should be dashes of uniform length and it should be joined together.

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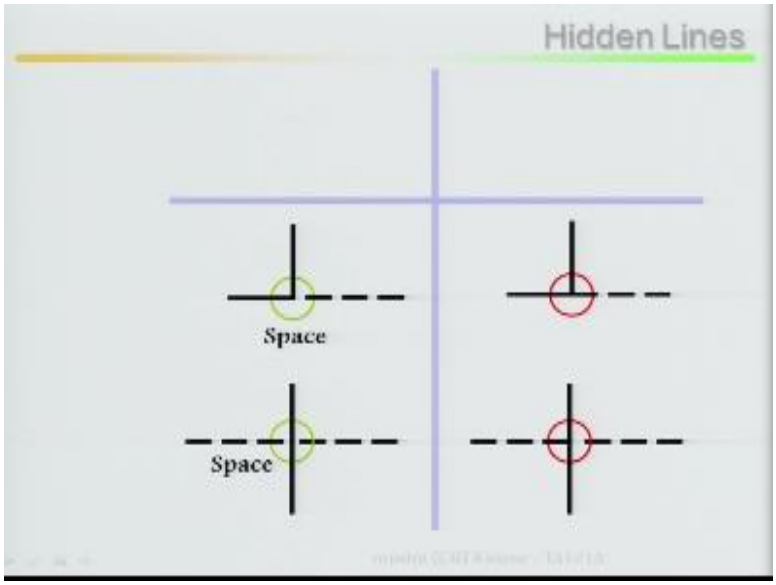

Up to this I have finished last class.

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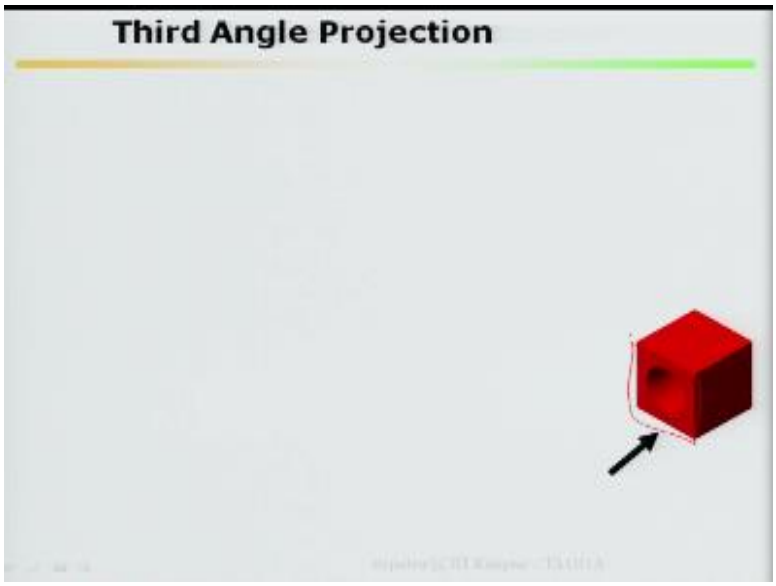

Now let me start with few examples of third angle projections as well as first angle projections. So we will start with simple example, and we will go to the complicated, then curved face examples. This is a simple cube having a hole throughout this and this cube has been visualized by this direction, once there is a direction has been given this is the direction where we are visualizing this object that means this face will be frontal face, our front view will come from here.

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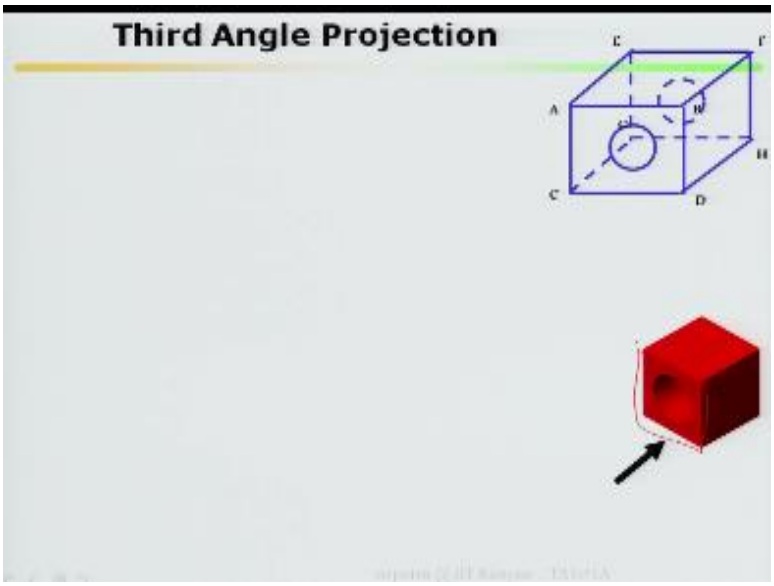

Now let me take out this view 3D picture it has been drawn, and if you look at here and different surfaces has been marked, it will be better if you mark it different surfaces a, b, c, d, front face then g, h, e, f, back face.

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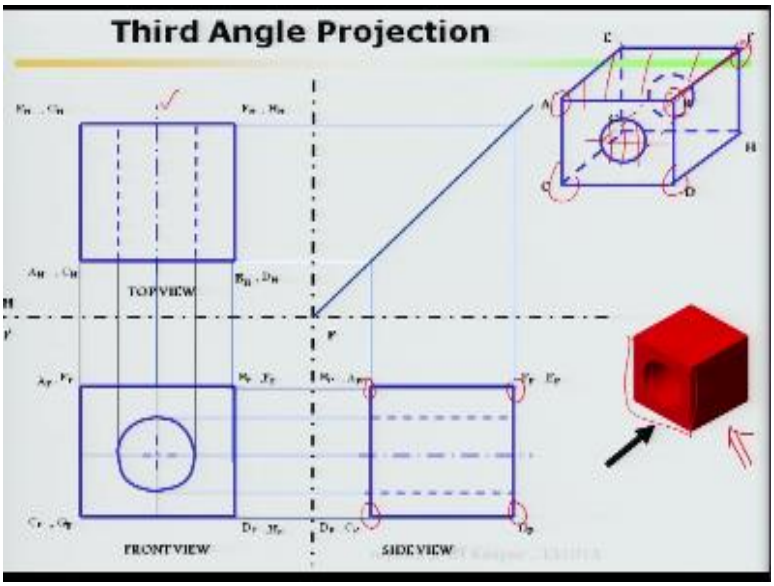

Now then once you start your drawing, in a drawing you divide into four quadrants this is the beginning divide into four quadrant, and if it is a third angle projection third angle projection generally top view is at the top that means top view in the horizontal plane, and front view in the frontal plane. So you clearly mark it if it is a third angle projections, this is a horizontal plane that means top view will be lying here, frontal plane front view will be lying here, then profile plane.

Profile plane means here your third angle projection right hand side view will be drawn. As I said earlier once you draw the two views front and top it will be very easy to make it back to your profile view. So in a drawing seat accordingly you scale it down, then mark your points where is your frontal plane, where is your horizontal plane, where is your profile plane. Then name it in that front surface name it a, b, c, d then rear surface face or rear face you can name it e, f, g, h.

Then write it top view, front view, and side view so that there will not be any further confusion while doing the drawing. Then start with this front view, so I am looking from this side so this will be my front view. So if this is my front view I draw it then name it also. Then at the center

there is a circle, mark it at the center, mark the circle point and draw the circle, this is a very simple one, this is starting point.

Then top view you mark it top view, then extend it to your center point of your front view, extend it to top view, then this circle at the extreme side at the end side diameter wise you can extend it back. Then in the top view what you are supposed to do, this is your hidden lines if there is a circle throughout, there is a whole throughout if I am looking from the top view or top surface that means this part -- it is not going to visible, this will be hidden line.

And this hidden line will be coming because this point is merging this point, this point, this point particularly if I am doing it here this is merging, this is merging, this is merging that means if I am drawing a line here, that means from here to here I can see only one dotted line, this dotted line. Because this point and this point b and d it will merge and a and c will merge. I will see this surface and this will be as a hidden line, two hidden lines here and along with your center line.

This is your center line, this is your two surface side face of this circle and it is the hidden line. Then draw a 45˚ line in your top view access nearby this 45˚. So project it back from the top view you project it back, first the sides that means first the surface you project it back. Similarly from here front view the surface has to be projected back, then this intersection points has to be marked.

So these are all your intersection points, so it has to be marked. Then circle has to be projected back, then again in the side view that means in this case I am looking at from this side, this is your right hand side view. Once I am looking at this again this hollow face of the circle throughout I cannot see it, so this will be dotted line. Here it is a dotted line then center line has to be marked.

This completes your third angle projections then you can name it, the surface the way you name it a, b, c, d this is your frontal plane or frontal view. Similarly you can write it – you see I write it A_f, B_f, C_f and D_f. A frontal, B frontal, C frontal, D frontal this is the front face. Rear face will

come into picture because this will merge, this will merge, this will merge with this, then once rear face will be there A_e is merging then E_f is coming.

Similarly F_f is coming, similarly G_f is coming, H_f is coming. Similar way you have to mark your top surface, similar way you have to mark your profile or side view, this completes your third angle projections.

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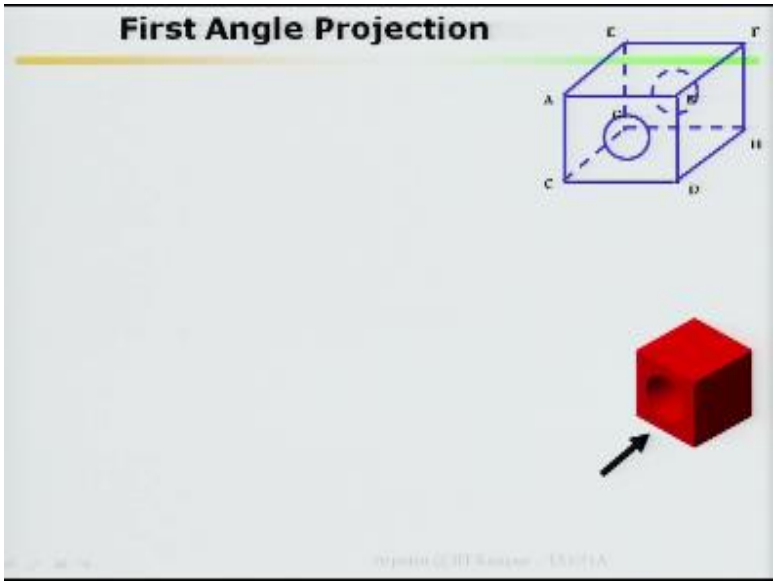

Go to the first angle projections as I said, there might be change in positions, but the views will be same. The benefit is a kind of first angle projections, top view in third angle projections, top view at the front, top view at the top, front view below the top view. And in case of first angle projections front view at the top, top view will be below the front view, but the front view will be same as the front view, size and the dimension will be the same as your third angle projections.

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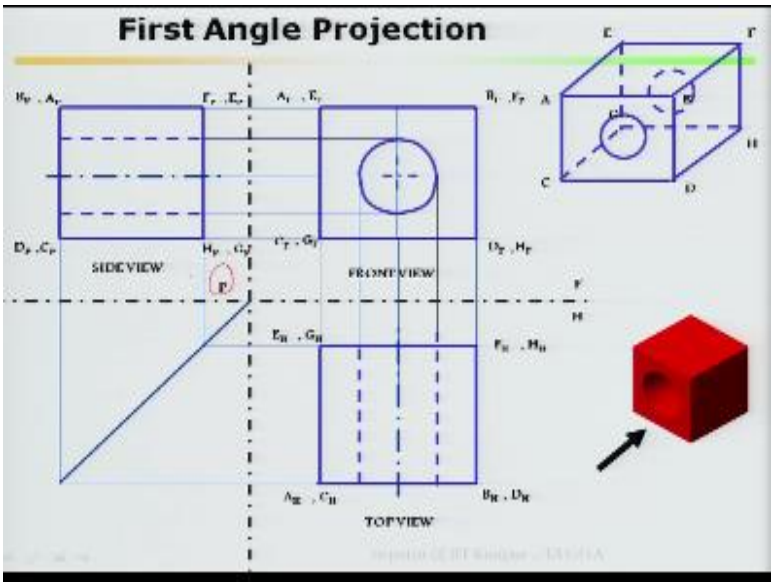

So I am looking at this object same, this is my viewing directions, then principal make it into four quadrants and mark it where is your frontal plane, where is your horizontal plane, in first angle projections front view at the top, so that is how this has been marked as a frontal plane. And top view at the bottom of your front view, so this is your horizontal plane and this is your profile plane.

This profile plane though it is in the left side, but this profile plane in side view you are going to see it is your right hand side, side view, this is your right hand side view, you are producing in the left hand side. So then same way you mark it front view, then top view, then project it back front view to side view then top view, then it completes in these surfaces how you are looking at this front view and top view.

This is your first angle projections. If I look at this first angle projection and third angle projections this is my front view, viewing direction is same.

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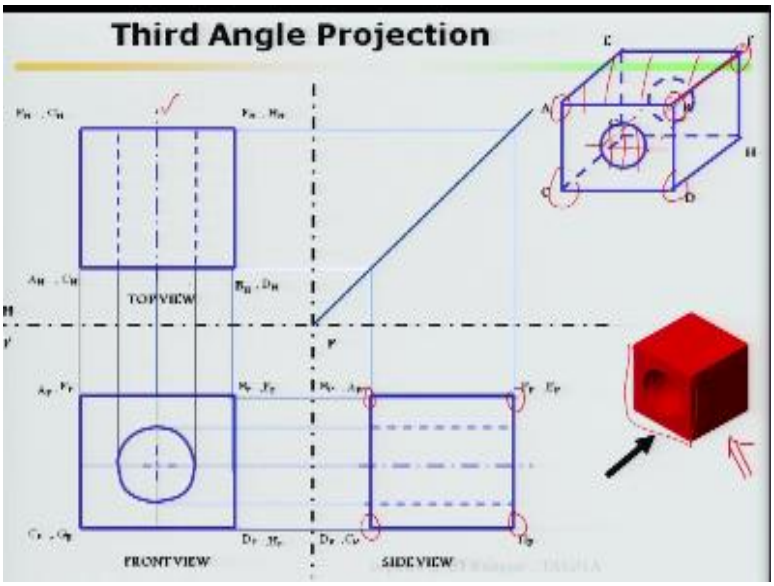

Now come back to your third angle projections, this is your front view, these views are same, maybe this orientation, here in this case top view at the top, front view at the bottom, that case front view at the top, top view at the bottom.

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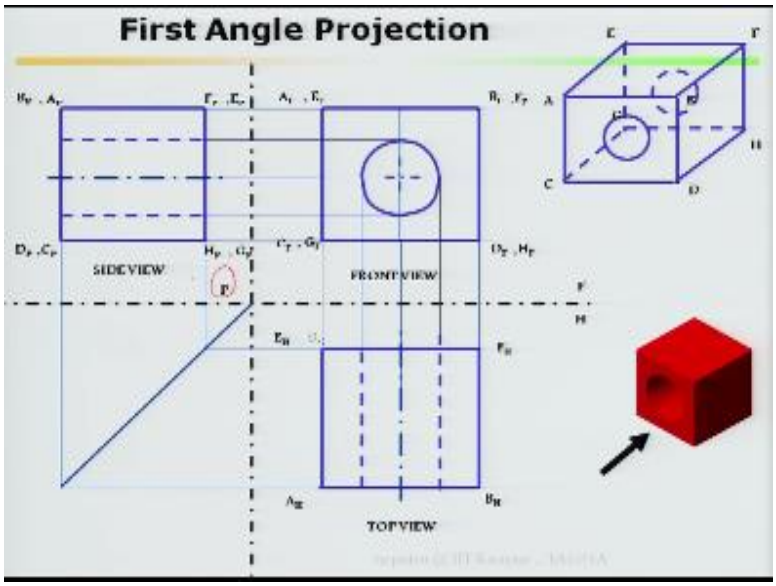

It may change with the viewing directions but once the viewing direction is the same the views will be same.

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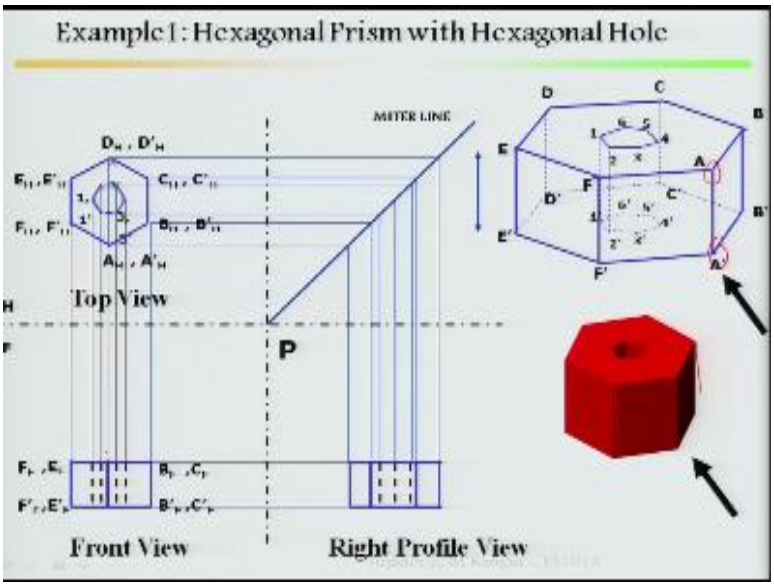

This is simple example for both this cases. Now let us start with another example that was a simple example, let us start with example one, example one hexagonal prism with hexagonal hole in a third angle projections. And this is your viewing directions has been given, and I have named it outer surface a, b, c, d, e then e, f and similarly a′, b′, c′, d′, e′, f′ inside surface also 1, 2, 3, 4, 5, 6 and bottom part also 1′, 2′, 3′, 4′ then as it is make it into four quadrants then mark horizontal plane as well as frontal plane.

Similarly mark your profile plane and mark your top view, front view and right side, right profile view because you are going to draw it for in third angle projections. Then in the top view first draw the outer hexagon, then mark it because it is in the top view horizontal plane mark it A_H, B_H, C_H, D_H, E_H and F_H. Then -- because it is at the top view that means A and A′ this will merge, A and A′ it will merge if you look at here A_H and A'_H both points are coming.

Then come to your – mark your inside and draw a circle, then draw your inside hexagon, draw the inside hexagon. Once you draw the circle you can do it very easily for inside hexagon, then mark it 11′, 22′, 33′, 44′, if you look at here this is your 1, this point is your 1 and 1′ so then this

is your 22′, this is your 3, 4, 5. I just put it arbitrarily 1, 3 and 5. Then from there draw your front view, if I look at there this is my front view that means this surface.

If I am looking at there that means this is my border line this and this. This will be merged, this will be merged, but there are hidden lines appear in your hexagonal because of that there are hidden lines. This is the front face, front view then mark it front face, front view, front face from where I am looking at from here. What are the points you can mark it, e f, b, c. EF and BC if I am looking it this will be my outer surface, this is coming then BC is coming.

Then from there because here it has to be marked back to your front view, then extend it, then similarly a side view outer surface you mark it your outer surface side view. And also inside face also you mark it inside face it is very easiest one only, if you do it systematically it will be very easy to draw it. Here there are hidden lines, this hidden line will come from where, inside hexagon it will come from there.

Now take it 1, then this is your 2, this is your 3, this is 4, 5, 6 all you mark it then project it back this will be your hidden line. Similarly this hidden line for your right side profile view, because this is a regular hexagon, inside the hexagonal hole even if this is my front face, right side face will be that side easier to hexagonal shape, similar surface will come in right side view.

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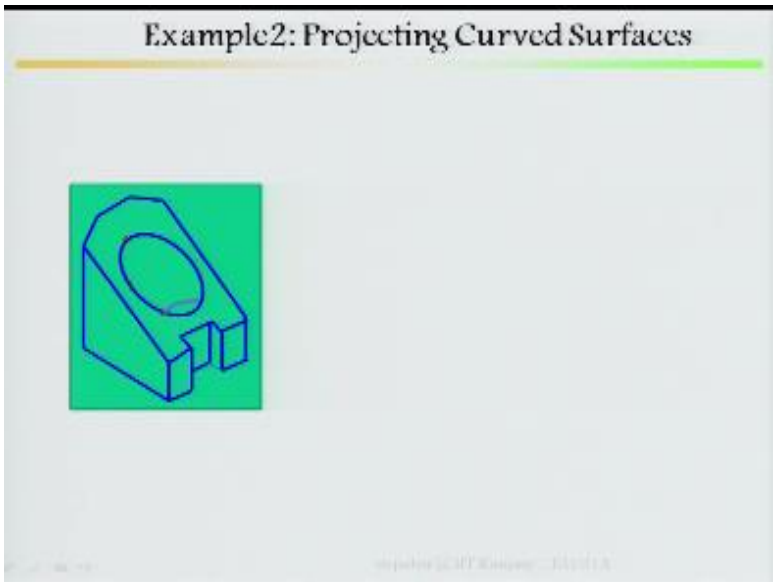

Next one is your interesting one example 2, projecting curved surfaces. If you look at it this is a regular feature of a cube it has been got it, slanted it. So that this face is elliptical, elliptical that means it has been got it, so this is not circular, this is not circular, rather ellipse. But bottom part is circular, bottom part is circular, because this has been got it in a slanted way.

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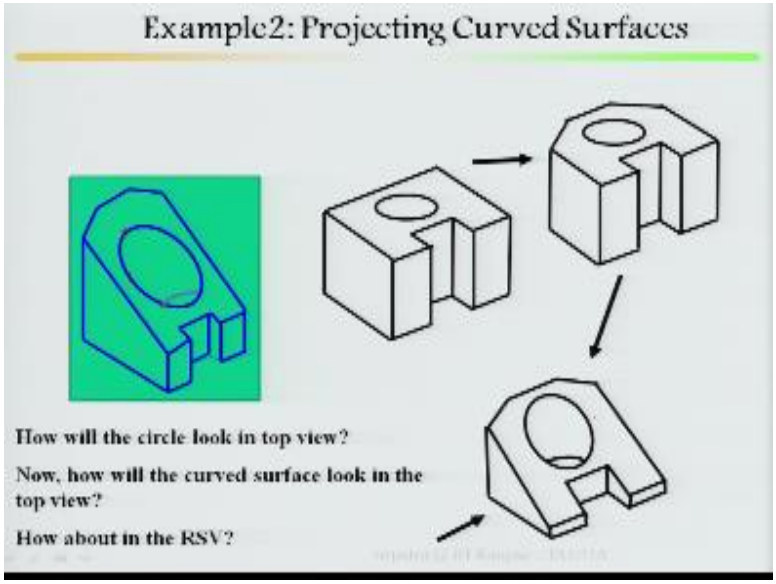

So how to project it back, this is a regular face, how it looks like this is a regular face, then how will the circle look at the top view see, how it has been made it. This, this and this, it has been got it. Now how will the curved surface look in the top view, in this case how this curved surface will look at, it is a regular section. The curved surface look like a circle, now I got it inclined, then how the curved surface look like, how about in the right side view? I this is my front view what is about your right side view?

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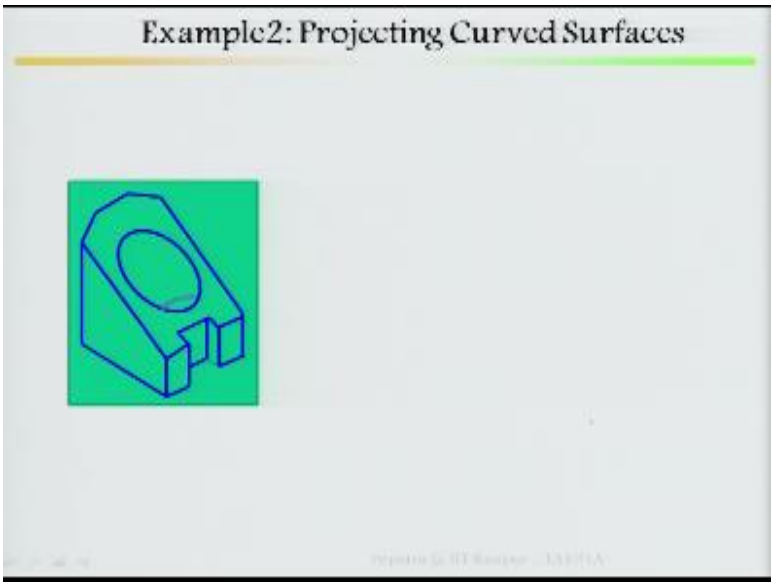

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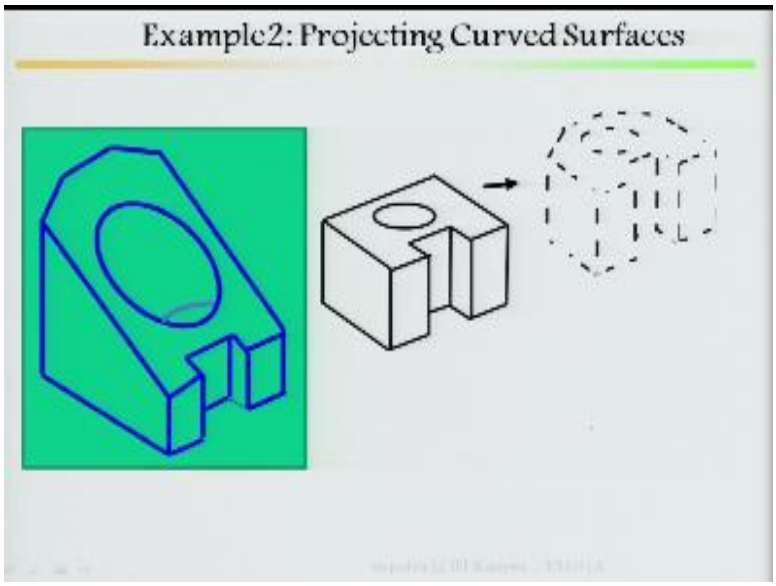

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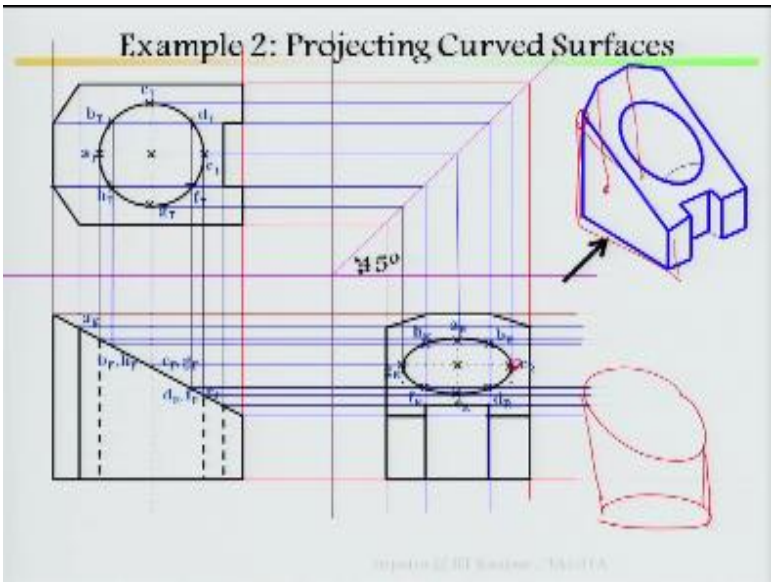

Take this curved surface, take that, particularly that view you take it, this is your direction of your view that means this is your front face, this is your direction of your view. Then draw your code quadrants, mark your horizontal plane as well as frontal plane, then draw the front face. If I am looking at here that means this surface I can very easily see it, this is your – this surface then mark it in the top view as well as top view which part you can see it very easily.

This top view you can very easily mark it, because once you are looking at the top view that means this point and this point will merge, similarly this to this point will merge, this to this point will merge, it will come as a one line in this directions. Then mark your side view, here in the top view how it looks, if I am looking at the top view how it looks, it is a circle or it is ellipse? Why? Tell me, in the top view it is inclined surface like this in the top view because there is a surface is like this then it is coming, right.

Then what will happen, this point will merge this, this point will merge this, this will – just let me finish and see it. Mark in the top view circle points, regular points you mark it, dual number of equal points or twenty points you mark it, then once you mark it you name it, once you name it you project it back, project it back this point to project it back in the surface. This is your

inclined surface, project it back this points and mark it this points, this points also project it back to your side view.

And respective points, suppose this is your C point with respect to C it has been projected back and this point has been projected back, this will be your point. Then each coordinate has to be located, each coordinate has to be located in the side view, let me see how it looks. Is it clear, now in the top view it looks a circle, because if you look at here it is got it, because this point has to be merged, bottom face is a circle, bottom face is a circle though it looks like a curved surface at the top, but this one is to one it will be merged.

So that means it will be looking like your circle, it is a circle then here this is your curved surface, this circle the moment I looked at this side view how it looks like, this is a ellipse. So this is the thinking projecting a curved surface and it will be easiest if you mark it, name it one by one, then project it back to your corresponding front view, then again from the top view you project it back, from the front view you project it back, intersection point you will get automatically, the view points for your side view.

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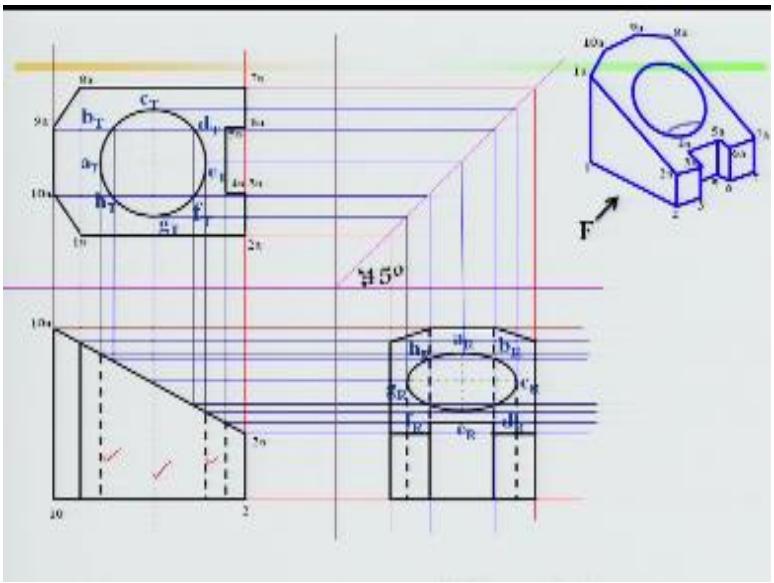

Once again it is a complete view, this is your top view, this is your front view, these two lines are what? These two lines are – the circle is inside and it is inclined, it is a throughout, these are all your hidden lines. And this will be your center line, because this is a circle.

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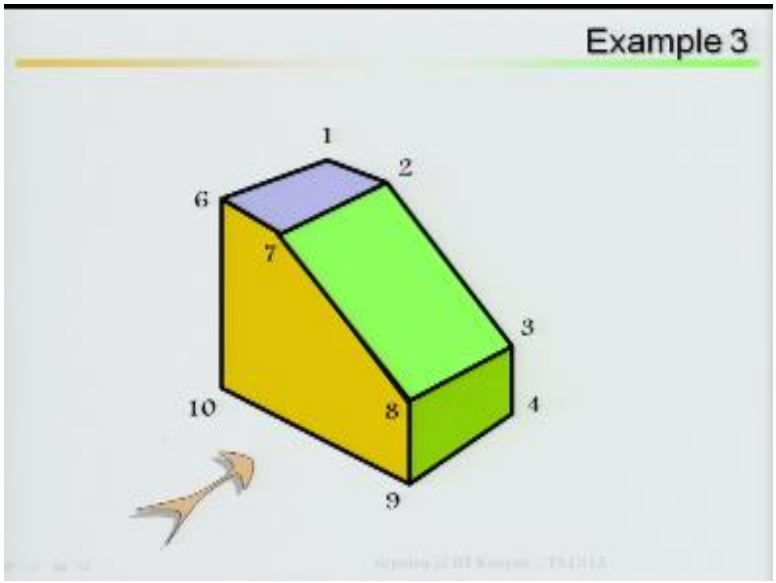

So then example three, look at this surface.

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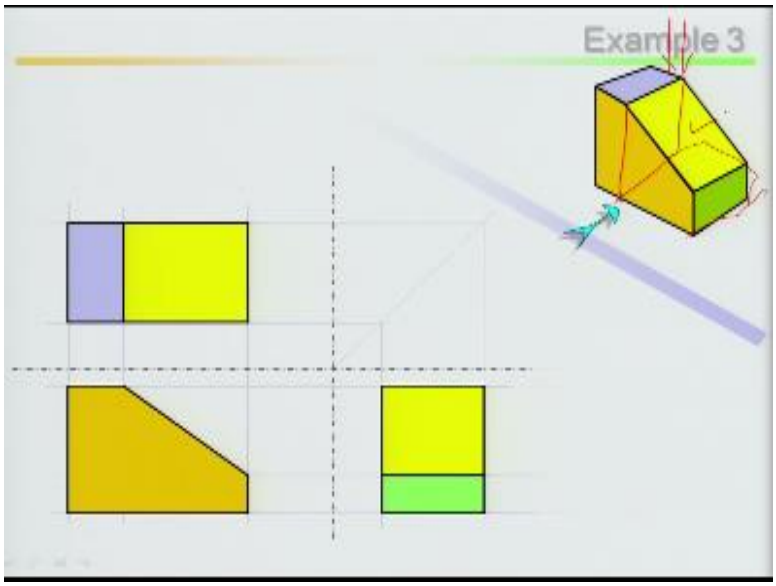

Though I have covered it earlier also example three, how it looks? I said earlier because different, different surfaces we have just made it different colors, yellow, blue, orange, these colors are there. Now if you look at front view how these colors are there, front and this is your top view. To make it understanding, better understanding if you look at here in the top view I am looking at the top.

Now this is inclined, so that means you should not say that in the top view you should see as an inclined surface, no. what will happen this point to this point will be merged, this point to this point will be merged. So it will be looking like the surface, so it will be this surface from here to bottom of the – from here with the surface, this is your top view. But inclined face you are going to see it in your front view.

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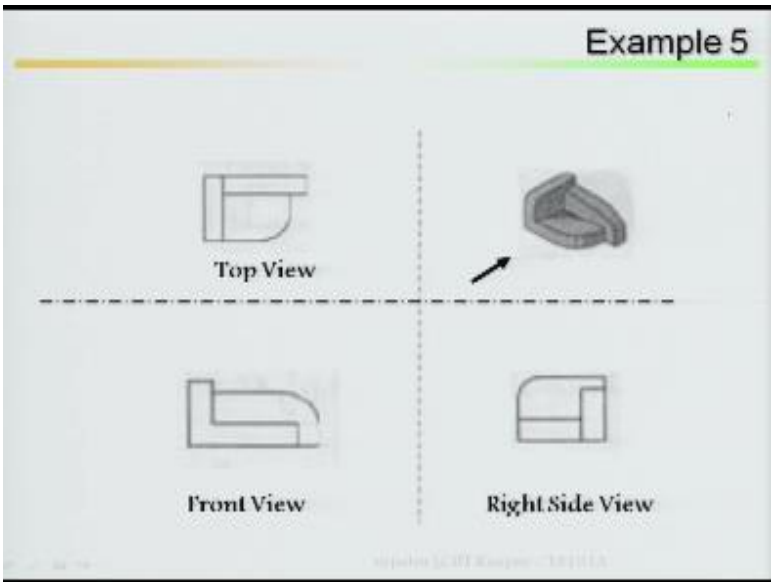

This is a continuation of example.

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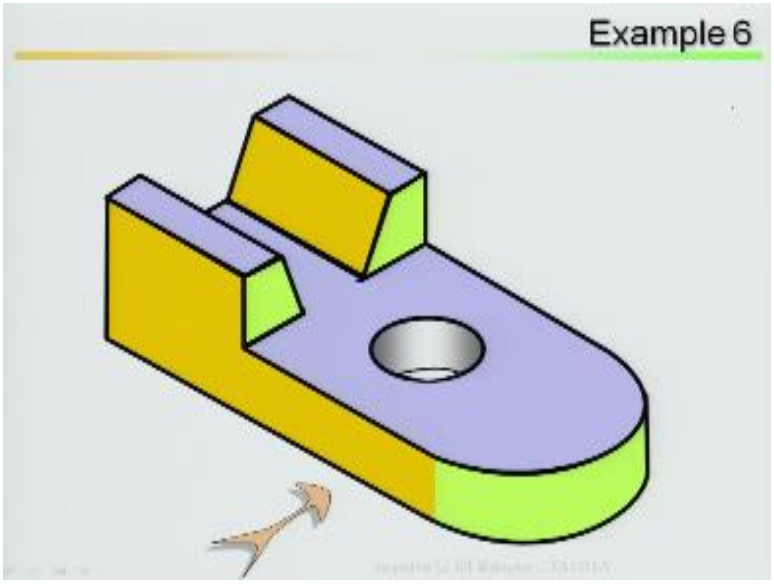

There are few examples, now there is another features of your example, curved faces are there, now you are viewing here and there is a hole throughout this section, there is here also there is a curved face or you can say there is a circle, half of a circle.

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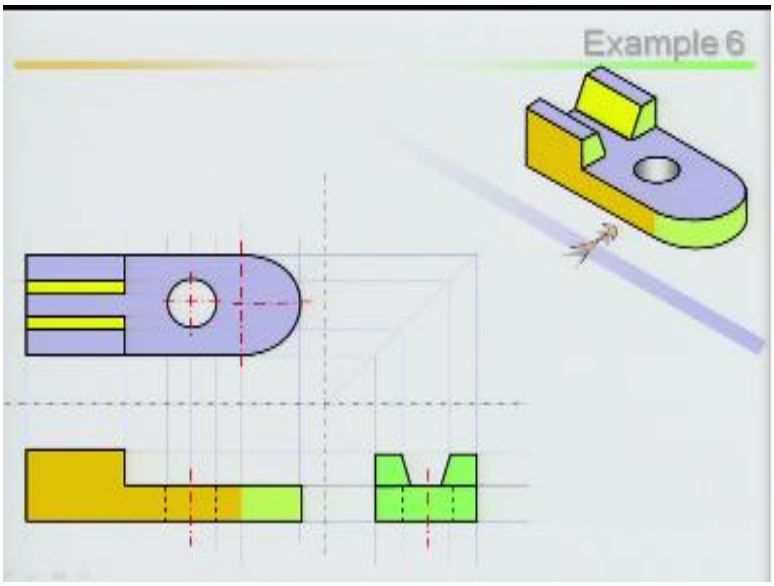

Then how it looks, if you can see that if I am looking at the top view this is my top view, that means this point, this point will merge, this point, this point will merge, this point, this point will merge, this will be a circle, this will be a circle. So in the front view this circle is inside that is why there is a dotted line. In the side view again this circle will be dotted line right, anything else you are looking at the difference.

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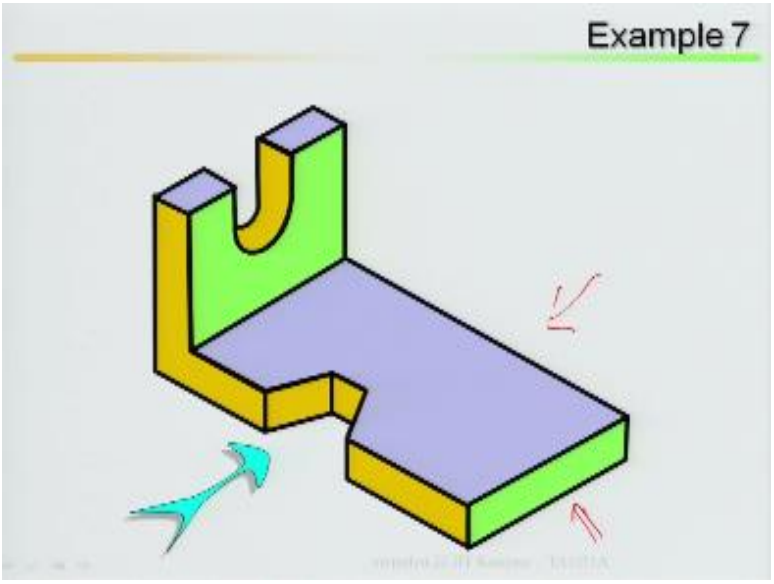

Similarly example seven, I am looking from this, why I am looking this direction from here, as I said you set a direction, your front view should be such a way that maximum number of parts you can visualize. As far as possible number one point is your maximum number of parts you can visualize or components you can visualize or components you can visualize, number two point as far as possible avoid hidden lines, hidden lines in your front view.

I can see these directions also front view, I can see these direction also front view. If I look at from these directions this will be hidden line. If I look at here this will be again hidden line, so I choose it so that I can see, I can see here.

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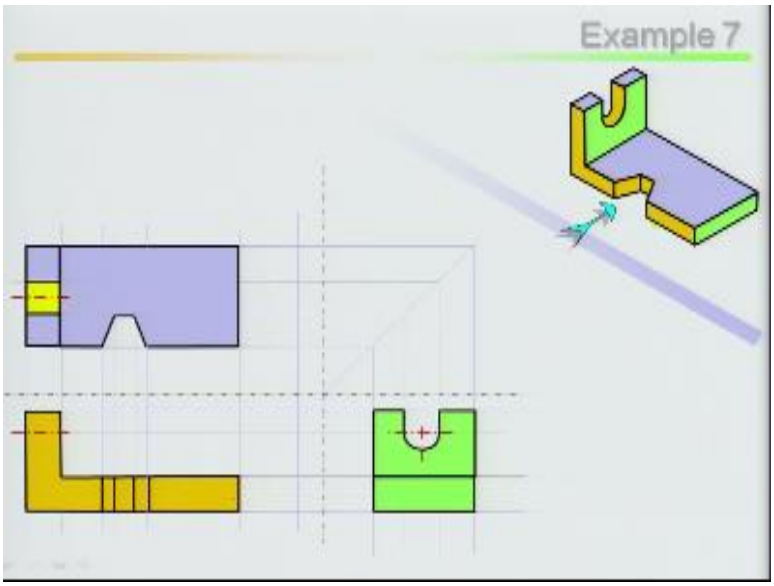

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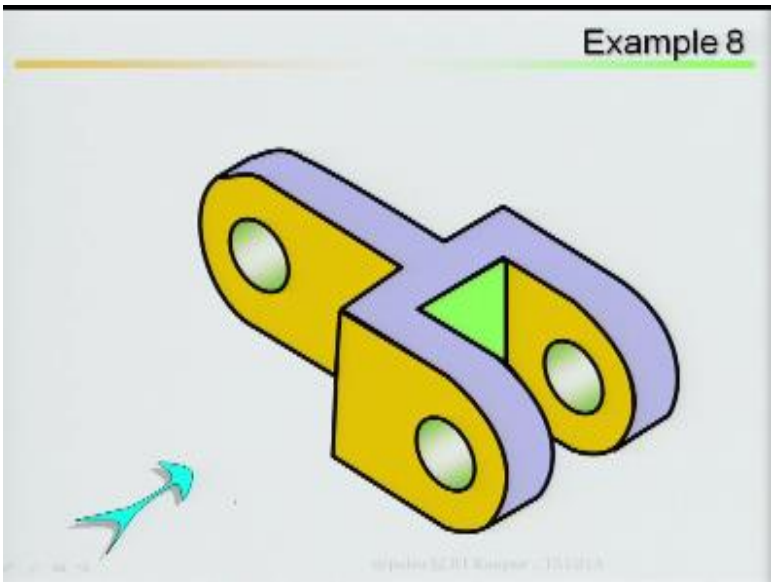

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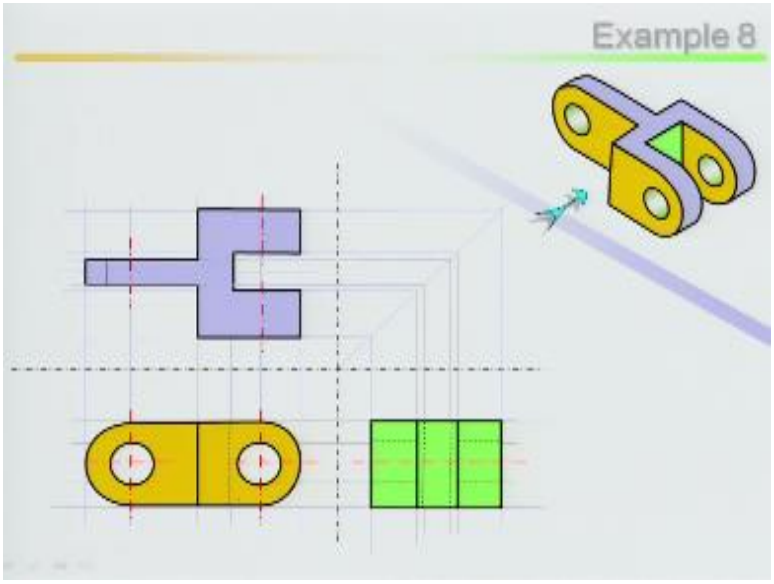

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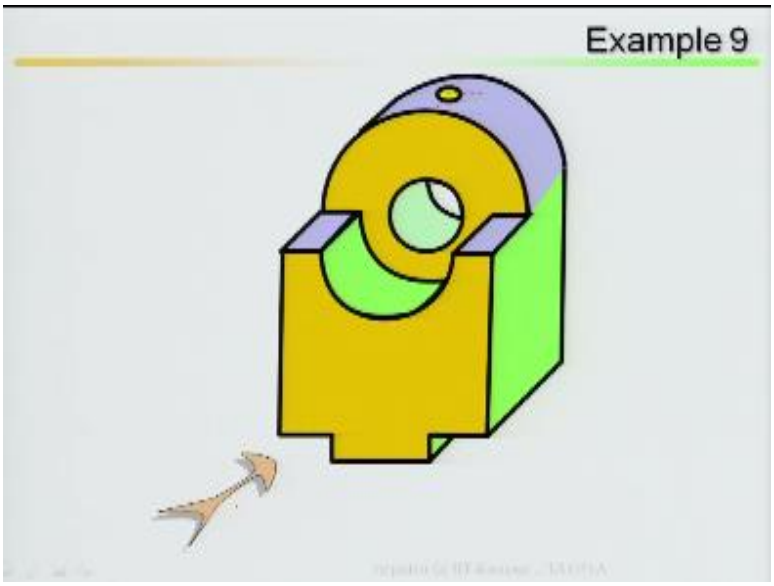

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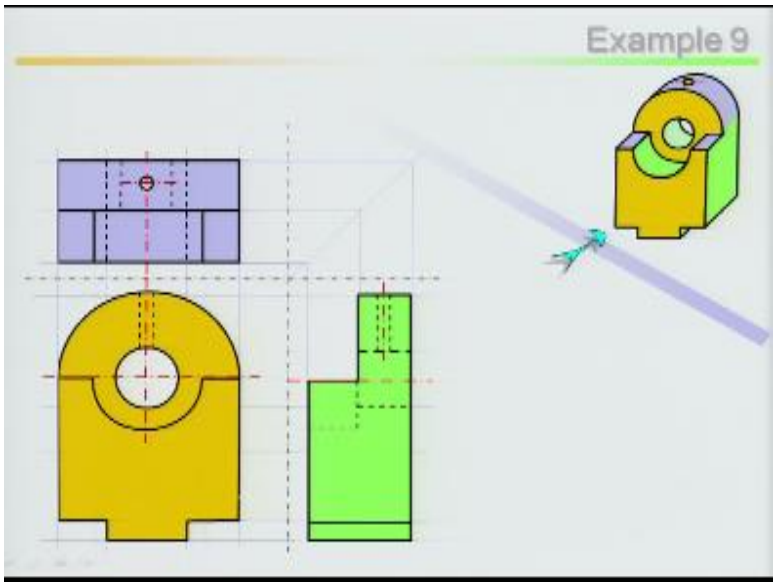

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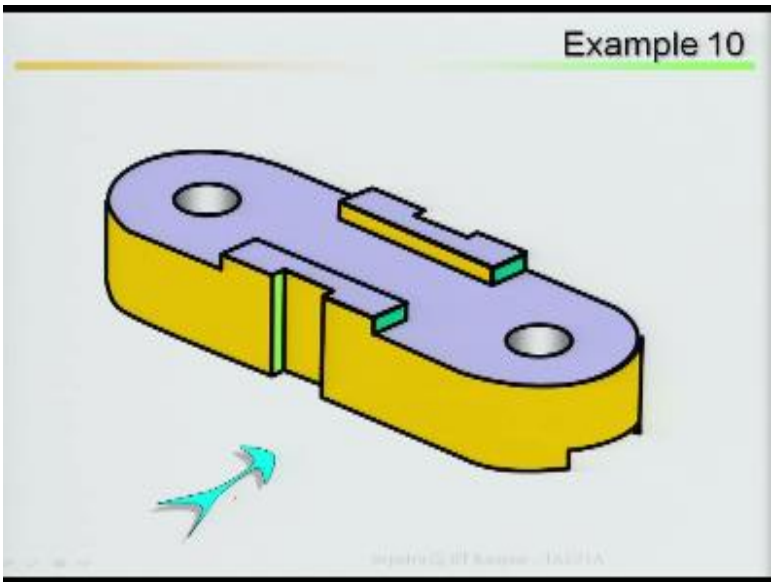

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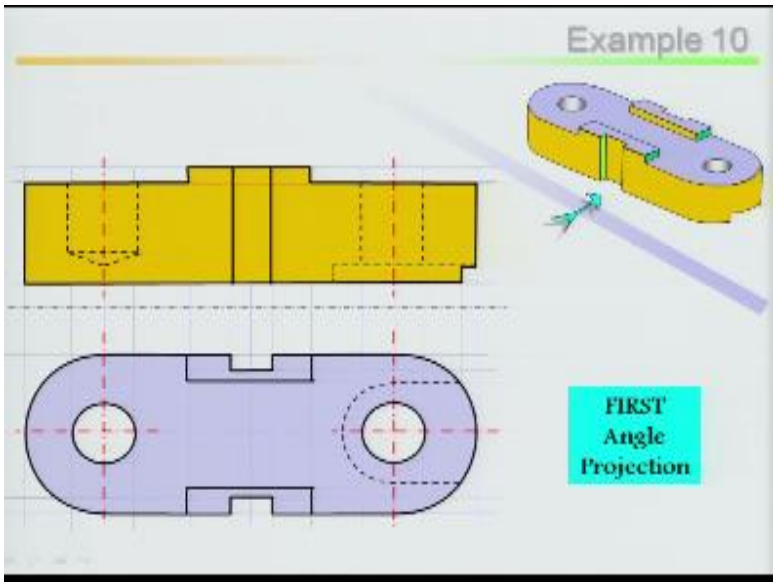

These are all typical examples.

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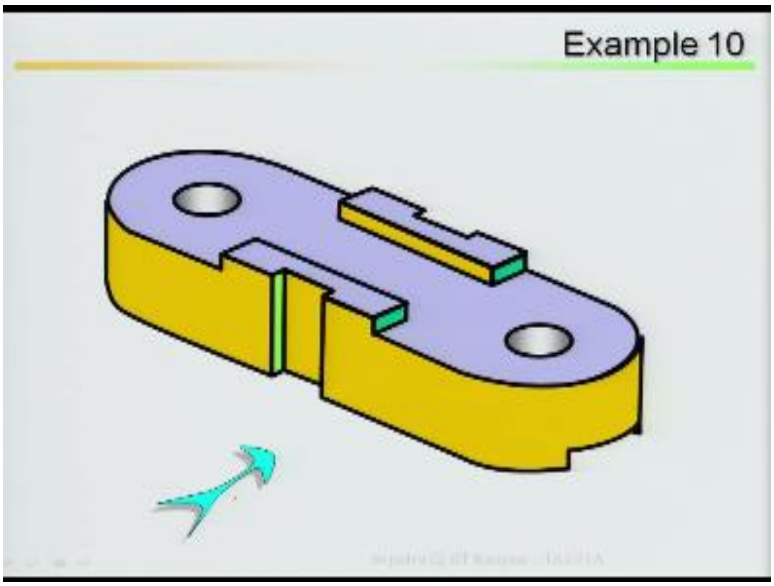

So maybe later on we can discuss, I will stop it here for orthographic projections of example one. Let me go to the second part of your orthographic projections, and last one for this orthographic projections before this assignment on the other part.

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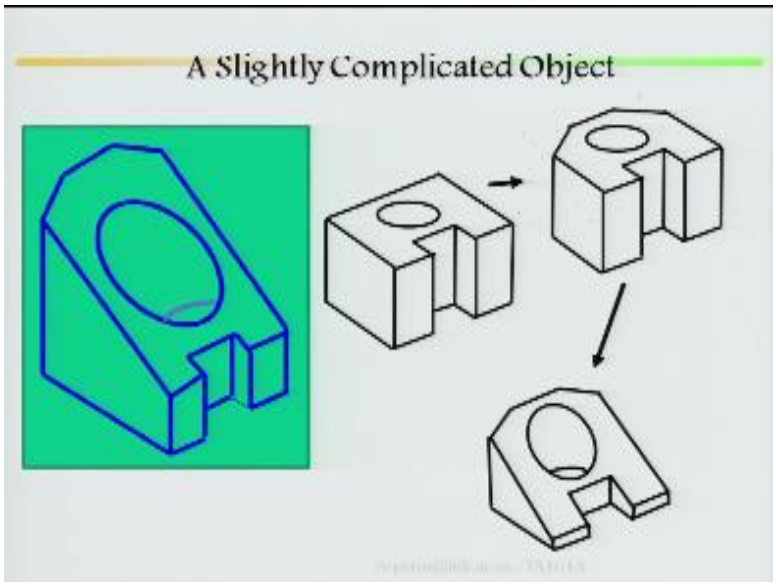
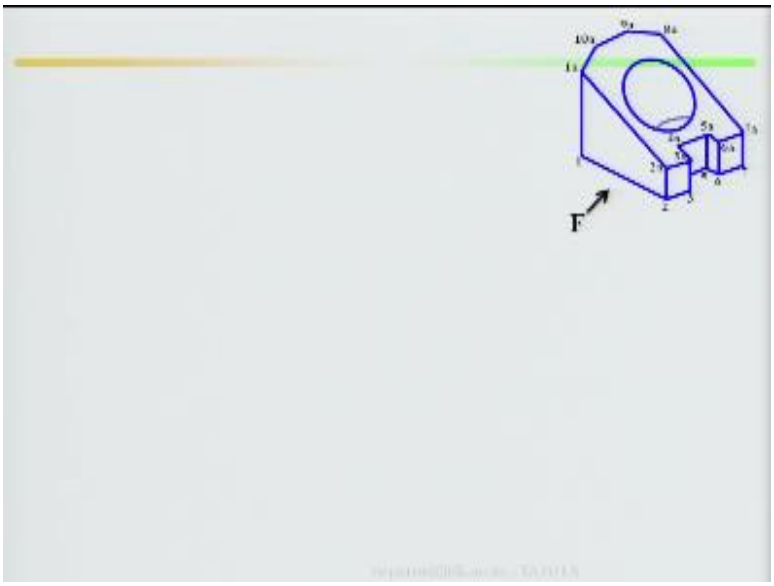
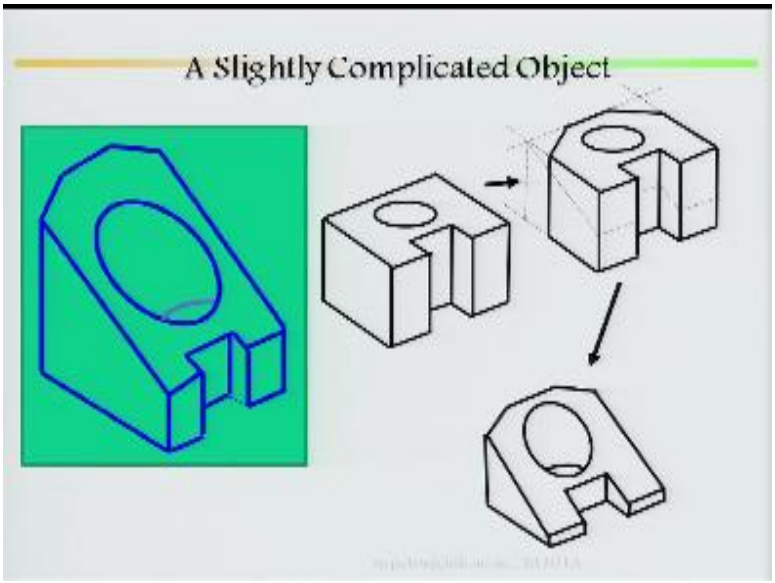


(Refer Slide Time: 20:58)



This part I have already covered.

(Refer Slide Time: 21:00)



So I will stop it here, next class I will start dimensioning of the orthographic projections, how the dimensioning has been done and what are the principles behind the dimensioning.

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Prof. Satyaki Roy
Co-ordinator, NPTEL IIT Kanpur

NPTEL Team
Sanjay Pal
Ashish Singh
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Tapobrata Das
Ram Chandra
Dilip Tripathi
Manoj Shrivastava
Padam Shukla
Sanjay Mishra
Shubham Rawat
Shikha Gupta
K. K. Mishra
Aradhana Singh
Sweta

Ashutosh Gairola
Dilip Katiyar
Sharwan
Hari Ram
Bhadra Rao
Puneet Kumar Bajpai
Lalty Dutta
Ajay Kanaujia
Shivendra Kumar Tiwari

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