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

Lecture – 12
Isometric Projections-Part-IV

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

So last class I have finished how to make isolated drawing by means of boxing methods and some of the few examples I have covered suggests a, before I proceed further just to take it a slight repetitions, how to make isometric drawing.

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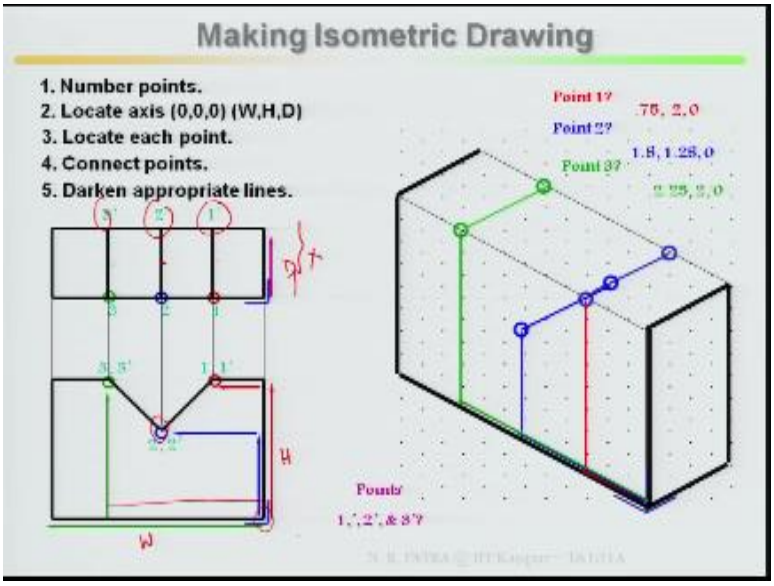

You will be given either three views or two views, that means top view, front view or top view, front view and side view, this is a typical example where only top view and front view has been given. So first you number your points, number the points, second locate

the axis, axis with respect to width, H is your height D is equal to depth, if I take it this is my width, this is width, this is height and this is your depth.

Then locate each point, locate each point and connect the points. Now if you visualize this example particularly the top view as well as front view has been given, no other view side view is not given. So there is a notch, there is a notch here and now it seems to me because as not side view has been not been given it is throughout in the depth directions, this is your first understanding.

It is throughout in your depth directions, if you locate these points in your isometric box then if you note the depth distance then very easily you can locate in the depth directions where these points are line. Let us step see it, first step is your identify axis where you start your 00, in this case axis is not necessarily the point here in any of the view it may be anywhere else, you can take a coordinate anywhere else.

Once again I am repeating you can take anywhere else. So for this example we have considered axis at here it is your 00. Then accordingly mark your 00, mark your width this is your width, then same width has been marked in your isometric box in that directions. Then height, height has been marked in that directions.

Then similarly depth has been marked in the directions, once you get the dimensions width, height, and depth then finish your isometric box. This is what you are finishing your isometric box, then mark each point, mark the points once you finish your isometric box mark the points in the views, then same points what is the distance from the, suppose I mark this point, this point how far from this axis or reference point with respect to width, height, and depth.

Once you locate this coordinates then you can very easily mark this points, let us start with one by one, I finish this box by means of darken lines then start with this points if you look at here 1, 2, 3. 1, 2, 3, these are the points and one prime, two prime, and three

prime in the depth directions. So first you locate 1, 2, 3, as I said once you locate 1, 2, 3, if your depth dimension is known with respect to 1, 2, 3.

Then you plot in that depth directions then you can locate one prime, two prime, and three prime. So first start with the point 1, what is its width? 0.1 is your 0.75 if you look at here this point one is located 0.75 this is your width and 2.0 this is your height, if I write it this is my width, this is height and this is depth. So this is 0.75 and height is 2.0 for 0.1 and depth is what? Depth is zero.

Because you are starting from here with reference to this coordinate this reference point depth will be towards this. So depth is 0, then you start with 0.75, 0.75 here iin isometric box, then 2.0 in your height directions locate your point 1. So this is your 0.1 what you have taken the reading , then similarly start with 0.2, point each what? If I take the 0.2, 1.5 this distance from here to here width again 1.5, height 1.25, and depth = 0.

Depth zero means 1, 2, 3 is the front face, depth wise it will continue. So it is 1.5, 1.25 and zero. Now taking into 1.5, 1.25 and 0 mark these points upto this is your 1.5, 1.5 then this is your 1.25, then you locate this 0.2 coordinate at this point has been located in isometric box, Similarly 0.3, 0.3 marks 2.25, 2 and 0. 2.25 is from here to here distance is your, here to here distance is your 2.25.

Here to here distance is your 2.25 this is in width direction because this is my axis 000, and from here to here with respect to here this is your 2.0, mark this point 2.25 and 2.0, finish your point number three. So you locate 1, 2 then 0.3 this is your 0.3. So 1, 2, 3 has been once it has been located, now next question is where is your one prime, two prime, and three prime.

If you look at here in the figure in the top view one prime, two prime, and three prime they are located in depth directions and it is in the equal distance, it is the equal distance, it is nowhere else like here, or here, or here, it is here, it is here, it is here. So distance

from here to here, here to here, here to here, this is your equal distance in depth directions. So now it is very easy to locate.

From 0.1 take parallel lines in depth directions and measure what is the distance of the depth and then if I take in the depth direction like this, this distance is known because this distance is known, this is known, this is known, I can very easily locate one prime. Similarly I can locate two prime, similarly I can locate three prime, this is the procedure has been followed.

Let us see, yeah this a depth direction this is a complete depth. So this is your one prime, similarly this is your two prime, depth direction, this distance this distance same. Similarly three prime depth directions. So now you have located one prime, two prime, and three prime, this is the critical phase or critical surface of this particularly this drawing because there is a notch it is continuing throughout.

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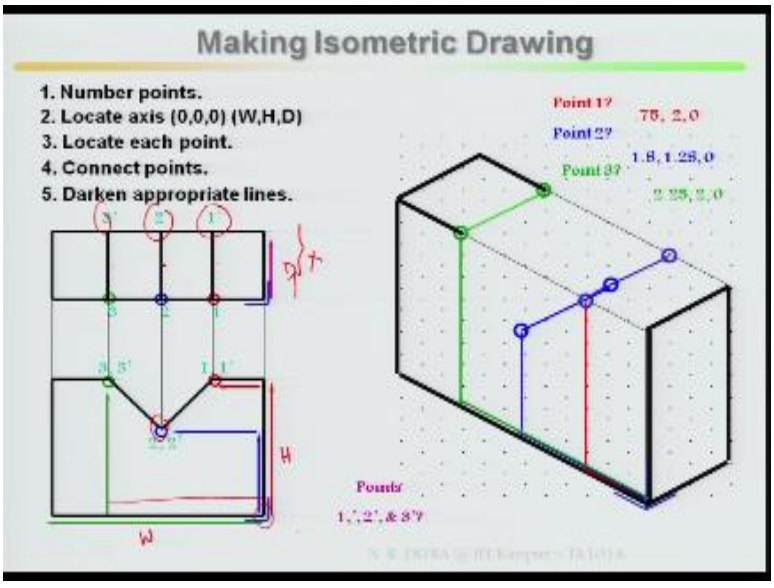

So now once you finished then finish your drawing, darken appropriate lines means entire drawing it has to be darken. So that the proper shapes should be visible as well as readable.

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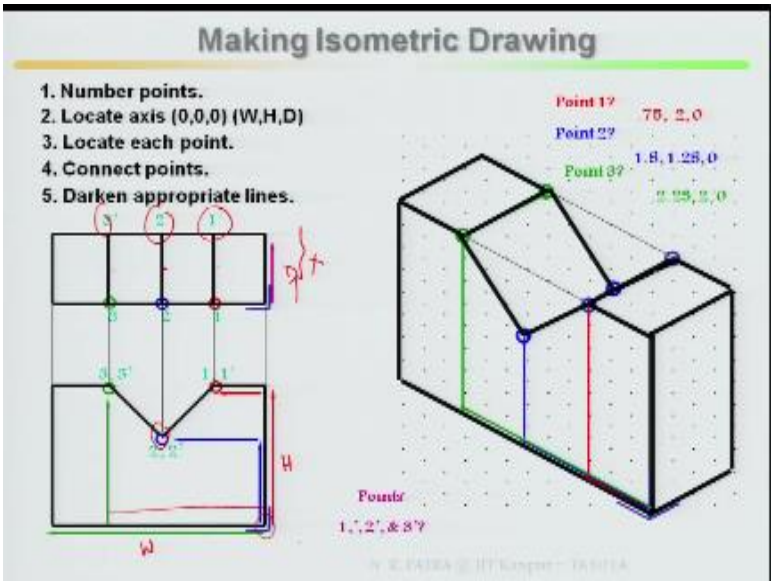

Then draw it, draw it, draw it, now once it is over if I remove it everything, how it looks?

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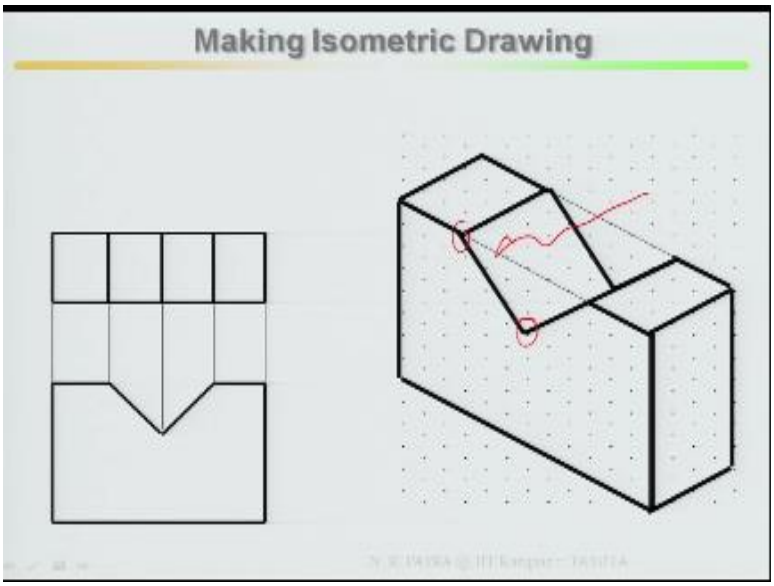

I hope it is clear to all of you. So this is what once you locate, now this is your isometric plane, this is your isometric line but this is non isometric lines as well as this is your, this plane is your non isometric planes. So non isometric planes on principle you cannot draw lines only you can locate these points on isometric planes then join the lines, join the lines. So this completes, upto this we have covered last class. Thought to repeat it so that in further example it will be helpful.

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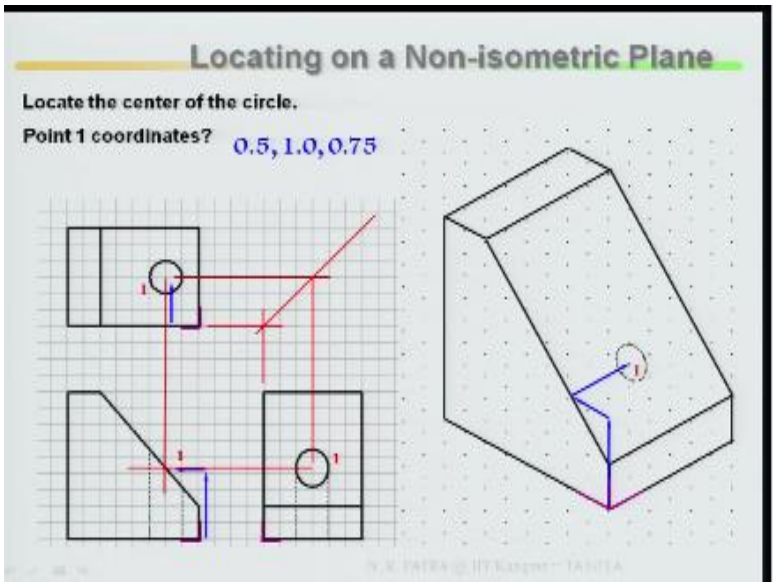

This part also I have completed.

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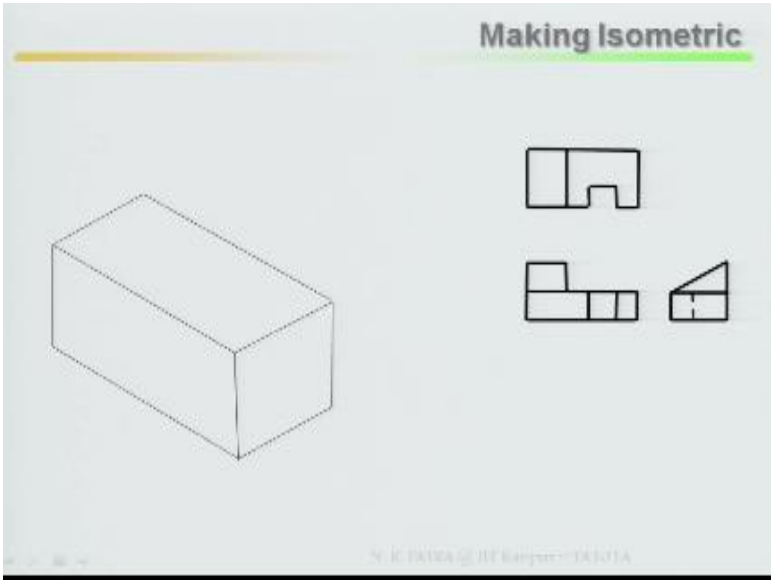

Last class, how to do a circle. So this part also I have shown making isometrics, this is interesting without locating these points once you start practicing locating the point one by one then you have a visualizations, how the isometric drawing has been done, so this is the view has been given.

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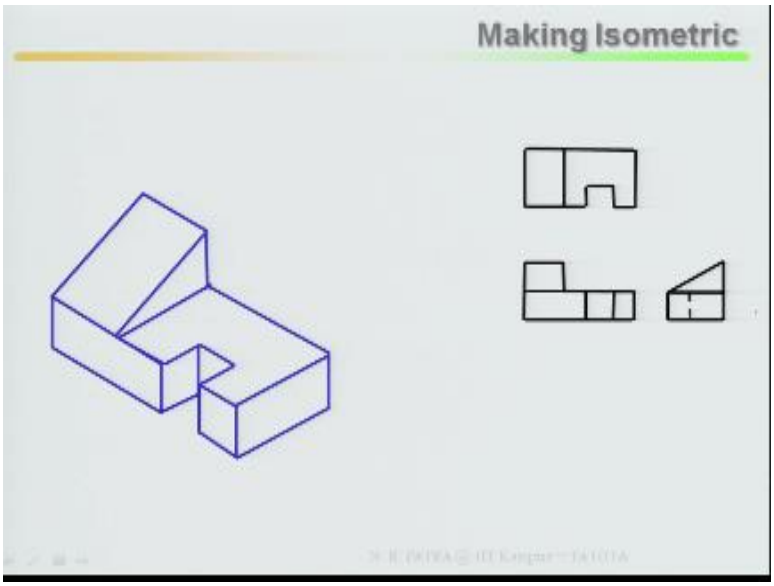

Top view, front view, as well as side view has been given. So isometric box has been prepared, then with respect to isometric box. So front view I plot it in the front, top view I draw it in top, side view I draw it in the side. So if I am taking it this way you can look at this animations how interesting it is, take it one by one. First I draw the side view as it is, as it is, nothing doing anything else.

This is a side view, whatever you are seeing here this is your side view. Then draw your front view as it is, draw the front view as it is, now it is your front view, similarly draw your top view, draw your top view, this is what you have done. Now then what I am doing it you looked at it, imaginations how this isometric view will come into picture one by one, merge it, taken it back one by one portion.

Then again taking it back, then again taking it back, then taken it back here, then taken it back here, then draw it without the ,without doing any point system marking the point in the isometric box with a simple practice it can be done, with your imaginations. So now, how to check? This is what you have drawn, how to check that whatever you have drawn

it is correct, now you can cross check with your isometric drawings with respect to your views.

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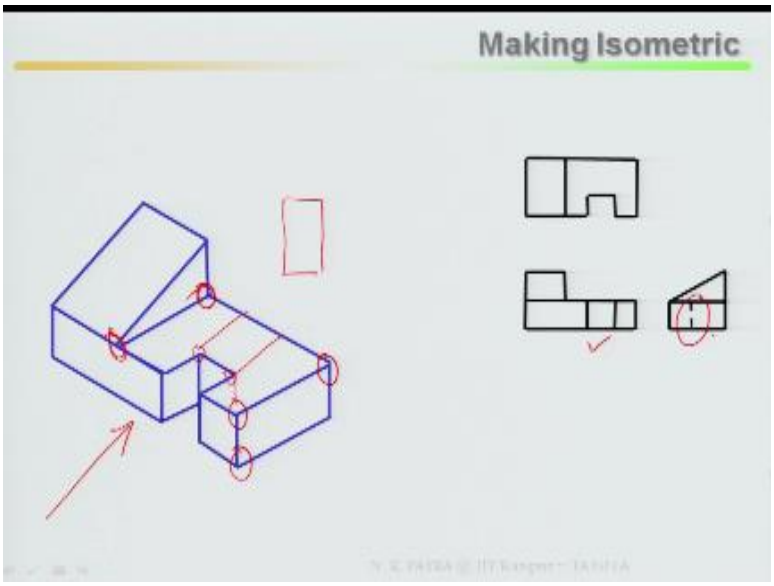

There are three views, top, front, and side view. So your front view looking this object from this side. So from this side you looked at whether your front view is coming same or not, if I am looking at from this side, what will happen? This point and this point is going to merge, right? It is going to be merged completely. Now because this there is a notch here I can see, I can see here, I can see here.

So this is what it is going to be merged, again this slanted surface or inclined surface this point and this point is going to be merged, right? Now this surface is a inclined surface if I take it looked at from this side, what happen? This point and this point is going to be merged this line particularly, now it will be no more inclined in the front face. So that means this point will be going like this.

So it will be only looking like this, this kind of set. Now looked at whether this is the whatever is your isometric view from there if I am looking at the object from this side

from the front view whether this is your front view or not, exactly it is matching your front view, now similarly you can looked at your side view, side view what happen? If I am looking at this is the thick it is there.

And there is a surface inclined surface I can looked at, what is this? This is your hidden line. So this hidden line of what? This hidden line because there is a notch here inside it is going inside. So that means this line I cannot see it whether it is a hidden line, similarly top view it is exactly matching, that means my isometric drawing it is correct because I have drawn this isometric drawing based on the views has been given, top view, front view, as well as side views.

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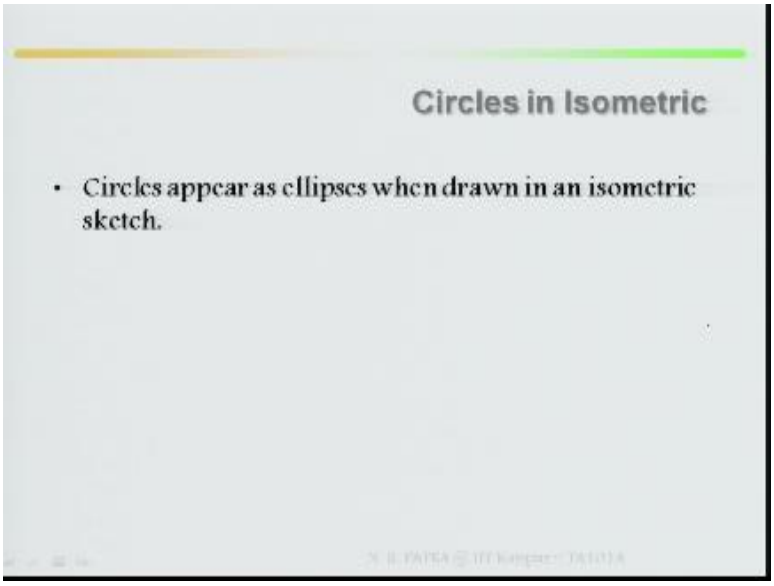

Circles appear as ellipse when drawn in an isometric sketch remember.

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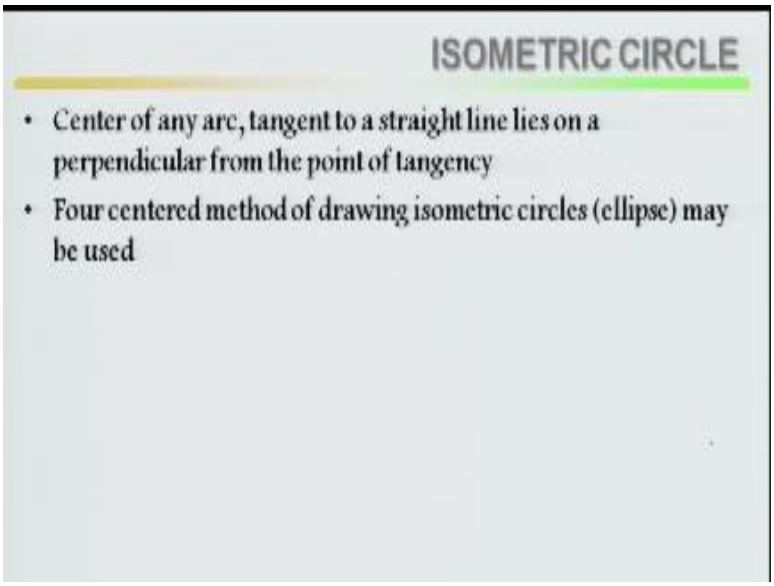

Now isometric circles looked at here, centre of any circle tangent to a straight line lies on a perpendicular from the point of tangency, that is true. Four center methods of drawing isometric circles ellipse may be used, if you remember well go back to my first, second class, curves and ellipse basic things I have explained, there are two methods to draw your ellipse, one is your exact method, other is your approximate method. One of the approximate method is your four center method, so in this case four center method you can always use so that draw your ellipse.

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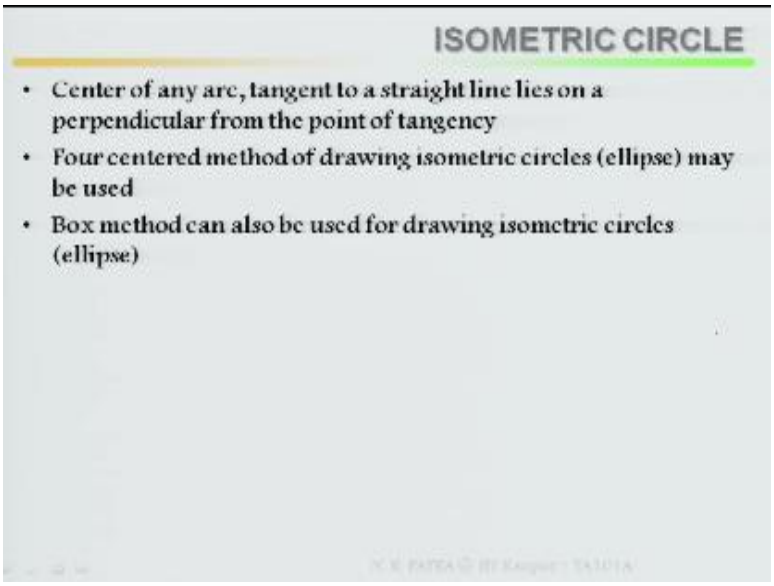

Box method can also be used for drawing isometric circles or ellipses.

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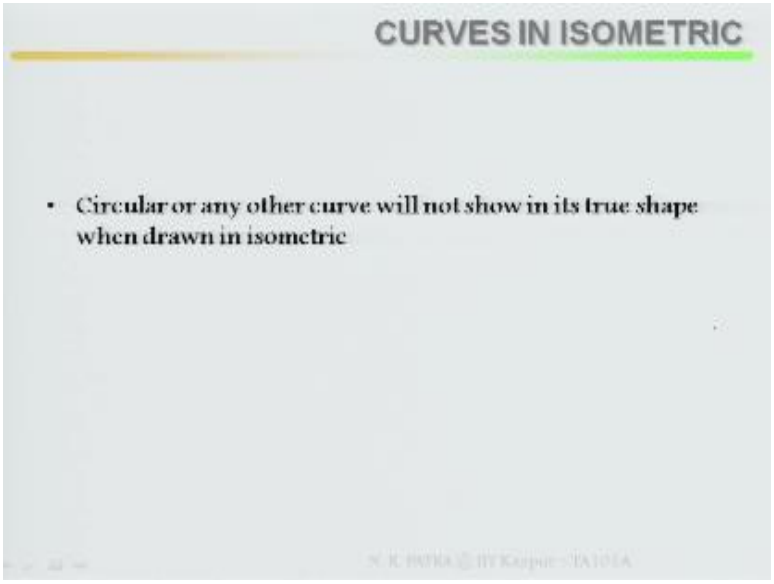

Let us look at here curves in isometric, circular any other curves will not show in its true shape when drawn in isometric, definitely because you are looking at 45° with rotation with respect to vertical axis as well as 22, 30° rotation about your profile axis, so it is not necessarily that you are supposed to see true shape.

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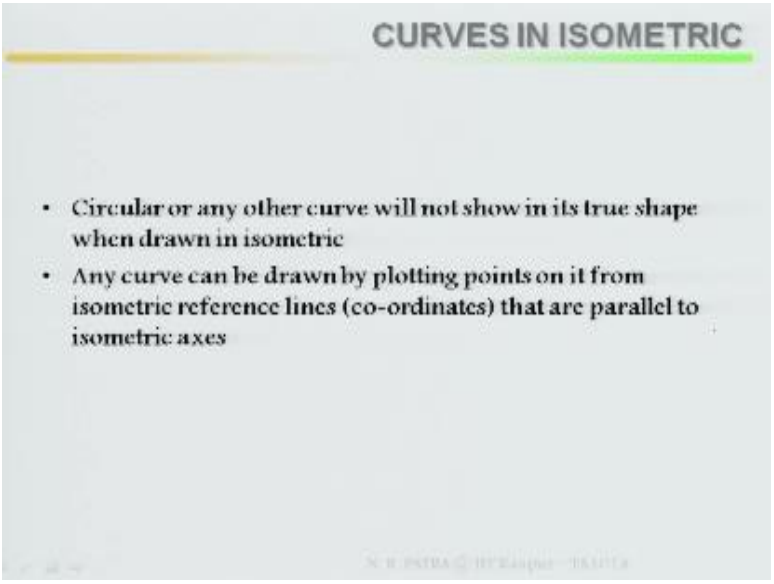

So circle will be seen as ellipse. Any curve can be drawn by plotting points on it from isometric reference lines remember, the way I explain from the top view, or side view, or front view mark the points any curve, mark number of points 12345, then it can be projected back or it can be the best on their coordinate it can project it on isometric box, then.

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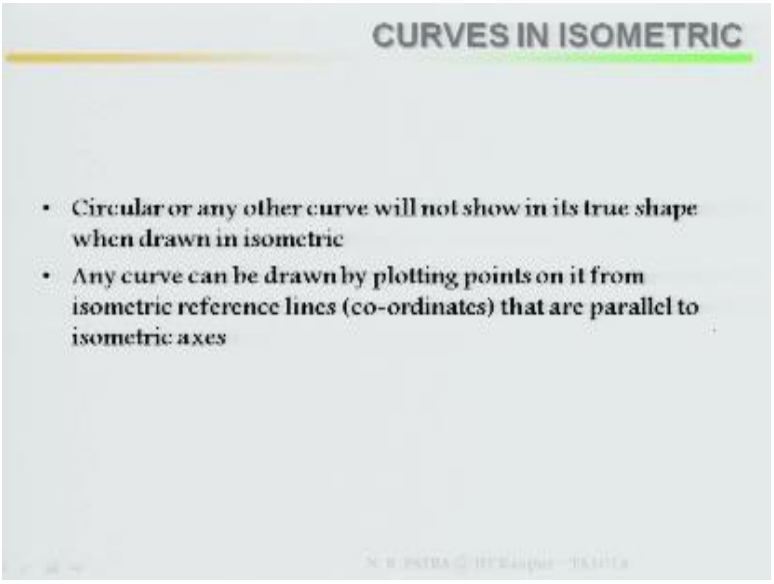

It can be drawn very easily.

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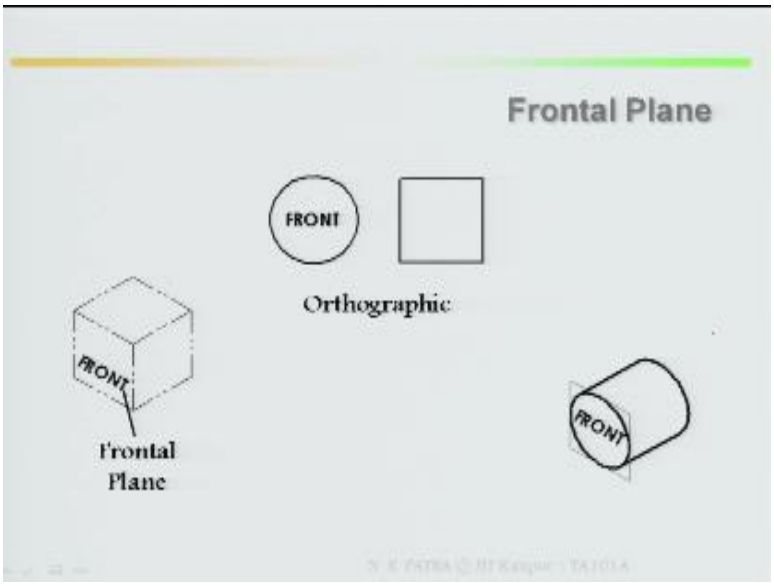

Frontal plane, orthography, this is your front view there is a circle. Now frontal plane in isometric, so it will not be no more a circle it will be an ellipse looked at here, how the ellipse has come into picture.

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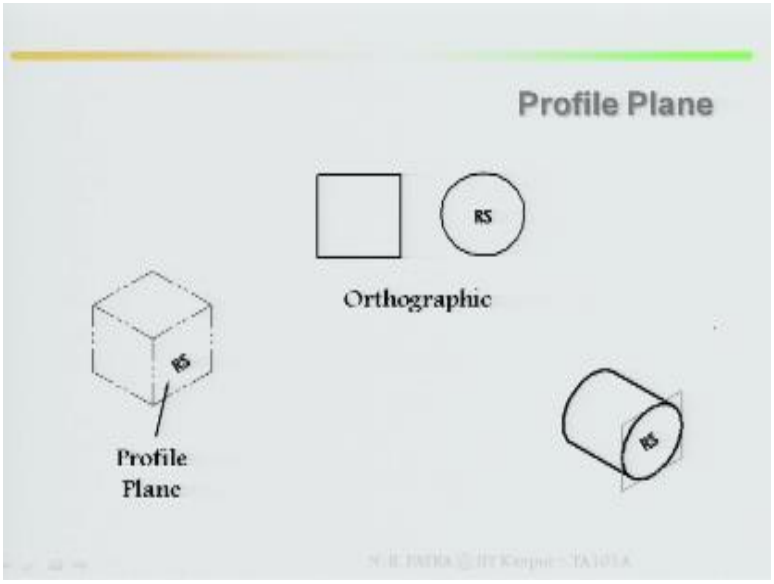

Similarly profile plane, profile plane this is what, how it looks, so in profile plane how we are going to draw your ellipse.

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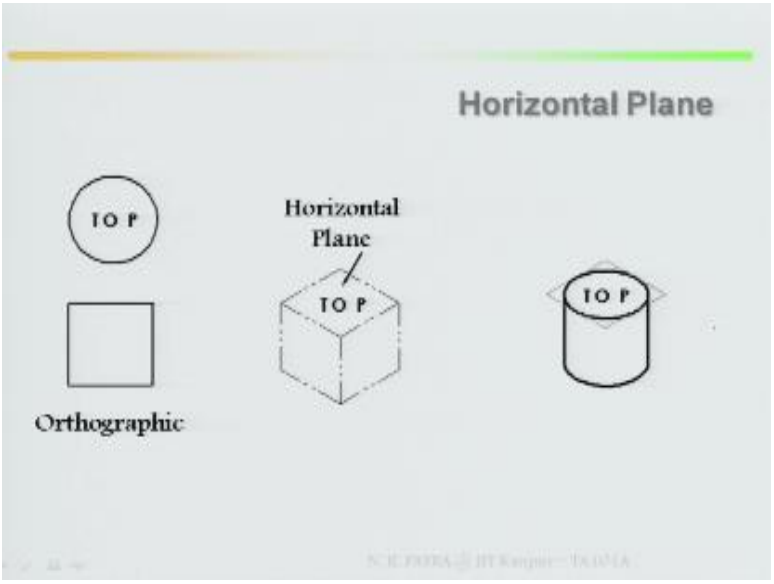

Similarly, horizontal plane or top view.

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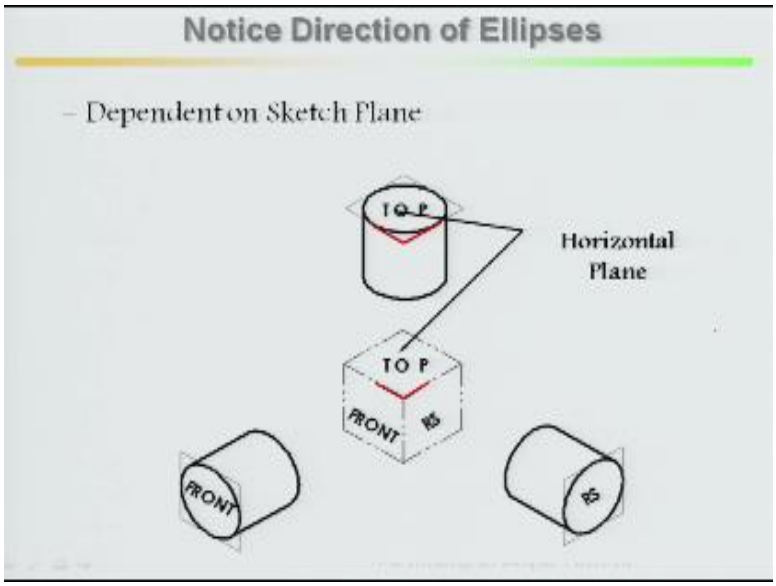

How we are going to do it? So dependent on sketch plane, this is your top, this is your top, horizontal plane.

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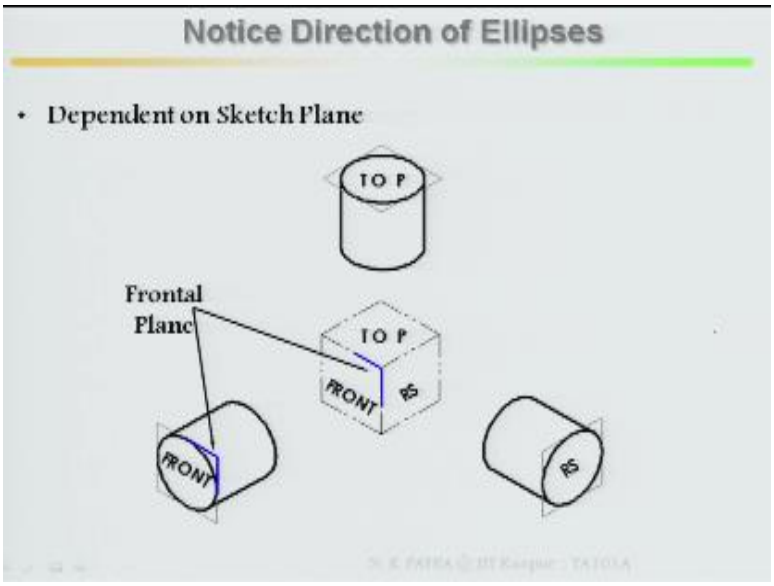

Frontal plane, this is your front.

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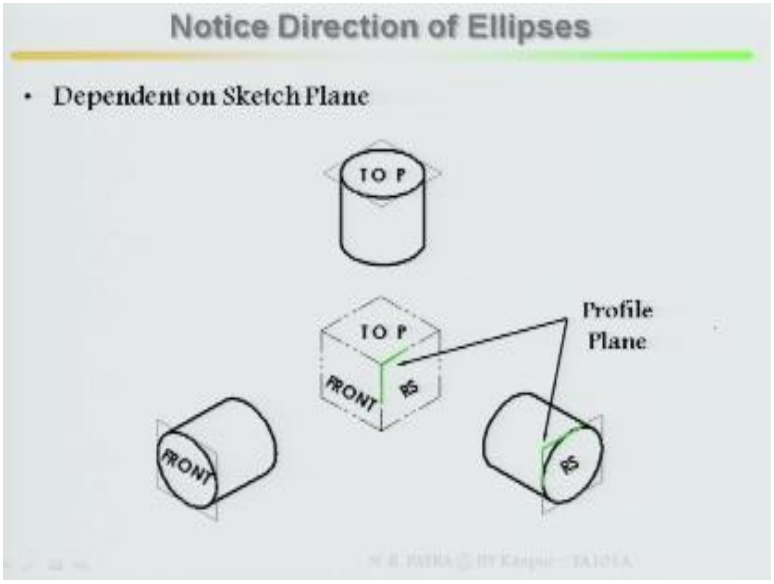

Profile plane, this is your profile plane.

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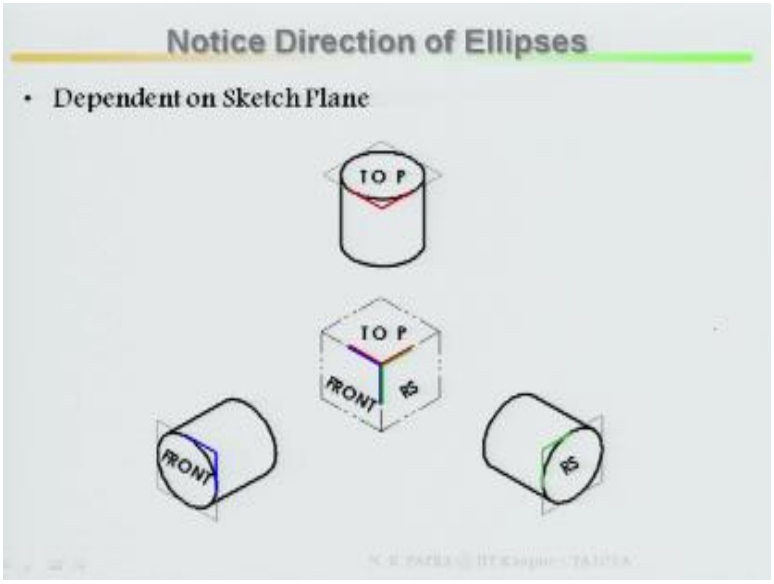

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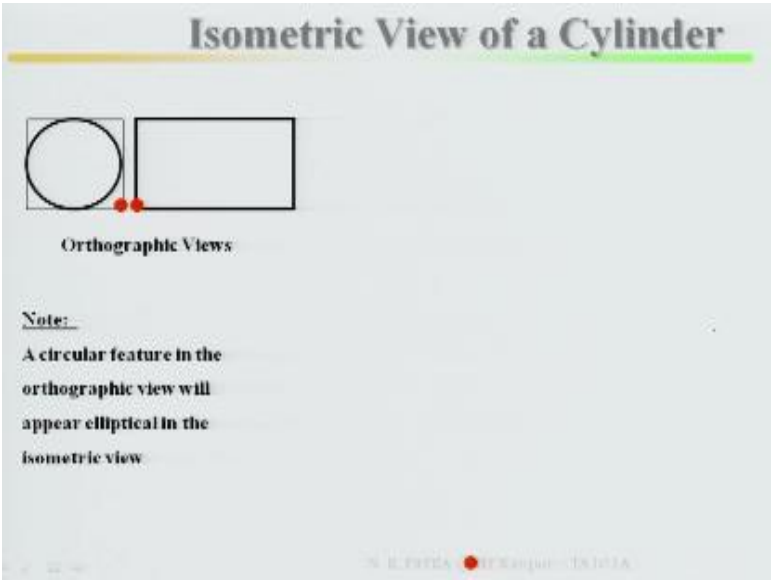

Isometric view of a cylinder looked at here, orthographic views, this is your front, this is your top of a cylinder. So a circular feature in the orthographic view will appear elliptical in the isometric view. Because you cannot see as a true set, let me start with this.

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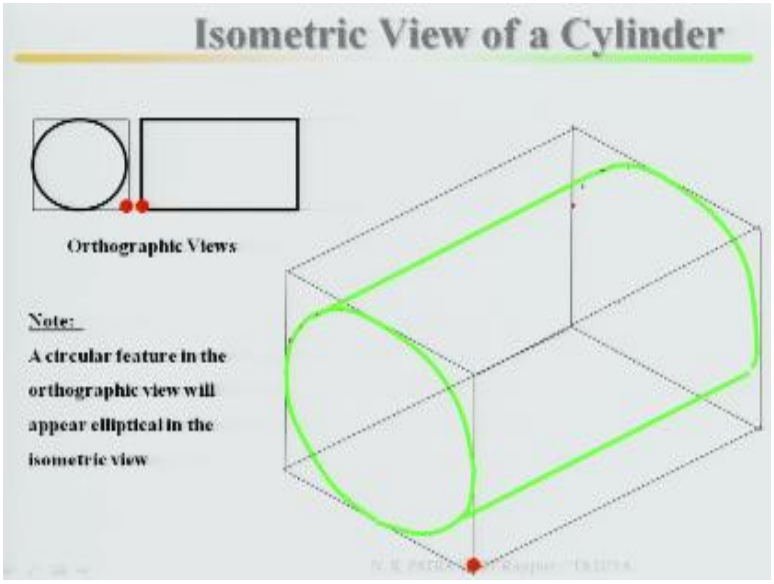

Draw the isometric box, draw it, then mark your four center then by means of four center method this method I have already explained in the second class, you can go and browse up with your how to draw ellipse by means of four center method. It was well explained in the second class, then point it out your four center, then draw your ellipse by means of your approximate methods, is your ellipse. How the circle in the orthographic view, how it looks in isometric view, this is your ellipse.

Then once you get the front surface of the ellipse then you can continue back side in the depth directions, there is no problem. So, either you can take it there are two ways, either you can take it point by point, take the points right, in depth direction this distance is fixed, from there you can draw the parallel lines and where these points are marked, you mark it. Then taking the points you draw an arc here.

Taking these arcs tangent and this as tangent these can be done, then similarly you can take this side one, one quarter you can take it, this quarter, this quarter, this quarter, this quarter, four arcs are required. This way it has been drawn or, or you can do it in the depth direction again you take it, draw it by means of four center method, draw it by

means of four center method. Then you finish it up, then join it surface to surface you join it then it has been joined. Then you take it out back side, how it looks this is your surface, this is your cylindrical face.

A cylinder and remove, this is your main cylinder and these are all your construction lines, this will be drawn in lighter side, so this finishes.

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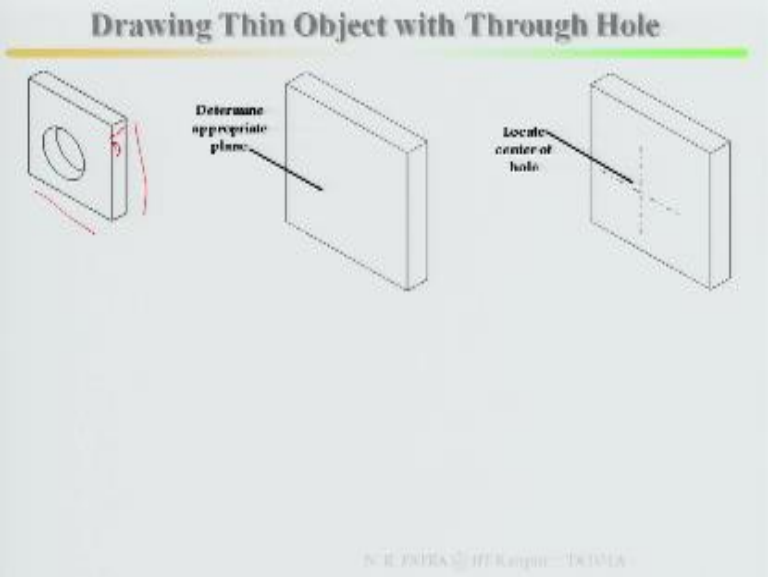

Drawing thin object with through hole, looked at here they are very thin object there is a hole throughout in the depth directions. If I am taking this is the width, this is the width, this is the height, this is my depth, this is my depth. Now determine appropriate plane, first you determine which plane you are going to draw it. Once you have determined first step is determine the appropriate plane then once you have determined in this plane your, this hole is throughout. Then locate center of the hole.

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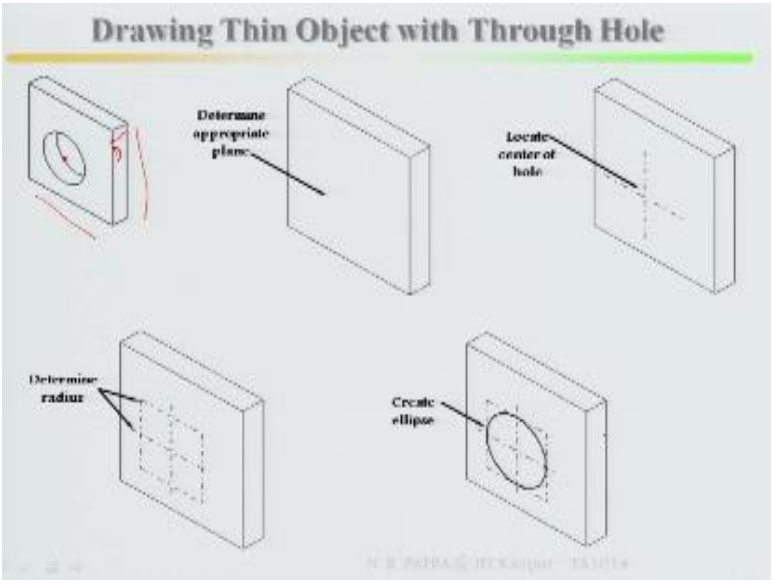

Where it lies center of the hole, because obviously once this is your object you can very easily find it out where is your center of the hole from here, then you can take your look at your center of your hole. Then determine radius, from this you can take your measurement of your radius determine the radius with respect to the radius you can prepare four quadrants, or maybe a parallel gram can be drawn and once determine the radius then create the ellipse by means of exact methods or by means of approximate methods.

Once this ellipse has been created in one plane then depth there extends throughout, it can be very easily created. So this is a state repeating, determine your appropriate plane and locate center of the hole, determine radius and then create ellipse on that plane, create ellipse on that plane. If you looked at here, this hole is throughout, that means you have to create an ellipse only in the frontal plane, that means in depth direction also you have to create it.

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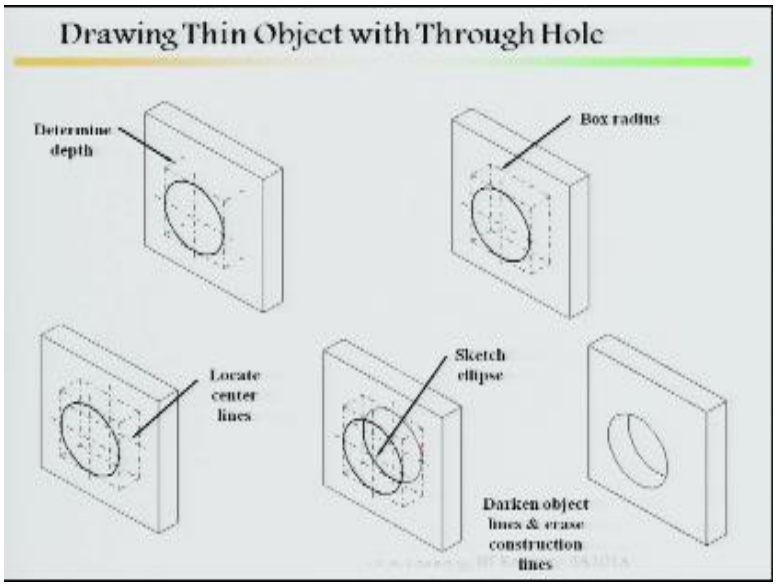

Next step determine the depth, what your dimension on the depth you determine, then accordingly this depth has to be projected back, 1234 it has to projected back. Then box radius you have to find it out your box radius, then locate center, back side also box radius you find it out the plane, then back side also you locate the center where this center lies because this center to this center is going to match.

Because this is your center of line. Then locate center of lines, once you locate this center of lines, then sketch the ellipse in the back side or your side. Once you sketch the ellipse looked at here, this ellipse has been created in the front plane or frontal plane, this ellipse has been created, this ellipse has been created in the rear or back face. Then once you, once you draw the ellipse then looked at the picture.

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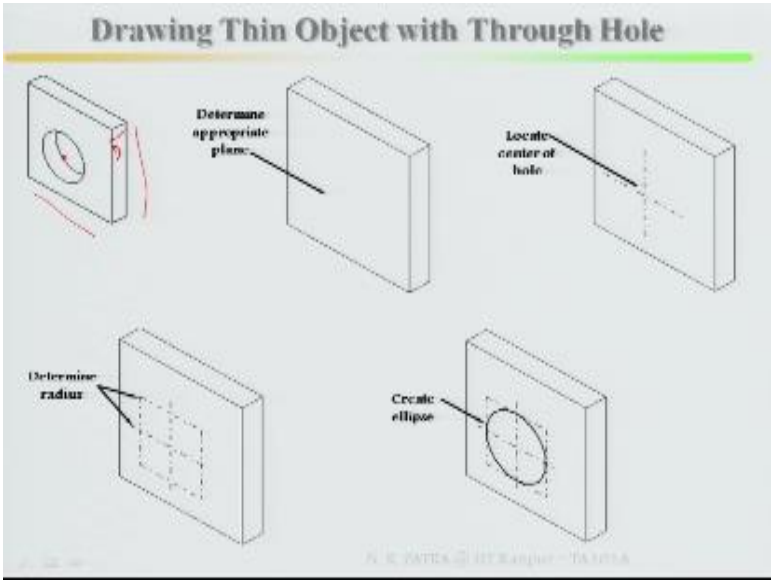

Go to the first slide how it looks, one ellipse other ellipse is half because this is slightly incline, that means this is your isometric views. So inside not necessarily you can see it all together.

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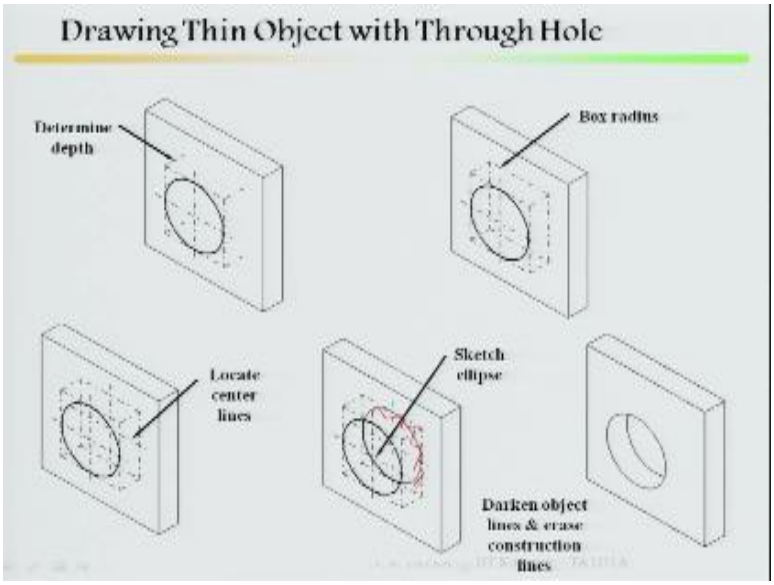

So if I go it, in this way so I draw this with a thick line, this is my first ellipse, then second ellipse which is inside this ellipse that has been drawn and rest part, this part you can remove it so, and darken it, once darken object lines and erase construction lines, these are all your construction lines, so at the end you have to draw the construction lines by lighter or maybe you can erase the construction lines.

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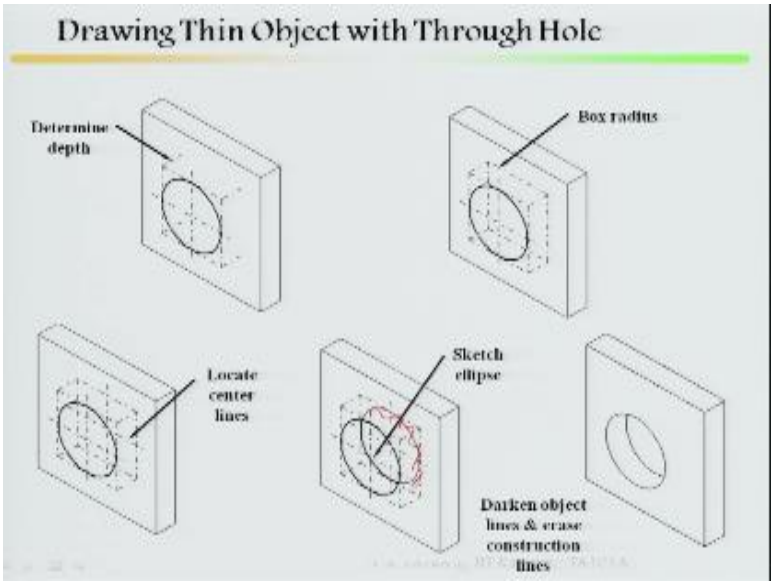

So then you darken the entire object this and this, so this finish what drawing thin object with a hole throughout, if you looked at here.

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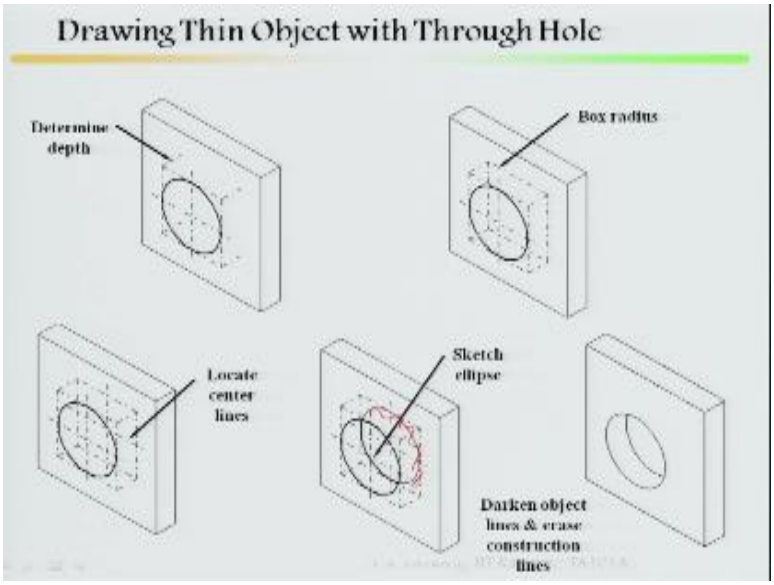

Initially it looks like, later on we have drawn this, this way. This is what drawing thin object with a hole throughout.

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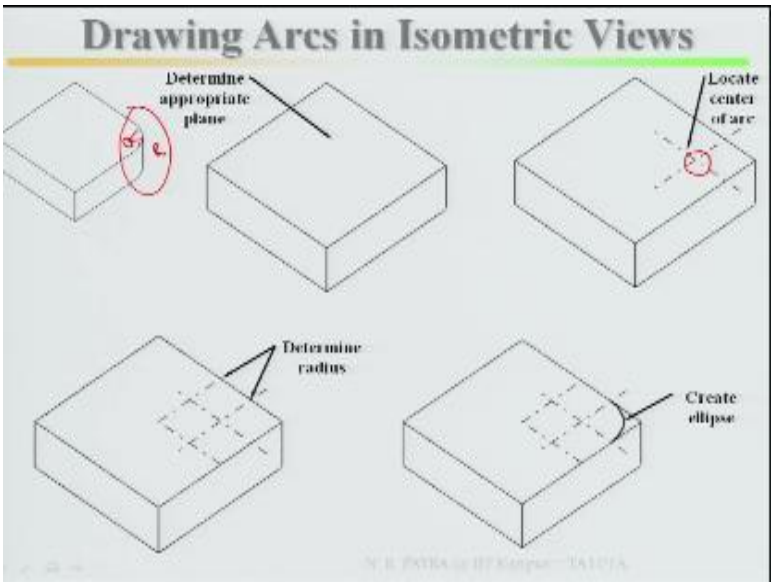

Drawing arcs in isometric views, how this isometric views look at the object, this is your object isometric view. One of the edge there is an arc, this is the edge where there is an arc right. How we are going to do, draw your regular isometric box, this is your regular isometric box, then determine appropriate plane, because top plane bottom then this is your depth direction, determine appropriate plane, this is your appropriate plane. Then, locate center of the arc, if you looked at here this is my radius.

So you locate where is your center of the arc is there. Then once you locate the center of the arc, determine the radius, what is the radius, taking consideration of this radius, taking consideration of the radius you finish it off, then draw, create an ellipse, create an ellipse only one side because if you look at this picture, if you look at this picture one side it is arc, then here creating an ellipse one side then.

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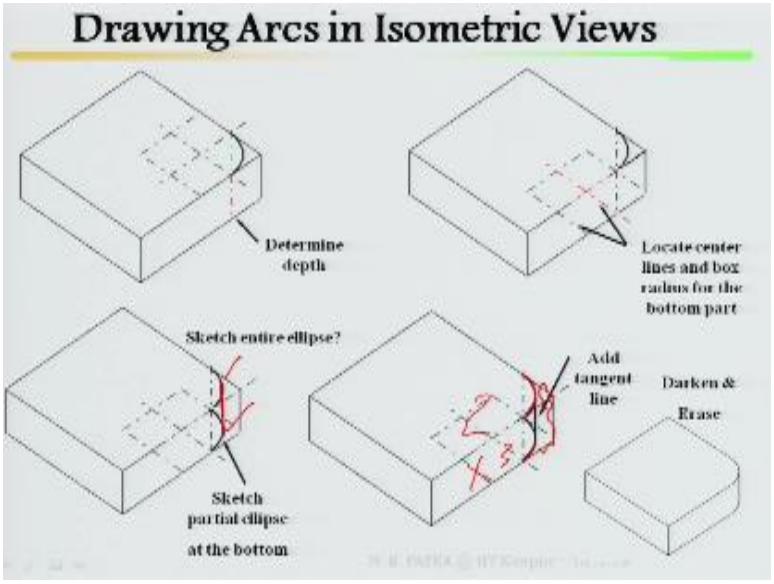

Then determine the depth, you determine this is your depth directions. Then similarly locate center line and box radius for the bottom part, top part also will locate center line and radius, bottom part is also you locate it. Then sketch the entire ellipse of the bottom part, drawn at the top part, ellipse for the top part, ellipse for the bottom part, at the bottom. These ellipse should be parallel to each other remember.

Because if there is some dimension missing then it will be unequal or uneven. Then once you have drawn it then draw a common tangent, two ellipse our tangent line right. I add a tangent line then erase all other parts. Once you add it because we need to half to half this line, if you look at here this to this. Then in this figure we need this, this part completely, this construction line it will be erased or may be slightly lighter side construction line lighter pencils you can use, so this is your final, how it looks. I will stop it here, dimensioning and other examples I will cover in the next class. Thank you.

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Prof. Satyaki Roy
Co-ordinator, NPTEL IIT Kanpur

NPTEL Team
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