Technical Arts 101
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Lecture - 30
Lab 02

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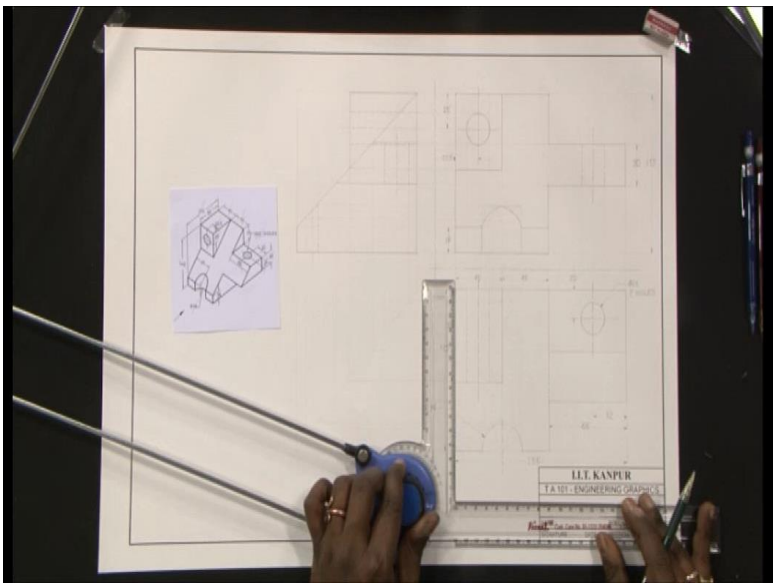

So, we will be drawing the first angle projections of this object. We are viewing this object along this direction. So, this is my frontal plane. This is my top plane, and this is my right side profile plane. So, on the first angle projection; the front view comes over here at the top. The top view would come below the front view. And the right side profile view will come to the left side of the front view. Let us take a look at dimensions of this object broadly. So, the height is 115 millimeters, the width is 115 millimeters. The length is about 45 plus 45 90, 90 and 65 about 155 millimeters. So, as I said it is always a nice idea to be prepared. So, I have prepared the sketches for this object. Let me place the object also here. So, this is front view of the object, the top view of the object, and the right side profile view of the object. Broadly, the dimensions; 115 115 90 plus 65. So, there are bunch of holes here; one and two, so one hole here, the other one here.

So, if I look at this object from the top, I see this arc as a semi-circle in the top view. In the side view this is a slant plane. In the front view; however, this will not be a semi-circle, something that will have to be a little careful about. So, we get this curve rather

from the projections of this semicircular arc, and this slant line. We will see how, while we are drawing. So, as I said we have two through holes, both of diameter 5 22, one here and the one here. Take 2 and the other one here. Let us start drawing. So, I take my object away for a while. I place it down here, and I keep my sketches over here. I plan my sheet so that my front view comes over here, the top view comes here, and the right side profile view comes over here somewhere. I plan my worksheet in such a way, that my front view comes over here. My top view comes below the front view, over here somewhere, and my right side profile view of the object, comes on the left hand side of the front view. So, these dimensions are 115 and 115, which would make it about 23 centimeters or 230 millimeters.

I will take one of my set squares, and try to get an idea. So, this is about 22. So, looks like I will have to be starting my front view somewhere over here, so that I do not hit this part of the worksheet. And the width of the object is about 90 plus 65 which is 155. So, this is about 25 centimeters or 250 millimeters; 155 would be here somewhere. So, let us take close to the right margin of the sheet. So, let us start by drawing the bounding boxes, for the front and the top view, to start with. Once again this is having the h grade 0.5 mm led, this is having the 2 h grade 0.5 mm led. I use this for construction and projection lines, and I use this for solid lines. So, let me have the green pencil in hand. The idea throughout the entire drawing is, to avoid using these friends. They are not good for the sheet as well as for the time. Let me get this height first. So, this is about 12 centimeters, and this would be about 18. Let me see if my drafter is fixed alright. So, I am all align to the horizontal margin, may be not so very well lined to the vertical margin. This is not a very accurate drafter, so I will have to deal with this, but for now it is ok.

Coming back to the front view of the object 115, perhaps from here, and may be a shift a little on the right. Let me also not stay very close to the margins perhaps here. So, I will start from here, through a vertical line, red dim line, and then from here I go 165 millimeters to the right. Again dim lines 115 millimeters from here, which is probably here dim vertical line and a horizontal line. The box for the top view will be of identical dimensions. Let me leave some gap between the front view and the top view, and some gap for the dimensions. May be I can come for the down or maybe not. So, this is about 115, and then 16.5 to the right; 16. 5 to the right from the top, and a vertical line on the

right. Let me relate these two bounding boxes via projection lines, and let me also separate these boxes by hinged lines. So, they are going to be solid, dash small dash small dash big dash as a convention for the hinged line. Here I cannot see this line, perhaps that is alright. May be I can also have the bounding box for the right side profile view. So, I will switch my pencils, I will go from here. And then this dimension, this would be the same as this dimension 115. I do not need to stay too far from the front view, perhaps right about there.

Horizontal line vertical line which is again of the same size as this 115, is a dim lines alright. And then this is the line that I cannot see, I will draw anyways. And let me relate these three boxes now with projection lines. Once again these to be separated by a hinged line, so I will draw that, so far so good. And then if I look at the sketch, these two views are going to be related by a series of projection lines over here, and they will be deviating through this 45 degree line. Now for that, I will have to project this line to the left. Well I keep it a dim line, project this line vertically down, project this line down; not too much, but may be till here, and then project this line until this point. I dropped my pencil even though I did not want to use this friend of mine, I am forced to use it, but I do not have the excuse of erasing the main construction line or projection lines, so I would not worry about that. Now if I use my 45 45 set square, and join these two lines, rather join these two points, I can expect this angle to be 45 degrees, and let me see if I really have it, looks like I really have it, I will work with that.

My sketch sheet back here, my object here. So, both are for my reference, and a gulp of tea downs my throat. Back to work, maybe I can think about starting with a top view, because I seem to have all the features in there. So, I can draw this vertical line, solid line. So, I am going to be using a different colored pencil; h pencil rather. And then from here to here, it is a solid line, rather it is a solid line throughout, so I am going to draw that. I cannot see this top line otherwise my head is going to be blocking the view, so I draw this line with the leap of faith. It looks like it is ok. So, remember I am drawing the top view here. What is this distance, do I have this. This corresponds to this distance here. Probably I may not have that, but maybe I will have the dimensions corresponding to this 65, and then this is 45. So, I can may be go ahead and draw this block ;about 65 here, and let me record this point by a projection line, which I think I am going to be using for my profile view. I am using the wrong pencil, so I will have to switch that. This

is at 45, this length is 45. So, maybe I can go ahead and make that, it may be here. And then of course, this line is solid, this line is solid, this line is solid, this line is solid. So, I will make these two lines as solid lines, using the wrong pencil.

So, this part is done, maybe it will be a nice idea this time for me to project this line up, on to the front view. I will need this projection anyways later. Let me see this is 45, looks like it is alright. So, let me remind myself that I am still working with the top view of the object. So, this is 22.5 from here to here. So, I will have an axis, I will have a vertical axis. Let me mark this. I was probably marking the wrong dimension, so this is 25. I should be marking 22.5, so that I am focusing and not making mistakes. So, this axis is at 22.5 from this vertical line.

So, let me measure that this is about 22.5 not very accurate, but still. So, let me mark it, and then let me draw the center line. It is going to be a solid h grade line; long dash, short dash, long short long short long, so far so good. I am trying to figure which pencil I am going to be using now, but anyways I am focusing on this through hole here, the diameter which is 22. So, before drawing the circle in the top, rather in the front view, let me draw the hidden lines, because I know these lines are going to be hidden, in the top view, and I can of course, get these dimensions, so 11 from here and 11 from here.

Let me mark these two points, and then draw the hidden lines. I swap my pencils again, these are going to be short dashed. And I can project these lines upwards, to relate to the circle in the front view. So, this part of the top view is taking care of. Let me worry about this part now. So, this distance is 90. So, this vertical line will be distanced 90 from this vertical line. For now I will just mark it, and then draw a light line.

Now look at this center here, it is at 45 from here and 45 from here, and the radius is 19. So, perhaps I already know the position of the center line, which is at 45 millimeters from the vertical line, right here may be. So, I will go ahead and draw the center line, dash dot or long dash short dash. So, I have the center, and I am going to be looking at my stencil first if I have a circle with diameter 38; looks like I just miss it by 2 millimeters, so I will have to use my compass. Let me test my compass, seems to be working fine. Well so this distance is 19, this distance is 19, so maybe I will just mark them. Make sure I have chosen the center appropriately, looks like I have, and then draw

the circle in one go, may be the second go. And then using the h line, where h pencil draws these two horizontal lines.

So, I am not really sure about this feature, although I have sketched my three views, as to work this dimensions going to be. So, I will hope that I will get it from the projections from the profile view. For now, let me switch over to the front view, and start drawing it. This is 115, I have already marked it. So, I will not be scared straight away use the solid line, or straight away draw the solid line using the h pencil. There you go, and then this height is 18, I know where this discontinuity comes from; from here, I will project that. I am using a dimmer pencil now, and I will project this thing over here also, on to the front view.

So, this would be a solid line at least of length 18. This is perhaps of 18, and then I will draw this solid line. And then I will draw two horizontals, maybe I should, project it a little more, and then join these points using a h pencil. I will have these two vertical lines, and then this line will be solid throughout. You know why, because of course, this line is solid, this line is solid, and this line will be the projection of this arc; that we will be seeing in the front view. So, let me go ahead and draw this horizontal line solid; there I am. This top line will be solid line, I consider.

Once again I will trust my drafter on my pencil, and hopefully I am not making a double line as I did last time. Now, this block, do I know the height of this block, but perhaps I know this dimension. So, maybe I can extend this horizontal line in the front view. So, this is 35. So, this is 35. So I can measure that. Let me take my other friends, and request them to seat, or to be seated on a separate location. So, this is 35, I am using a wrong pencil, but any how I am going to be needing my h pencil, and this is my solid line, and of course, this is my solid line so far so good. This height is 30, and these two are solid lines.

So, I am going to retain my h pencil in my hand, draw this horizontal solid line, and draw a vertical line. This feature done, and of course, I am going to be drawing this solid line. Make sure I do not leave gaps. Now this axis is at 32 millimeters from the vertical line on the right. I hope I said it right 32 millimeters. So, let me (( )) can be h pencil with me. I have marked 32 millimeters from the right, and then I can go ahead and draw the center line long dash, short dash, long short long short, and then this hole is of diameter 22.

So, once again I measure 11 to the left, 11 to the right, and then draw the corresponding hidden lines, this time small dashes; here I am. How about this block. I probably still have no idea, or maybe I do, or maybe I do not, let me think. I think I may have to get this from the projections, so let me try. Switching my pencils, sipping on my tea, and getting back to the drawing sheet, maybe I can get started from the bottom itself. Since, I have to work on the profile view anyways. There is a horizontal solid line. I have this projection. I switch pencils. I join this feature here. I relate this feature to the profile view with this projection line. This line is a solid line. I do not know if you can see this, but let me shift this perhaps here.

So, this line is solid line, done, and then the slant surface here, starts from this vertex, and ends at this vertex; of course, this vertical line is solid line. Let me go ahead and mark this first, there I am. And now using my set square, I draw this vertical line, rather I draw this slant line; it is too long, alright. My friend goes back, this close friend of mine comes back. I am ready to take this projection up to the profile view, I will start the lines, rather I will start the pencils, perhaps up till this point, and then from here I draw this line, and then of course, this would be a solid line as well.

Again the problem of double lines, because I cannot have my eyes directly over this horizontal line; nevertheless. Now, if I look at these two horizontal lines, and if I take these projections on to the left, I will see these solid horizontal lines, let me draw them; first the projection line, and then the solid line. Once again, first the projection line, and then the solid line, which is now going to go up till the slant surface alright. I was wondering what this height was, what this height was. So, looks like I now have it, I now have it through the projection, emanating from the profile view, right there. And of course, this block is going to be a solid block. So, two solid lines alright, how about the circle. Let me first figure up the center for the circle. So, it is at height 25, rather its 25 millimeters below this horizontal line, and of course, that lies along this vertical line. So, why do not I go ahead and draw the center lines, anyways center line vertical line anyways. So, long dash, short, long, short, long, short. And then measuring 25 from there may be not may be, yes draw a horizontal center line long short long short long well.

And then this is 522 I look at my stencil, this is my circle where I need to be using, right there I align the center lines. Of course, accurate stencils put to a better job, but for now just for demonstration, I align these center lines, and I hope I am ok, but I still have these

vertical projection lines from here for reference, and then I go and get a circle. Well I am not supposed to be doing this again, but just to make sure I got the top left part of the arc right, you know, little better alright. So, I got everything in the front view, except for this arc, which definitely I know now going to be semicircular. So, I will wait till I make this arc. So, I just came back from a break, I would figure out where I let lost. So, if I am to compare my sketches with the drawing over here, looks like I am pretty much done with the front view, except for this curve, which I do not know how to get at this time. Well I know how to get this time, but I probably I am not very much prepared. So, what I will do instead, is focus on this part of the top view, which is what is little tricky, and in particular I would be focusing on how I would get this edge and this edge.

So, if I take a look at my profile view, in the sketch looks like this edge, is going to come via the projection lines from this vertex. So, having said that, maybe I will draw the projection line from here. I am going to be using the 2 h pencil for this, may be take it a little down, and then draw horizontal projection, all the way up till this point. So, once I have this, I know this line of mine will be here. So, I will draw a solid line, and then I will draw this vertical solid line. This line will be solid again, since I already have the h pencil in my hand I will go ahead and do that.

Now I need to worry about how I would get this line. So, in my front view, this surface is represented by this line. It is projected on to the profile view here, start line, and if I take a projection down to the top view, and then horizontal projection line right there. So, this is how I would be getting this line. And since this line is solid, I am going to go ahead and use my h pencil. So, in the top view, this line would show via this line here, no, rather this line when fact this line is going to be projected on to this line, and this line is going to be seen here. So, I will make this solid.

And then how about any line if it is present in this region. So, if I look through this part of the object, this entire thing is continues, but if I look at the horizontal plane below. So, this plane here, this vertical plane here, and this horizontal plane of course, are connected by this h, and corresponding to this discontinuity between the two planes intersection line between the two planes, I will see an edge not visible, but hidden in between these two vertices. So, I will draw a hidden line; a bunch of dashes. So, this completes this feature of mine. All I am left to do is to draw the circle. I know whether vertical center is, so I will just draw that. I will just draw the corresponding center line. And then of

course, I am working with the top view. So, this point is at a distance of 20 millimeters from this edge, from this edge 20 millimeters I measure that, mark it, and then I draw the horizontal center line, and there is hole through hole, is of diameter 22 right there. So, I am going to be using my stencil, if it is a nice idea for me to draw the projection lines first , since I already have the corresponding circular feature in my front view, so that it gives me a nice reference to place my stencil.

Now that I have the projection lines, I will try to fit circle with diameter 22; seems probably alright, and this looks alright. So, I have pretty much of thing cover up, I have this block alright, I have cylindrical hole here alright, hidden lines, center lines, circular arc, center lines, solid line, hidden line, solid line, three lines, center lines circle, and a vertical line. So, this part is done with, maybe I will just mark it. In my front view, I have this part cover, I have these two places cover. I still have to work with this arc, so I put a question mark, and I have this part of the view cover. In the profile view; however, I do not have the projections corresponding to the circle on this block, and the projection is corresponding to this circle over here; maybe I should draw them. So, here would be my first hidden line, I will draw the projection line from the circle, and then I cannot see that line alright. And then I will draw the projection from this part. By the way would this be going throughout up till this edge. It looks like it will. So, maybe I should extend these dash lines, likewise I go over top, get the projection line first, and then get the hidden lines.

Perhaps I am using dashes longer than I should be using, but anyhow, and then we have the center line; I got that part. So, this is cover, and how about this hole. So, I will be coming from the projections from here. First thing I need to do is, project the center line. And then of course, this circle would be in between these two lines, the corresponding solid lines are here. So, I need to be a little careful, because this solid line and this hidden line are quiet close to each other. Anyways I will take the projection from this circle, on to my profile view. There I go and first would be the center line, which I draw now. And then the first hidden line, I have to be using the projection lines; I need to correlate each feature in each view to every feature in every other view. these dashes look little better, smaller and better how I prefer, and again this projection line here, having certain pencils left and right; pretty much done. This is cover, looks like my profile view, how about this hidden line, this would correspond to this feature here. Remember it is a void, so this

pretty much like a cylinder or rather or slant plane cut by a cylindrical surface. So, I will have to project this on to the profile view, which I do now, then I go up right there, and then I have the corresponding hidden line, shown using small dashes. Pretty much alright.

So, let me compare again. once again to remind myself this part is done, I still have to work on this arc, and to compare the profile views, I have got this part alright, I have got this part alright, I have got these two lines here and here. I got this center line here; two dashed lines, left and right of that center line. And I have got this center line right there. These two hidden lines I have, of course got the slant surface, this vertical line here, horizontal line here, corresponding to this. So, its peak sliced block right there. So, looks like I am pretty much done, except for the fact that I still need to work on this figure, and how do I do this. I have to be using projections explicitly for that. Well, so to get an idea, or to give an idea this is how the curve, and the front view is going to be. So, it is the intersection between the cylindrical surface, and the slant surface. This is where my cylindrical surface is, in the top view. This is my slant surface, in the right side profile view. So, what I will be doing is, I will be marking different points here. Taking the projections on to the profile view. Taking the projections on to the front view, and then getting these projections back from the profile view to the front view, find with the intersections of the corresponding projections, and then those points will give me the required curve.

So, let me get started with that, may be a nice idea for me to mark these points symmetrically. So, I will use the protractor that I have with my 90 45 45 set square, and maybe I will use a very dim line to mark the points. So, one would be here let us say, at 30 degrees each, that probably give us some nice spacing, and then using the same set square I am going to be joining the center of the circle with the irrespective points, and may be just, you know mark the points. So, one was right there, the other one is right here, or why do not I use the radial lines instead, so that the construction becomes lot more clearer; 60 degree line right there. And well I can just use my mini drafter, and get the corresponding point here on the left side of the arc, and then get the radial right there. So, maybe I can start projecting these on to the slant surface. This is the first 1. So, now, that I have the points on this arc, maybe I will start projecting them, to the slant surface in the profile view. So, here is a first 1; I am using very dim lines, second one, and I

already have the 3th 1, and this projection from this would be the same, and projection from this point would be the same.

So, I do not need to be using other projection lines anyhow. So, let me project this line on to the slant surface. This line on to the slant surface. Well I am quiet short. Now I think I am ok; there I go. Well let me make it little darker. So, these projections let me use a little rectangle here, to bind these projection lines. As I said my drafter is not very accurate, so I need to keep calibrating it, time and again, but anyhow. So, this box will pretty much do the job of binding the intersections between the projection lines right there. So, I project this point, this point corresponds to this point on the arc, and then make horizontal projection from here, and then make a horizontal projection from here. This would be the ideal way of getting the curve. And then use the vertical projection from this point, and from this point of the arc. Well I already have the projection, but I will kind of make a continuous line, and then vertical projection from this. Although, on terminating these projection lines, at this horizontal line. I am going to go up, and I am going to extend the lines anyways.

So, I go up, I extend these projection lines right there. So, the points that I going to be lying on the curve; this point, I am not going to be indenting the sheet to hard with the tip of the pencil, but enough, so that I understand what the points are. And then intersection between this projection line, and this projection line here. I hope I get it right again, just little dot, same on the right, and then two projections to the left from the center, two projections from the top, right there and right there, and of course, these points will also lie on the curve. Once I have these points, maybe I can use another friend of mine, and think about joining the four points, using the French curve inside.

Of course, now going to be accurate, but could not for me to represent the arc. Hopefully I get it right, and perhaps may be I will just inward that. Let me try to get a nice fit. Well for the first time, well rather for the 2th time I guess I am going to be using an eraser. It is for me to use, it major mistake, but ideally I should have avoided that. Now let me go back and complete the projection lines, just to make sure that my grader, if any would understand what I have done, and then grade me base in that, getting back to the French cover again.

Well perhaps again, this is not a this is not an accurate fit, but perhaps good now for the purpose. Of course, the tangent here will be horizontal, so maybe I will erase that a little. I am trying to be as fair as possible in my work. And then perhaps draw a curve, that pretty much gives me a horizontal tangent, may be at this time I will just draw free hand. So, you would notice that this point is at line on the curve, but that is alright. So, this completes the drawing I believe, what we are left with are the dimensions. So, in the previous example I had used aligned scheme of dimensioning. This time I guess I am going to be using, the center line scheme of dimensioning. Well this dimension is 95 and 65 155, and I am going to be writing this thing, perhaps I am not concentrating too hard. This height is about 115 vertical arrow, arrow heads, and maybe I will write this thing here. This would be the top view, so this is done with. This dimension is 65; smaller dimensions are closer to the drawing, larger dimensions are further away from the drawing. So, this is 65, this one gone, these two dimensions are 45 each, so arrow heads.

So, this is 45 and this is 45. I am trying to print, though perhaps I am not that successful. So, these two dimensions gone, so always a nice idea to go to the circles and specify their diameter. Well I am done with the sketch, so maybe I will just keep it aside. For that maybe it is a good idea for me to get the leaders from here. I use a combination of my drafter, and the 45 set square, get the 45 degree line like. So, make an arrow head, let go of my set square, draw horizontal line, and then dimension of course, using center line 522. Ideally I should be showing many of these dimensions in the front view, because I do not want to reach up there and block the view. I am trying to show these dimensions on the top view. So, these dimensions are done with. Perhaps I can dimension this distance as well. This is 32, let me check if it is really correct, looks like it is. So, this dimension gone, this is 20. So, maybe I can dimension this. Well I am going to be using a slightly different strategy, because I do not want to dimension within the drawing.

So, I am going to be using set of arrows like this, and then of course this is 20. So, here are my this, this height in the front view, is 25, this height here, and this is 22.5. So, perhaps I need to extend the center line. Once again use the different scheme, draw the arrow heads, and then mark this as 22.5. So, probably not come out probably at anyways we will do the job, 25 is this height, and this is 25 down this. So, this height is 18, maybe I can mark this here, my dimension lines are getting darker now, but I think I am now hurry to go back home. This 18 is marked alright, so this distance 65. So, perhaps I can

mark this 65 here. Once again it is because of convenience that I am mentioning all the dimensions in the top view, ideally I should have been mentioning these dimensions alongside the front view. This would be 65, and then I realize that I made a little mistake. I used the aligned scheme of dimensioning here. So, maybe I will erase that, and I will mention 32 like so. Did I mark this dimension possibly not. This is the height that I will be getting in the front view. So, perhaps I have to go to the front view, and get this dimension recorded; this is 30.

My printing style is also getting changed that is alright. Top view I have got on this, but I have not got on this dimension. So, perhaps I can mention this dimension here, maybe I need to extend my construction line from here, my construction line from here, or projection line from here. Make sure I am parallel to this, little adjustments that I am making to my drafter. I really I should be doing that, but anyways. So, this is 115 I want to make sure that I align myself along this number. So, this is 1 1 and 25. So, this is also taking care of, what am I left with. So, this would be two holes, of course. So, I am left with these two dimensions 45 and 19. Let me take care of 19 first, use of 45 degree leader. Well this looks like little inconvenient. Well I do not need to necessarily use of 45 degree leader. I can as well use a 30 degree or 60 degree leader; I need to use one of these projection lines, as a reference. The figure would look much neater.

So, I will draw a little arrow head here, and then I will use a horizontal. Again let me remind myself that I am doing center line dimensioning, and so this would be r 19, this is taken care of. Now this dimension here 45, how important this is. It is important because that would locate the center of this void perhaps, I can well, but I already have this 45 marked over here. So, maybe I will not worry about that too much. So, thinks like scale, is something that not mentioned, maybe I should mention over here scale 1 is to 1, and I should also mention my details, and of course you know who I am, if you do not, you will probably know who I am right.

Thank you.