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

Lecture - 34
Lab – 06

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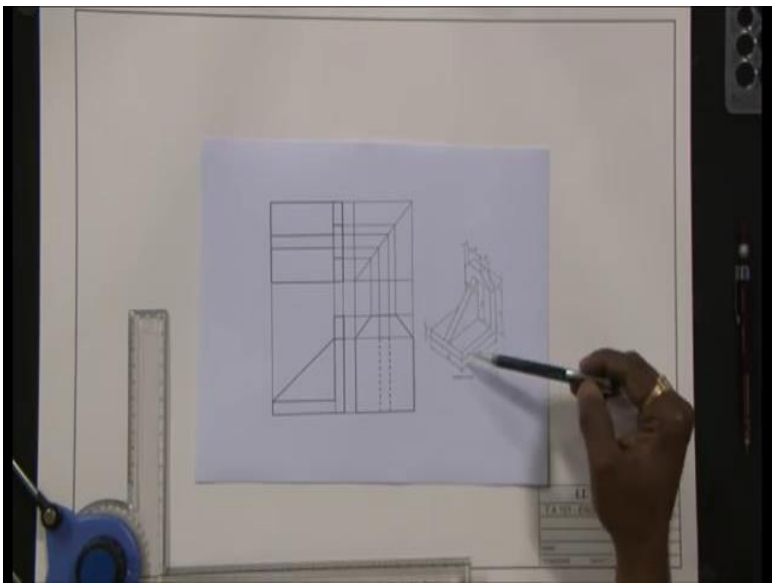

This is an example on perspective view. So, what I will try to do is I will attempt a three point perspective of this object and what I will do is, I will be using a two station point method, to draw this perspective. I will not be using vanishing points explicitly, but instead what I will do is, I will rotate this object twice, one would be about this axis, I rotate the top view above this axis and afterwards I will rotate the profile view above this axis.

I will do that to ensure that none of these edges are parallel to the picture plane. So, these are the orthographic views of this object the front view or the frontal plane is this, top view the profile view, so what I did was I performed one rotation.

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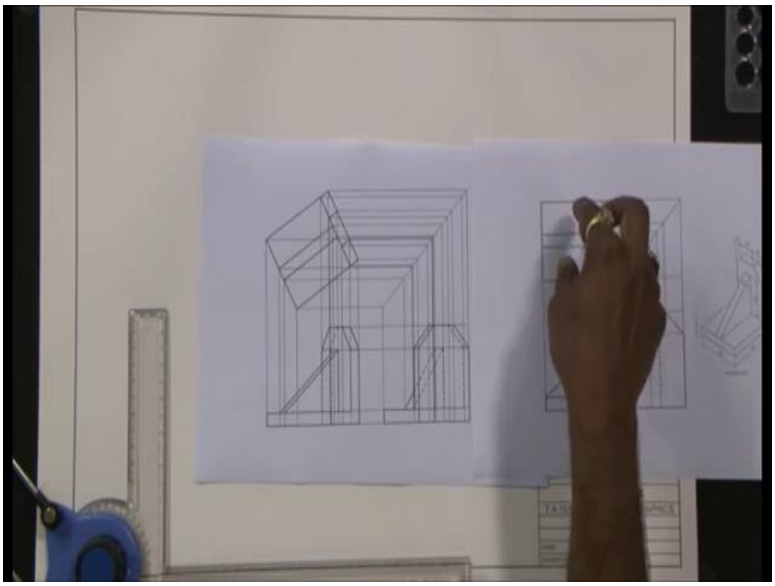

I rotated the top view like, so by some degree I got the frontal view as well as the profile view, but then things became complicated. So, what I did was the next smart thing I went to MATLAB, I recorded the three dimensional coordinates of all these vertices, I also record the connectivity's and then within MATLAB, I performed two rotations of this object.

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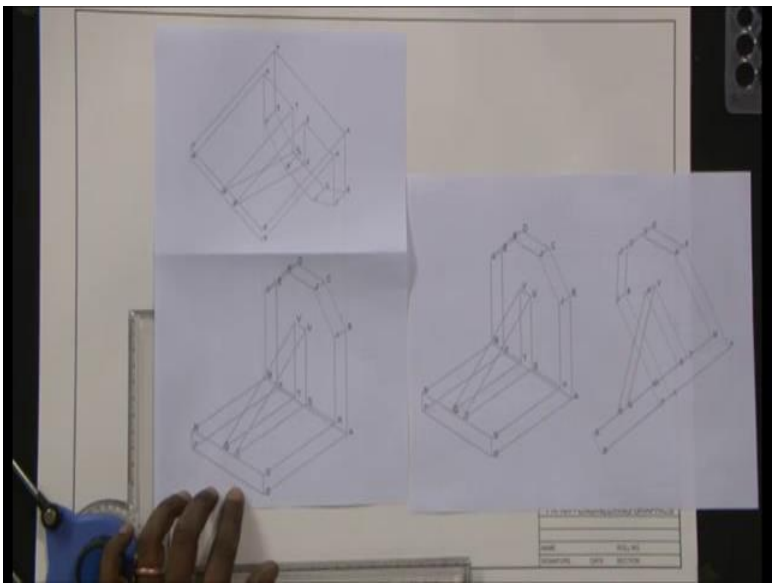

Once I did that, I got three views this was my front view, top view with respect to the front view and the profile view with respect to the front view. So, the trick is to use the

true top view and the true profile view to get the perspective of this object, we will try to see how this example goes.

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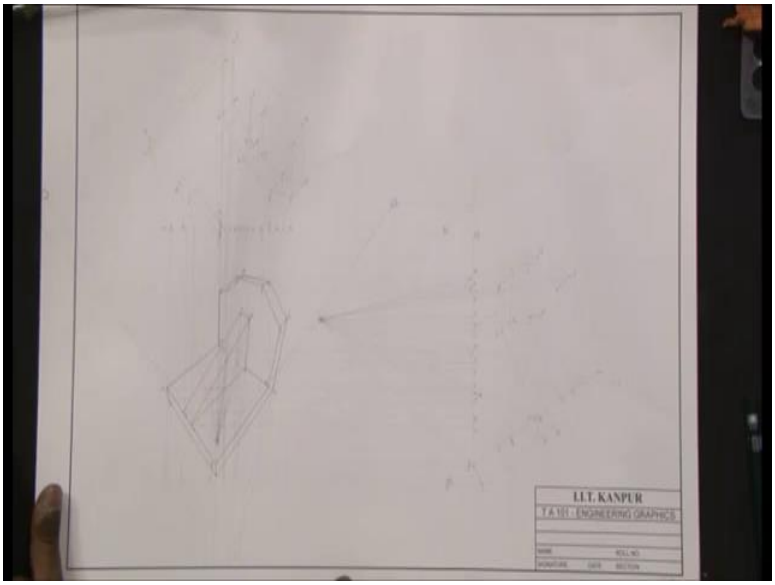

So, what I have done is I have copied down the true top view here and the true profile view here and with these two views using the two station point method, I will try to the attempt perspective drawing of that object. Let me first specify the ground line, so the ground line will be passing through this point o little gentle line, let me also specify the picture plane. Now, in the top view the picture plane, let us assume that it passes through point a vertex g, let me call this p p.

The picture plane in the profile view the picture plane is going to be vertical and it is going to be passing through this vertex g here, I have to practice littering, but let us not worry about that for now. Now, let us say I am station somewhere here, in the top view and let me mark a point or perhaps somewhere over here, the further I stay from the picture plane and the further away from the object I will probably be getting a nicer perspective, but a smaller perspective.

So, I do not want to be too far away from the picture plane and I do not want to be write in front of the object may be I want to maintain some angle between the object and myself in the top view. Let me have my station point somewhere here it is arbitrary and let me encircle it, so that when I am drawing the perspective I do not miss it. Notice that

I am using my two h pencil and let me call this station point with the subscript t to remind me that this is in the top view.

Now, in the profile view let us say I want to see the roof of this object, so my horizon line would be above this portion of the object and this distance in the top view should be the same as this distance in the profile view. So, let me first choose the horizon line, horizon line could be anywhere in the profile view does not matter it could be above the picture plane or below the picture plane.

Let me have my horizon line here, where you would notice that after while I would stop calling this is the horizon line because I will have my station point here. Let us measure this distance it is about 60 millimeters and let me have this distance over here, let me encircle this point to remind myself time now here that this is the station point in the profile view, I use a subscript p. So, throughout I will be using the two h pencil, because there will be a lot of many construction lines there are chances that I might make a mistake if I am not careful and if I am not focusing first things first.

Let us identify this vertex g, vertex g in the top view lies on the picture plane. So, I can take the vertical projection down from the top view and perhaps I can take the horizontal projection from the profile view intersection of these will give me vertex g. Now, what I will do is I will start seeing these vertices in the top view from the station point, I get their projections or their images on the picture plane and I will try to project the images downwards.

Likewise in the profile view I will start seeing the respective vertices, I will get their images on this picture plane and I will try to project them horizontally. The intersection of vertical projections and the horizontal projections, will give me the respective vertices on this part of the sheet, the perspective plane if I may call that.

Perhaps not a good idea to disturb my drafters I am going to using this kind of line the 30, 60, 90 swiss square. And let us perhaps focus on this vertex R, this is the ray in the top view through which I am visualizing R, I get its image over here I project it down by some instance I am using very dim line perhaps may be a little darker, so that you could also see. And then from the station point of the profile view, see my vertex I here, this is where the image of the R will be formed, I use horizontal projection from this point here and this is R.

Let me view myself for now and work on these vertices the top view and the profile view, let us see how this go, the procedure to get all these vertices on the perspective plane is identical, I am working with Q I get the image of Q, here now within. So, whenever I draw the horizontal and vertical projections I need to be careful in correlating them. Let us take P in perspective have it is image down maybe it is a nice idea for me to indent these intersection points otherwise I will get confused, the image of P is right there and this is where p would be perspective and perhaps O.

So, looks like O is going to be lying on this vertical line and let me take o from here, it is image on the picture plane is right there, O lies on this vertical line need to be little careful I do not want to miss these lines, perhaps just to get an idea has to have the picture of perspective is getting formed. Let me join these 6 points to form a plane, these 4 points N Q R and G they will have to be collinear.

So, they will have to line a straight line, so this seems we got it right and then in P forms an edge likewise O G forms an edge and O B forms an edge, this seems to be looking quite queued. I wonder if I have taken this view right or this view right, seems like it was ((Refer Time: 19:07)), nevertheless let me continue and see where I go from here perhaps may be it will be a good idea for meet to draw this face and see if everything seems.

So, let me focus on vertex a that connects with O, I have labeled these vertices for my own convenience otherwise I tend to forget where these vertices are nevertheless. So, a gets it is image formed over here, bring it down if I look at vertex A from this station point, this is where the image of A gets formed project it horizontally and this is where my vertex A is I indented also right a little notation.

So, O A gets connected, let me see where B is looks quite weird to me at this time, may be not a proper choice of station point, but let see image of B getting formed over here, I project that image down. And then I look at B here in the profile view from the station point, get this ray go in the image of B gets formed here and I need to intersect the horizontal with this vertical here, this is perhaps where my B is looks quite weird looks really weird.

Well let me continue about I, vertex I here image getting formed here somewhere take this down then go to many, many, many, many rays one needs to be quite careful from

here vertex I forms an image somewhere here picture plane, take it is horizontal projection an get the intersection here indent this point. I am not supposed to be do that, but just to remind myself that this is where I is you proper use a grammar should be I am, but this is vertex I.

Let me verify if this is, seems like this is seems like, this is all right let me have this point I. So, I have done A B I perhaps H look at this station point here, H would be very close to this vertical line, very close indeed. So, this is my vertex H in the profile view, this is perhaps where if the image of h gets formed, I take a horizontal projection from here and mark it over here, so this is 1 point H.

So, just to make my sheet looking better, I will take a break and I will erase these objects and then I will come back later. So, looks like I have all these vertices corresponding to this plane in my picture here perspective picture. So, G O and then I have got I perhaps I should go in an ordinary fashion, so G O then A I have A here, perhaps I have P here, I here and H here.

So, let me try to join them maintaining the same connectivity let me keep my drafter for while. So, let me join G and A first, I will worry about visibility later and then A B and then B I, I H, H is here and H back to G. Perhaps I made a mistake, I should have really joined O and A, I erase that and come back got joining O A as I mentioned earlier if you are not careful there are chances that mistakes will happen.

So, O A, A B, B I, I H and H back to G, perhaps I can try to get this face as well, at least I will be able to figure if my top view is okay or not. So, already have P and N I need to get these four vertices let us focus on M, going to be careful me to use 2 h. So, this where m makes an impression on picture plane, project it down my vertex m is here this is where I get the image of m on the picture plane I project this horizontally perhaps this is where I get m intend that may be make a little note for myself.

Now, for vertex F that is where the image of F is take it down and then F is here make celebration here very close to M perhaps I lost my projection over here. So, F coming from here S here and F is making its image very close to m on the picture plane, well it should be little above that one more time, I let that line stay. So, 2 points remain E and L, so this is where the vertical projection is coming for E and this is where the horizontal projection is coming for E.

So, perhaps this is where E S, so very easy to get last in perspective finally, I think is where I is let me verify, so the ray from this station point towards L makes an impression here on the picture plane gets down. So, this is where I should be and then from here this is the ray that is making an impression at this point on the picture plane and so looks like I am fine.

So, I have got L E M and F and F is connected to P and M is connected to N, let me work on these connectivity's M connected to N and then L connected to M, L connected to E and then E connected to F here perhaps and F connected back to p, it is going to looking weird. But, let us see how this goes further still not a good idea perhaps for now to start making these lines darker, because it is still lot of construction left.

So, if you realize L E D K is making a phase, D C J K is making another phase and C B I J third phase. So, I got this edge I got this edge in perspective perhaps if I get these two edges, I then will be able to see these three phases and verify if I am really going. First let us look at C these are going to be true many lines. So, maybe I will start marking and maybe I will remind myself if this is C take a vertical projection down all right go to see here, may be lets mark c here get the horizontal projection up till this vertical projection this point here is C.

Let us look at J now, so it looks like J is going to be very close to this vertical projection it is not going to be very far from that or may be it would be, let me mark this is J get the vertical projection from here. And let me look at J in the profile view, let me get the horizontal projection from here and perhaps this is where J X, let me intend this point and call it J. So, looks like I have this phase B I J C, so I is connected to J let me make that connection and then B S connected to C, let me make that a little darker and then of course, J is connected C.

So, I have gotten this phase, now what remains is to find k and T, so I look at K this is where K should be bring down the vertical projection from here my lines are getting darker now, that should not happen. And I locate K here, this is where K would be take the horizontal projection and this is where point J is. So, looks like too many points are close to each other and D E this is going to get mess here, these takes here take the vertical down.

And then take the image of D on the picture plane in profile view, here mark that as D usually these markings are not supposed to be done, but I am just doing that, because otherwise I know I am going to get last I know I am going to be last it is my drafter. So, possibly it lies a little above the picture plane and I need to project this thing upwards a little looks like my D would be somewhere here.

So, now, these looking messy here because there are, so many points I need to be careful in locating K, which is here and T which is here. So, before we tend to lose ourselves let us go ahead and connect the vertices. So, L is connected to K, K is connected to D and D is connected back to E and I have no idea where E is did I get E right and how to figure that out.

So, let me go back E should have been here, somewhere and then E should have been on this vertical projection E should be coming out from here. So, E should have been here, so I marked this point wrong, once again station point to E image of E comes here somewhere take it down right. So, may be let me mark E here and then station point to E in the profile view, E makes an image here take it is horizontal projection from here and E should be here, so looks like I got E wrong here.

So, this connection is also not proper, so if we not careful you know mistake happen here looks like I am in a mess here, so many points, so many rays horizontal and vertical projections. So, I will take a break try to sort this mess out and come back and then continue with the rest of the perspective projection. So, what I did was I went up line and darkened my construction lines, so that I do not get confused, but in the process it looks like I am little more confused anyhow.

So, I got this part all right, so this was the region where I started to make mistakes if you realize this is point C this is point J vertex K, vertex T would be somewhere here and if I look at this phase here C J K T makes phase. So, C J K T let me complete this phase and then move further this time it looks little messy, but hopefully when the final drawing is done things will be a lot more clear.

Now, look at vertex L vertex L is behind the face C J K T and s, its vertex E. So, one of the option is to let go of them second option is to you know make this phase, but if you do that things would be a little more messy, well let me try it out let see how it goes. Now, that we are in the mess already and later on we will work on the visibility part and

try to finalize this drawing. So, looks like I have this face done pretty much and then on the back side E and F would be connected, so it is a very cute line, but let me have it and let me darken B C just to get an idea has to how cute the perspective is.

So, before we work on the ray part, perhaps it could be nice, if we can figure out the visibility of this. So, let me go back to my front view right here and realize that phase H G N M is on top. So, these lines they need to be dark P O is at the bottom, so this part can be vomited and O a is visible, so this is visible and so S G O. So, let me work on this part first and if I to darken these edges, before I start getting more confused.

So, here we go and to darken I am going to be using my h pencil I hope I will not be making mistakes from now on, if I do well I do. Now, this part will probably not be visible, because this edge would hide that. So, maybe I will just make a partial phase or may be let me not work on this for little a while, because I am not sure if the ray that we are going to be working with will further hide it or not, so let me vomit this part and perhaps darken this part of the perspective.

So, these phases are going to visible anyways rather or not the ray is there only a part of the ray is going to be behind these phases. So, let me darken these phase, I am not supposed to be pencil over itself, this what happens if I do overlapping lines, which is something that I do not recommend, but just to show you how the perspective is going to look like and darkening these lines as much as I can. So, that they are still visible when compare to the constructional lines around them, well now that I am working with dark lines.

Let me make these lines are dark as I can, just to have them in contrast with the lines rather than many lines in the neighborhood, it looks better. And of course, this phase is also going to be visible, let me mark it looks all right to me and of course, the back phase F. So, now let us work on the rep, notice that rep is composed on these vertices U, V, T, S and Q, R none of which have been well Q, R are there, but other than that these four vertices they are not there slightly dark T, S is with this region, anyhow we will have to get them lets first focus on U and V.

Let us get back to construction U is here let me draw that in station point and looks like the projection of U and the projection of V are pretty much same over here or perhaps over here. So, let me use my drafter extend this circle little, need to switch my pencils for

that and then mark little u here, let me go back to the profile view, u vertex u from the station point get it is image on the picture plane right here.

Now, notice that I have started using darker construction lines, this where u is take my drafter and this what where my u would be now I have to be extremely careful as u and then looking at V going to the top view looking at V from the station point, getting it is image on the picture plane in the top view. Now, that these lines are dark enough I do not had to worry about the darkness of the construction lines though I need to make them as light as possible and as clear as possible, unfortunately in this example things have been little messy specially in this area.

Now, back to V, this where V would be let me draw vertical projection, slightly extended upwards. So, that I can mark V here, now let me look at V in the profile view from the corresponding station point, draw construction line drawing perspectives is now very easy. And then use the corresponding horizontal projection and perhaps can V reach the corresponding vertical projection here, so this is v let me intend that and mark a little v.

So, let me pullout my front view for reference, so v is connected to Q and U is connected to R, let me make those connections, let me for the drafter verify a little while. And only a part of this rep will not be visible, let me make this connection here, Q with V and you see that this part of N M, now is hidden behind the rep. Well perhaps I can now see this perspective little more clearly let me draw this line as thick line a few strokes back and forth and then it looks like both these edges of the rep they are going to be visible.

So, I am going to darken them I will stop at the top one first and then I am going to go only till this point and then only up till this point I still do not have much ideas to have this perspective is going to look definitely looks much weirder than I expected.

But well and then perhaps what we can do is starting from R, so this edge would be visible. So, perhaps if we can locate S on our perspective, we can draw this edge and hopefully finish this diagram let us not worry about T, because T is going to be behind, so it is not going to be visible. So, let me take this off and worry about S switch pencils look at S in the top view get it is corresponding image on the picture plane, it is going to vertical close to this projection here.

Let me extend this little upwards, just in case of these two projectors call this s, little small note and then in the profile view, let me get the image of S on the picture plane here somewhere, it is going to make sure I do not use it bringing my drafter there make a horizontal projection. And follow these projections perhaps this is where my S is make a little note S all right and then join R with this again this part the rep will be behind it is not going to be visible, so perhaps I can use a dark line directly.

Well, as I said many, many times it looks like very weird perspective and one of the reasons why this is source possibly, because the vanishing points are very close to the image, let us try to locate the vanishing points. So, this is one of the axis this is second one and this is the height axis. So, corresponding to this axis, if I try to draw, if I try to extend these edges and I am going to E using a different color of pencil going to look little weird, but if I try to extend these edges, this is the first vanishing point that I get somewhere here.

And if I extend the height edges this is the second vanishing point that I would get over here somewhere and if I extend edges along this direction these directions I will possibly be expecting the third vanishing point over here somewhere. So, vanishing point 1, vanishing point 2 and somewhere over here, the vanishing point 3, let us see if these vanishing points are indeed correct, because if they are not, then of course, there something wrong with this perspective. So, always a good idea to verify if you have made a mistake or not there is nothing wrong with making mistakes.

So, to get the vanishing point along this direction, we will probably have to look along this direction from this station point. So, let me now start adjusting my drafter, align my horizontal a longer scale along this, along this edge and look at an object at infinity along that direction. Let me use the blue pencil for that and of course, this will be making an impression over here on the picture plane.

Now, I will do the same thing I will look at an object at infinity along this direction this will perhaps explain why the perspective is this weird anyhow. So, if I locate an object along this direction at infinity from this station point, I probably be getting the image of that object over here. Let me mark these vertices, let me now straight my drafter and draw verticals. Now, let me take a vertical from here, I will extend it along both

directions and also let me take a vertical from here again I will extend it along both directions.

Now, in the profile view the x and y directions they are along these edges and the Z direction the depth or the height direction is along this edge. I will do precisely the same thing as I did over here set my drafter to be parallel to one of these edges from the station point I will look at an object at infinity the image of which it is going to be getting formed on the picture plane somewhere here. And likewise I will set my longer scale in the drafter parallel to this edge and I locate an object at infinity along this from the station point in the profile view and that image is going to get formed here.

I need to be little careful, rather I need to be quite careful now, because little mistake I will not ensure that my perspective is indeed right or incorrect possibly here somewhere, you know little tangent angle makes, so much of difference.

So, looks like these vanishing points are quite sensitive to these edges, we will have to be very, very careful. So anyhow, so taken this and drawing the horizontal from here and the horizontal from here, extending that and extending the horizontals from here up till both these vertical lines, I see that my vanishing point here and my another vanishing point is there. So, if I set my scale accurately along these lines I should probably be very, very close to that vanishing point.

So, looks like I should have really drawn them a little later, I was may be in a hurry, you know as I said a little error could make, so much of difference now looks like this is not aligning properly, so could be that I may have gotten these edges wrong is it that. Let me go back let me check my construction here, I got the o wrong, because if you look at O it is getting. So, this ray starting from this station point is hitting the picture plane over here somewhere and if I extend this right there vertically downward, my O should be on this vertical projection clearly I got my O wrong.

Let me verify from here, so this is where the ray from S B P towards O it is a picture plane this is a corresponding horizontal projection. So, this seems, adjust that my O needs to be slightly displaced towards left, having said that realize that both these vanishing points get effected. Let me go back make this correction and join with these shortly. So, realize that these mistakes are going to happen that is what the reason why I keep repeating that is always never a good idea to start drawing dark lines, one needs to

be very, very careful and focused nevertheless. So, this is where my point O is, well as I said nothing wrong in making mistakes, what I am saying that I am still using my h pencil, but hopefully I get things right now.

Let me join these edges rather this edge using a dark pencil, so this is thinner than last time. Now, if I align my swiss square to one of the edges to realize that I am actually approaching that vanishing point, which is good news. So, maybe I will just you know extend that, so this vanishing point is incorrect, perhaps that one is more reasonable, there we go this one. And if I comeback I need to erase this part as well which is because I do not need this edge in my perspective all I need is this point P.

Let me darken these lines probably get back a perspective just as it was four perhaps not pretty much there anyhow, so let me mark this using a thin line, switch pencils does not really matter, now but anyhow. So, now, if I extend this line this is also pretty, because now I am hitting the second vanishing point. So, this vanishing point was incorrect, now this better all right, so how about the third vanishing point.

So, in the profile view I was looking at an object at infinity along this direction that is the z direction. So, this is corresponding blue line, I got that image there I extended it horizontally, but then the top view, I dint do that exercise, so this is the Z direction I should be looking along this direction at infinity and get the image of the object on the picture plane. So, this is where the image of the object is over there and perhaps I can extend that downward.

So, it looks like this would be my third vanishing point, so again I probably did not get this correctly possibly because I did not align my scale or my ruler properly along these two edges. Let me verify if indeed this point is the third vanishing point and if that is the case then I can verify that this perspective of mine even though it is not need and I admit that I have made lot of mistakes, but that is okay, that is how people learn if I align my ruler properly along these edges hopefully I will be getting close to this vanishing point.

Now, before that let me verify if this indeed is the vanishing point that I should be looking at, so little error in alignment and you could expect many here is happening. Now, this suggest that these vanishing point should be upwards, let me look at a little longer edge, may be align myself parallel to that may be even longer ((Refer Time: 1:18:33)). So, if I go back to my station point, it looks like there is a minor deviation I

can effort to go down little further, perhaps over here somewhere and then I straighten my drafter, I can possibly expect my vanishing point to be little more down, then it was suggested before well things are messy, but you know this is a nice learning exercise if not fine.

It looks like I can get this edge to align with this vanishing point, this of course, is not correct and may be then there are something incorrect with this edge. So, let me see if I have gotten these two points right first point H. So, I look at vertex h in the profile view from the station point, this is where the image is getting formed and of course, this is the correct horizontal projection, where H should lie above the vertical projection I am looking at this vertex here.

So, you know this, this is quite close and a little sensitivity in the image of H over here could make quite a bit of difference. So, if I expect my H to be slightly towards the right and I expect my H to be here possibly perhaps I can get this right and looks like I do. So, may be a little deviation in this edge along this direction from it is me to have this vertical edge of mine converge to this vanishing point right there.

So, let me erase this vertical edge and perhaps join S and the new found vertex H, may be a few more strokes, let me drawn this and let me also smoothen this edge out. So, here we are the three vanishing points corresponding to the three orthogonal directions found let me mark them. So, this is the right vanishing point V P R, this is the left vanishing point V P L and this is what people tend to call as another point, because just be below V P N.

So, although this perspective looks quite awkward looks like the construction seems, because the three vanishing points although I have not use them when I actually started drawing the perspective, tends to conquer or agree with the vanishing points that I found assuming that I was looking at objects at infinity parallel to this direction, which is this edge object parallel to this direction at infinity, which is this edge.

And then object along the C direction the height direction, which is this direction here and the profile view this direction here. So, summery to any mistakes, but that is how people learn, rather I believe that people learn better by mistakes than by not committing them at all. Because if reason that three point perspectives could be awkward it is

prepared to draw two point perspectives, perhaps better choice is of the station points in the top view and profile view what I allow me to draw this perspective a lot better.

So, last time I had mentioned that I was not very happy with this perspective drawing for two reasons reason number 1 was that I probably had chosen my station point purely with respect to the top view of this object. And reason number 2 was that I made many, many mistakes perhaps I was not focusing well.

Anyhow, so I was not very happy, so after I drew this I stay back in the studio and I redrew the perspective with the same top and profile view with a different station point. So, my station point in the top view was this point over here, correspondingly I chose my station point in the profile view over here, so that this distance from the picture plane of the station point was the same as this distance. So, this was the picture plane in the profile view and of course, this was the horizon line.

So, you could see how nicely the three point perspective of this object has shaped up, I like this one particularly better, before drawing the perspective of this object, I also kind of got an idea of the vanishing points using the same method. So, you know from the station point look at infinity along this direction look at infinity along this direction, let the two rays hit the picture point over here somewhere, make a vertical projection.

And do the same thing over here locate, an object that infinity along this direction which is the Z direction the X and Y directions and get the corresponding horizontals on the picture plane over here. Let the horizontals and the verticals intersect at these two points. So, this was how the vanishing points were identified, nevertheless choosing this station point properly in the top view, will keep you a very nice picture a very nice perspective of an object that your trying to draw, so this was the point that I wanted to make.