Technical Arts 101
Prof. Anupam Saxena
Department of Mechanical Engineering
Indian Institute of Technology, Kanpur

Lab – 10

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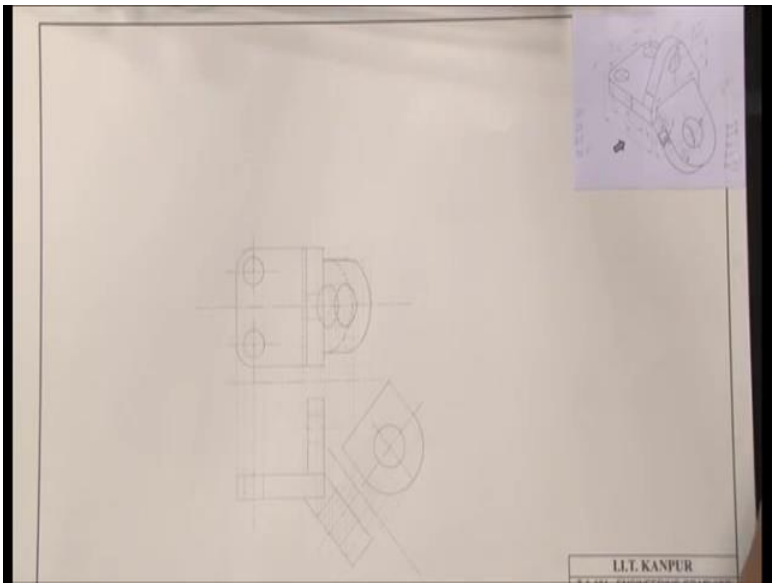

So we are gonna be working on auxiliary views; where we will be designing or we will be drawing an object that has a plane which is inclined at an angle to both the horizontal and the vertical. And to be able to get the features on this plane we would be needing an auxiliary view here. So, in the sense this is horizontal plane, this is vertical plane and capturing these planes is not a problem in conventional orthographic views; capturing this plane, capturing the features on this plane is a little challenging. But we will try to see if we can do that in today's session.

So, as you see I am ready with the bounding boxes. So, I will be drawing this object in the third angle projection; so this is the bounding box for my front view, this is the bounding box for my top view. So, let me first get these features done and then I will worry about this a little later. So, this distance from here to here is 64 millimeters; I have this distance. And let me use my H pencil and darken this line; I will be seeing this line and perhaps I will be seeing the vertical line as well. In fact, the horizontal line but at the top; I need to be a little careful because these are arcs. So, I will erase this part; always a

good idea to be prepared for the drawing. So, I do not have the sketch for this I was trying to capture the object directly on the sheet but that is ok.

So, this arc is of radius 12; so if I mark the center which is at a distance of 40 from here and this is about 12. So, what I can do is perhaps mark a vertical line which is at 12 from this; I need to draw this little dark. And then measure 12 from this right vertical line and make this vertical line; and measure 40 from here to get this centerline straight about there. So, I will may be mark the centerlines; to get these arcs I would need to focus on the top view. So, looks like my have these lines all right in there.

So maybe I will go ahead and draw this line but perhaps this line was not required. So, maybe I will just erase this part and the above centerline is also not required. So, maybe I will erase this also; for some reason I was trying to draw the top view I was a little confused. But usually that should not be the case one should never be confused nevertheless. So, this is my centerline and this just is or this thickness is about 12; so I will measure this thickness 12 from here. And perhaps mark I make this horizontal line up to here; so first I go down. Now, this hole or this void cylindrical void is of diameter 14. So, I will make 2 hidden lines at 7 mm to the left and 7 mm to the right of the centerline; I am using my 2 H pencil directly; perhaps what I will do is I will go I will project the centerline up; maybe I show it make a slightly darker line I should be switching to a 2 H pencil. And perhaps make 2 centerlines over here in the top view; which is where I will be capturing these 2 holes.

Here, perhaps may be let me project this vertical line also at the top here. So, these 2 holes are centrally or symmetrically located; so let me try to locate these 2 centers. So, this distance is about 64 millimeters half of that is 32 this rather this. So, maybe I will just draw a dim line or a thin line and from this line this center is about 20 millimeters to the left and 20 millimeters to the right. So, I will measure 20 millimeters here perhaps and there perhaps. And using my H pencil I will draw the horizontal centerline; do not need to go too far with that here also the same all right. Now, then I have gotten these 2 centers; first thing I would need to do is perhaps get the inner circle both of which are of diameter 14; so I will take my circular tensor.

So, this is the circle that I would be wanting to draw; I will try to locate the center properly. And for more accuracy may be it is a nice idea for me to project these hidden

lines up on to the top view; good I have these lines all the way done just about, just about there to a little more. But just about there; they goes my first circle, this is my second circle may be another one. And then to get the 2 arcs both of radius 12; if we I can look at a circle of diameter 24 which perhaps is here just make sure this centers all right. And perhaps I will draw an arc which is tangent to the horizontal line there and the vertical line here; where I am and the same thing below. And first I have these 2 arcs; perhaps I can work with straight lines and try to get this part of the top view ok.

Now, I need a projection for this which I have by their of course this lines gonna be visible it is gonna be visible as a rectangle this part is gonna be visible. So, I will perhaps draw this using a dark line; likewise this part is also gonna be visible. So, I will draw dark line from here and 2 dark vertical lines because these 2 guys are gonna be visible. Now, if we have a hole over here which is at a distance of 25 millimeters from this vertex here. So, from this vertex I switch my pencil; I measure 25 looks like perhaps I got this height incorrect; so this should have the 25 plus 16. So, I will probably have to extend this; one a problem. So, these are the things that you should not be doing what I am doing using the eraser after, so 25 plus 16; 41 from this vertex here pretty much here. And I would expect straight line there; and then let me complete this vertical line and then 25 measure from this vertex right about there.

So, that is where my centerline lies; of course this line is again as diameter 14; so 7 millimeters down and 7 millimeters above the centerline I mark them. And then hidden lines; likewise there would be a centerline here and then 7 millimeters below and 7 millimeters on top of this; again I make inner lines. So, as far as this plane is concerned and as far as this plane goes I think I have captured both these planes in my line front and top views. So, looks like if I draw a horizontal across this object; see if this object is symmetric on the left and on the right. So, may perhaps it is a nice idea for me to extend the centerline through and through; so that I capture the symmetricity of the object there I am…

Now, comes the challenging part; now comes the challenging part to get this feature of the object. Of course, for that I need to draw the auxiliary view or this plane of the auxiliary plane; it is pretty simple. So, I take my 45, 45 ((Refer Time: 16:17)) 45 degrees and I would need to be a little careful. So, perhaps I can take a quick look at how the object is of course, this angle is 45 degrees and we have some distance over here. And

there is a little bit of penetration over here; this distance is about 20 from here to here this distance is about 8 millimeters. So, we need to figure this thing out. Now, perhaps if you look carefully this vertex is at the same height as this vertex. So, which we need to capture this edge first in the front view; if I focus on this region perhaps I made mistake over here. So, I should not have had a vertical line here; but rather I should have had a horizontal line here. So, maybe I should go back to my ((Refer Time: 17:22)); erase this part and make that corresponding correction.

Now, from this point rather from this point a 45 degree line downwards should not be that difficult. So, from my 45, 45 ((Refer Time: 18:10)); so I probably pull my drafter little down perhaps on the to the left a little. And I just make a little 45 degree line using a 2 H pencil from this point. So, I get this surface done and may be very close to that surface I will draw inch line that would separate this auxiliary plane with the front view. And this inch line is going to be you know a single dash followed by 2 dashes; you know the convention at some distance from this inch line notice that we do not have much space between the front view and the top view here.

So, I would recommend that this distance is not large some distance from that inch line; we will draw the auxiliary plane. So, for that I need a line which is vertical to this line; perhaps I can use this surface off my friend 45, 45 set square switch my pencil. And may be draw projection from here and using this projection start constructing this plane. Now, notice that this distance is about 50 millimeters; so I can either use this portion or perhaps I can align my drafter to focus on this part of the object. So, I will align my drafter in such a way that my long rulers parallel to this inch line. And then at may be some distance from the this inch line; I measure 50 and perhaps then using my H pencil draw this edge.

Now, this distance is about 25 and this radius is about 25; I will go 25 very nicely from here and perhaps 25 from here. And then I will mark this centerline because we have a little void over here of diameter 22. And is this centerline through which this semicircle is also going to be drawn; of course this is symmetrically placed. So, this distance from here to here should also be 25 mark this distance over here and mark another centerline. So, with this center perhaps nice idea for me to draw the 522 circle first; I go back to my tensor this is where my circle is try to line properly; make sure I configure these vertical

and horizontal you know those little lines along with the centerlines a line with properly and then draw this circle; so fast so good.

And of course this is of radius 25 I do not have circles bigger than 536 on my tensor; for that I need to use a compass get the radius make sure that I need the other point as well. And with a single stroke uniform pressure, I draw a semicircle may be I will go the other way around to get better; one more time perhaps. And then at this junction will be I just use a little touchup; so I got this feature all right.

Now, it is for me to transfer this feature on to the front view and on to the top view; unfortunately I do not have much space between my top view and this feature but that should be ok; should be effecting my drawing or it should be effecting the accuracy of my drawing; just that things are gonna get or things are gonna look a little congested; first things first let me measure 20 along this direction. So, align my drafter properly and then measure 20 millimeters from here; I should be using 2 H pencil for this; I already have define the limit of this feature. So, maybe I am project this, down here and then I get the low surface of this plane; switch on my pencil there I am so maybe I will just darken it, darken this part of the plane. And perhaps this edge also; little touchup there let me also transfer the centerline. And the outer portions of the circle of course there will be hidden always a nice idea to project and relate the 2 features in the 2 views; using this projectors makes things lot more clearer both to the person is drawing and both to the person who is following as well. And of course here we will have another hidden line.

So, the question is in my front view complete; so I got this feature all right I got this horizontal plane, I got this vertical plane all right; I got the circle here cylindrical voids cylindrical void over here. And then I gotten this plane; here in the auxiliary view or the auxiliary plane I have got all features all right. And then I have transferred this internal void here on to this plane which is at 45 degrees; this is of thickness 20; I got this boundary as well should also be relating by this projector; I have to scratch my head a little. Because I have a feeling that I have not taken care of this direction 8; I should have measured 8 from here. So, therefore I did was I assumed that the height of this point and the height of this point that are same; let me verify. And if that is not indeed the case then I will have to admit that I have made a little error here. So, well aligning to my drafter back now if I measure 8 from here it is above this.

So, if I measure 8 from here; so it looks like is a minor difference of 1 millimeters here; I would not want to erase this part. Although I admit that I made this mistake I should have measured 8 millimeters from here from this point along this direction. So, this edge it should be shifted by 1 millimeter along this direction. But I have not worry about that much; instead I would focus more on the top view all right. So, I would I transfer the features in the auxiliary plane; I have to I relate these features to those in top view; first things first. And I need to project the features in the front view over here; but before that let me project this part up. So, we will expect lot of lines being drawn many of them thin many of them thick.

Let me draw this using a 2 H pencil because eventually I would be expecting some kind of a curve here; I will have to get that curve from the auxiliary view. And then I will probably have to project this line up on to the front view rather on to the top view. And perhaps this point and then this point here and this point there. And remember so we have an edge at the bottom of this plane. So, this discontinuity will be shown in the top view as a hidden line.

So, let me make that hidden line all right. And of course I have an projected this point up; so maybe I should do that as well may be I have done that. So, let me make sure projected this point. Now, what like we did in case of auxiliary views I have to measure distances on say this arc here from this inch line. And then transfer those distances over here. Now, for that I need to first locate the inch line that would separate the top view from the front view. Now, I know that this point would be lying on this line ok.

So, let me focus on the top edge first. So, this point gets projected to this point in the front view which gets projected to this point in the top view. So, if I measure this distance and then I place the inch line correspondingly; I should be able to locate the ((Refer Time: 33:34)). Now, for that this distance turns out to be about 7.5 just about 8 plus 2 8 millimeters. Now, what I am doing is something that is not supposed to be done. So, once your drafter is configured; so that your long ruler is aligned to be horizontal, it should not be disturbed. But I am following all kinds of wrong practices.

So, this distance if we got is about 8 millimeters and once again I am focusing on the top part of this plane in the front view. So, if I measure 8 from here; this is where my inch line will be; and that is the critical step. Once I am able to locate the inch line the rest is

well tedious but not very difficult to follow; perhaps this is nice idea for me to discretize this curve, this semicircle into a bunch of points. And what I have to do is I will have to release my ruler and arbitrary draw of lines parallel to this line. So, that I get a bunch of or set of points on this semicircular arc I already have one point here may be; I will extend that. I need to be careful I should be switching to my 2 H pencil I get 2 points; I got 2 points over there and perhaps I can get 2 more points; there I am. And involve I am working on discretizing this outer semicircle and may as well discretize the inner circle as well; it is going to be a bunch of line. So, I need to be little careful all right.

Let me focus on trying to transfer this circular arc over here. And of course I am working the top surface; and if I do that let me measure and note down these distances. So, that I need not have to you know keep rotating my ruler on the drafter. So, this was about 8 millimeters; this is close to this is close to 8 again; so about 7.58 quite close to 8. So, perhaps I should note it down somewhere; maybe I note it down here. And then from here to here is about 8.5 or just about 9; from here to here is about 10 millimeters quite lucky getting whole numbers getting whole numbers; this is about 15 interesting.

And of course this is about 43, 32, 33 well; I will just make thirty 2.5 for now all right; I have got these distances from here up till here. And let me try to transfer this points over there; incidentally I made a little mark on my sheet. So, well just erased it make sure that my sheet is clean having aligned my drafter back. Let me project the point on to the surface rather on to this view; I just as I said I have I am going to be having a bunch of lines and I need to be quite careful in choosing them. So, this distance was 8; so I go up till here this is my projector, this is about 8. So, this is what I had use to locate this inch line; so I already locate this point here corresponding to this.

Now, let me go back to this point come back here. Now, draw the projector so maybe I will do that; once again I am looking at this point coming down going up; this is about 9 millimeters. So, I will make a point here just about 9 yeah; so pretty close 8.529 yeah. And then I look at this point go down I still have to make a projector from here which I will do right away. So, looking at this point going down following it up over here this is about 1 centimeter from the inch line from here perhaps yeah. So, this is where I next point is gonna be ideally I should not be indenting my sheet with these points it should be just marked. So, this was 8, this was just about first to 8, this was 9, this was 10, this was about 15. So, I go down on to the surface take a vertical projection up and measure

15 from the inch line. So, this is just about there and this distance; ideally I should expect this distance to be the same as this distance. So, that is or may be this distance that is a little check if I got the centerline right.

So, this distance was about 32.5 or 33 looks like there is a little discrepancy. Well, 33 from this surface; did I measure this right I will probably have to go back. Here, looks like measure this ok; you know what these distances all right. But the measurements that I am taking from this inch lines perhaps not correct. And I will tell you the reason why just a moment. So, this distance here is about 50 millimeters while this distance is about 64. So, I first probably have to locate the corresponding horizontal line; you know which is well I have to locate a corresponding horizontal line over here. So, that this distance is about 50 that was the major mistake that I was making. So, comes about this point here; let me draw the dim horizontal line. And then from here also I measure 25 and then I will draw a horizontal line again all right; having said that did I accurately locate this inch line; even if I have not I will probably make this adjustment. So,, the inch line this inch line should have been located with this inch line here. Well, I make that adjustment anyways is it is going to be constant that is that gets added up all right.

So, coming back to these features; so 8, 9, 10, 15, 32.5, 8, 9, 10, 15 no sorry it is about 8, 9, 10, 15, 32.5 it is all right; this is close to 7.58 it is all right. And this distance is just about close to 8 itself just about. So, maybe I will be adding 8, 2 all the distances and the best way to check that is to measure this and correlate with this. So, it was not 33, 32.533 and plus edge should be disclosed to 40 or 40.5. And if I measure that yeah; so just kind of terms out to be about 40, 41, 1, 2, 3, 4 yeah 40.5 seems all right. So, defiantly we have a point here and then let me go back. So, from here to here it is about 15; 15 plus 8 is 23. So, 23 to be measured from here. So, I got this here from there measure 23 from there; so this is where my next point is gonna be. So, this point is something that I would not need to worry about; so this distance is about 10 millimeters plus 8 is 18. So, I will write on this projector it looks like this is about 1 or 10 millimeters.

So, go down come up so 1 plus 8 18. So, 18 to be measured from here would be here somewhere seems like all right. So, 1, 2 and 3 again these points have to be ignored. Now, this distance is about 9 millimeters go down here; so these projectors are enclosed to each other; so I need to be careful. So, go down followed it up from here it should be 8 plus 9 which is 17. So, from here so 17 from here would be just about there just about

there; close it and this was about 8; 8 plus 8 16. So, I come down over here right on this projector and from this inch line this should be about 16 just about there.

So, looks like I gotten this points all right. So, 1, 2, 3, 4, 5, 1, 2, 3, 4, 5 and the 6 point differently is gonna be lying here; and one to this surface. So, having done that since we know that this features symmetric above this horizontal line; what we can do is flip these points over. And get the corresponding points onto this side of the figure; that I let me draw this projector having drawn that measure; this distance it is about 18 amongst point there measure this distance I just about 18 yeah. So, measure this distance it is about 23 over there somewhere; and then measure from here to this points about close to 24 just about there. Then, it is about close to 25 just about close to 25. So, just about pretty much there and then of course I get the points here all right. So, I gotten this points bunch of points or a set of points I can join them and get the surface.

So, what I will do is I will take a little pause; I will ask my friend Asuthosh to switch off the camera for little while well I go up and finish this curve. And then I will get back with a drawing in a little while. So, while we were on a break; what I did was I drew this smooth curve joining all the points using my French curve over here. So, once I have this curve done; what I could do is I could possibly join these 2 end points and make this edge a solid edge. Because this is going to be visible; likewise this edge will be again a solid edge, visible edge perhaps one more stroke pencil ok. Now, how about this surface but on the bottom edge; if you notice these distances that we are measured last time they are gonna be the same; all we need to do is project these distances up to the vertical projectors. So, what I would do is I would start projecting these points horizontally all of them. And later search what the corresponding vertical projectors on which the points on this semicircle would lie on the bottom face just about there.

Now, if I look at this point the corresponding projector its vertical projector there. And of course this point gets shifted to this point there. If I look at this point, the corresponding vertical projector is here; this point gets shifted to may be this point there. So, I have a feeling that these shifts are going to be equidistant this point there; here vertical projector. So, the third point get shifted over here, fourth point get shifted here and the fifth point which is pretty close to this possibly gets shifted over here. Of course, we have this point that possibly gets shifted over here right there is that going to be true; is

that what is gonna be like? Technically these distance is the horizontal projections of this line they should be the same in length.

Let me double check this. So, this point gets shifted over here; it is just about all right switching to my 2 H pencil this point which was lying here gets shifted here. So, I need to be extra careful I need to be extra careful. So, this is my point here, this point lies here on the vertical gets shifted from here up till here; this one lies here, this points gets shifted here. And eventually this point, the fifth one gets shifted very close to this. So, looks like this is my new surface; likewise I can draw horizontal projectors from these points need to be a little careful. So, if I draw horizontal projector here should be marking this point here, should be lying the same vertical projector, this point should be lying this projector here.

Third one marked this already this probably would lie there, the fourth one would lie very close over there. And of course we will merge with this horizontal edge right there. Now, if you are looking at the top view then the corresponding curve in the bottom or on the bottom surface that would be lying below this feature here. So, consequently that would be hidden; so this curve will be hidden or shown using dashed lines. Let me try to show it lie and let me also try to demonstrate how I use the French curve. Of course, the curve is not going to be accuracy it is going to approximate. So, I try to match as many points as possible on the curve; at least 4 if not more and just takes a little bit of time. So, perhaps 1, 2, 3 and 4. And then I am going to be drawing hidden or dashed lines through this; I check it over because the surface is symmetric or this curve is symmetric. And then I will draw the hidden or dashed curve lines to pass through this point. And then over here I will simply try to merge the rest of the line with the horizontal edge.

So, well I am standing I met as well you know finalize these horizontal lines. So, this part is unnecessarily thick; I should not be using multiple strokes or pencils but nevertheless it is a good demonstration of what not to do. Now, trying to capture this circular feature over here; what do you expect this circular feature to look like in the top view would be circular or would be elliptical? And how many ellipses; if they are ellipses are to be there, which one will be solid and which one will be hidden? Clearly, this circle here will possibly be elliptical and the circle in the top view is going to be or the corresponding ellipse is going to be shown using solid. And the elliptical void or

elliptical feature here on this bottom surface is going to be shown using dashed or hidden lines.

First, let me try to get the corresponding points on this circular arc; for that I need to align my drafter appropriately properly and measure distances. So, just to make sure that this alignment is done only once I am going to be measuring all the distances. So, distances from here to the inch line from this point to the inch line is about 21 I just note down there; coming back to the second projector this is about 22 just about close to 22, coming to the third from the inch line it is about 25. And coming to the fourth it is about 31 to 32, 33, 32.5; you know very much like what we have this distance. So, these distances I probably had initially taken the wrong position or the incorrect position of the inch line. But anyways I mean this distance is going to be added to the corresponding distances that I have just recorded to get these points.

Let me align my drafter back and very carefully, very carefully noticing that there too many projection lines; try to record or try to locate these points on to the top view of my drawing. So, starting from this point so this point is here I follow this projector up right there and from this inch line its 21 plus 8 which is 29. So, I measure 29 along the projector. So, this point is gonna lying on the centerline here not there 29 from the inch line here. Let me use a different color pencil; so that these marks they become lot easier to see 21 plus 8; 29 possibly gonna be there; where let me result back to my 2 H pencil, my blue pencil is not working properly.

So, 29 from the inch line on this projector, it is about there and then this distance is about 22 plus 8; 30 lies on this projector I follow this projector up here. And then I measure 30 from the inch line; which is just gonna be there. And then this point is distance 25 from this inch line. So, from here it is going to be 25 plus 8 which is 33; third point comes down over here and goes up. And measuring 33 from this inch line we will perhaps keeping this point here. So, 1, 2, 3 and locating this point; well 1, 2, 3 and locating this point this point is at 32.5, 32.5 from this inch line, 32.5 plus 8 from this 40.5 close to 41; this point lies here I take my projector up looks like my drafters not lying properly. So, maybe I will realign my drafter ok.

So, I take I follow this projector up and from this inch line I measure 40.5. And it is about just on this centerline which is what was expected. So, 4 points and you know this

feature is expected to be symmetric about this horizontal line. So, may be what I can do is I could measure these distances and flip this point on the other side as well pretty much like mirror symmetry. So, this is close to 8 millimeters, I measure 8 millimeters on this side; I will have to realign my drafter again my verticals are not coming properly; make sure my horizontal is also looks like is it is ok. So, this points lies dead cells all right this is about 8 from the centerline. So, 8 eight from the centerline here, this is distance about 11 from the centerline, just about 11 from the centerline 11 from the centerline. On the other side this one close to close to 11.5 and 12 same over there just about their yeah. And of course I am trying to make this elliptical void on the top face. So, I got a certain points; may be what I can do is I can get the other set by making horizontal projections from this.

So, let me make horizontal projections; this already there do not need to worry about that; how do I get the rest of these points on the top? Now, if these lines are symmetric I should be expecting this distance to be the same as this distance, this one to be same as this and so on. So, perhaps it is nice idea for me to take my 30, 60 or any other vertical or rectilinear ruler; you know just kind of make sure that this points are indeed symmetrically placed which I guess they are. So, I do not need to worry about that; I will simply transfer these points to the corresponding vertical projectors.

Now, this points lies on this projector; I need to project it up things are getting mess here, things are getting little more confusing; and this point has to be lying. So, this point has to be lying at the same distance at this point. So, perhaps this one should be marked here; above this one. So, if I look at this projector comes down follow it up over there; once again possibly my vertical alignment is not proper yeah follow it up there and perhaps I get this point right there. And then with regard to this point which lies on this projector. And therefore this projector up this point has to be lying here and correspondingly if I figure out the intersection between the verticals and the horizontals here. So, this point gets flipped to this point this point gets flipped to possibly this point; and I already have this point there.

So, looks like I have a nice elliptical feature shaping up. And of course this feature over here on the top face will be a solid visible feature; let me see if I can demonstrate the use of French curves and try to plot these points, try to connect these points properly; this is going to be time consuming. Perhaps, I can use the inner part, it looks like I have gotten

this all right pretty much know may be I missed. But of course it not going to be accurate but it is going to be good enough for me to connect these points by. And perhaps I can do a little touchup likewise over here may be I was trying to avoid free hand drawing, but looks like probably have to do that anyways.

And then this about here; as I said it is not going to be accurate but good enough for us to work with; perhaps this will be little touchup what remains is the same feature on the bottom surface. And for that I need to use tricks which are very similar to those which I had used to shift this curve you know leftwards; I will probably have to use same thing to shift this all feature leftwards; I already have the horizontal projectors. And what do I do? So, I need to I know that these distances are there pretty much recorded; let me first very about this point, this point gets shifted perhaps from here to here. So, I am looking at this projector; and this is where my point is gonna be; this point this one here coming down going up. So, this point get shifted possibly here and likewise this point gets shifted here ok.

Now, third one from here up to here; second one, third one this over here all right. So, third one is over here; now this one the second one well looks like I am confused. So, let me go back; so from here to here going up. Well, from here to here going up I got this point, from here to here going up I got these 2 points, from here till here it is all right. So, I should be getting these points here and here good enough; and from here to here going up; I will have the vertical projector and I should be getting these points right there. So, far so good above these guys they get shifted accordingly from here but I do not have the corresponding projector for that. So, I need to switch to my 2 H pencil and draw few more projectors. But one looks like I am going in on to this region of my top view no fit and then I am going further in ok having done that. Now, if I look at this point goes down; I identify locate the vertical projector and this point should be getting shifted over here; likewise this point is getting shifted you know over there ok.

Now, if I look at this point follow this projector and go up further. Well, I should be expecting a point here and another point there; and this one I should be expecting a point getting shifted from here to here or may be from here to here. So, again this is pretty much like oval shape. So, this part is going to be solid it is going to be visible and the rest is going to be hidden, it is not going to be visible. So, perhaps I can use my French curves back and just try to capture to this big part; if I can and looks like it is gonna be an

arc its look like I will have been able to do that. So, I will just draw a visible arc and the rest perhaps I can do a free hand again not a visible but well let me do the same is.

So, this kind of completes my top view does it take a look; I got all features represented over here in the top view corresponding with this vertical block, taped block whatever; this feature represented over here, this horizontal plane represented pretty well here and here; auxiliary plane I got the true shape of the feature here on the auxiliary plane; transferred all the projections over here I got this void of diameter 22 correct over here. And then projected all the features over there got this curve all right corresponding this top face; this would be solid; the same curve on the bottom face will get shifted leftward and will be behind. So, it will be hidden the circular feature when projected on to the top view will look like an oval. So, here this oval will be visible and here again this oval gets shifted leftward a part of it is visible and the rest of this oval will be invisible. So, looks like I am true with this example; we will worry about the next one in a short while?