Technical Arts 101
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Lecture - 18
TA 101
Think and Analyze

One minute passed to let me get started; so if you can keep your murmurs down and allow me to start. So, those who were there last Friday in the class we were discussing perspective views; using I would say a 2 station point method right.

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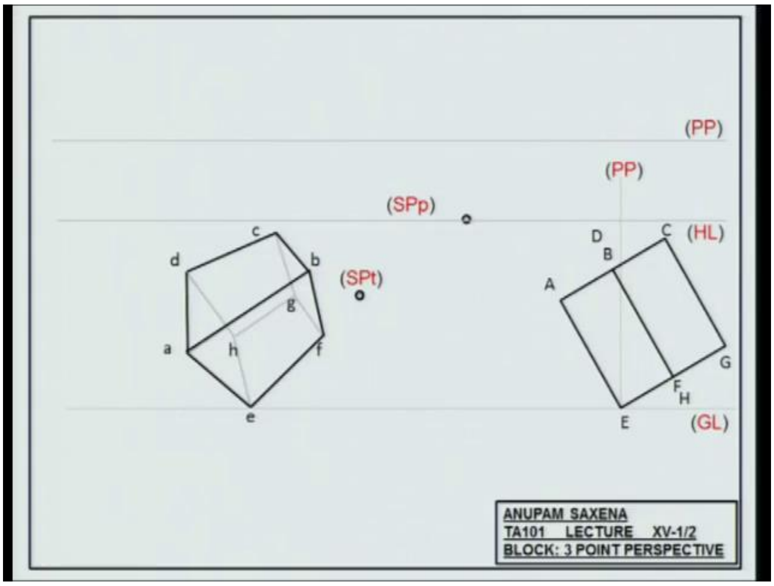

So, that is a generic method that allows us to draw single point perspective, 2 point perspective and 3 point perspective; maybe I will wait all right. So, this is what it is; so if you do not allow me to start now, if you do not permit me to start now, our classes gonna get split over may be till about 3: 50, 3:30. Because I am gonna be introducing a new topic to you; and it looks like I may have to do a little bit of explaining. So, if you allow me to start now; I will start, I will have to talk a little about perspective views and then I will switch on to space geometry all right good wonderful.

So, for those who were there last Friday; I had introduced what I call a 2 station point method that allows you to draw perspective of any kind. 1 point, 2 point, 3 point depending on how you place your object; rather how you place your top view with respect to the picture plane. So, if you have your top view like, so you will get a single point perspective. If you rotate your top view about axis that is perpendicular to the screen you will get a 2 point perspective And, further if you rotate your top view in such a way that none of the edges of the top view or none of the edges in the top view are parallel to the picture plane you will get a 3 point perspective. The beauty of this method was that you did not have to specify any vanishing point ok.

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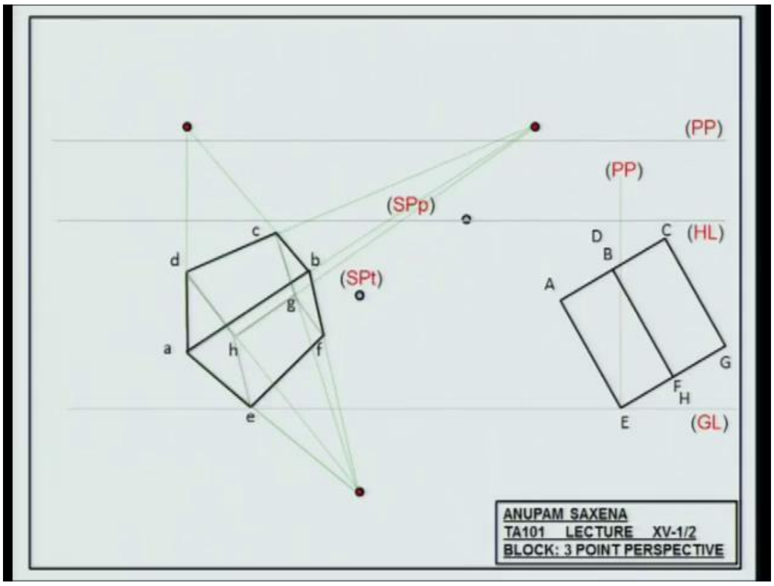

So, I was working on this example; and we had reached up to this point where I was trying to figure; if all the edges of mine they were converging to 3 different points in hour. And, then you guys said well, the first 2 points, the first 2 vanishing points they are not laying on the horizon line. And, that made me doubt myself; and I immediately went on I said well, I may have made a mistake and help me try to figure my mistake. And, we are searching for answers. And, it looks like I have found an answer and I say that well; the only mistake that I was making was I was probably not drawing these lines accurately ok.

So, these green lines now are much more accurate and they allow me to see that these green lines; they tend to vanish at 3 different points. I will tell you that they are indeed accurate. And, the top 2 vanishing points they need not lie on the horizon line; I will tell you about that all right.

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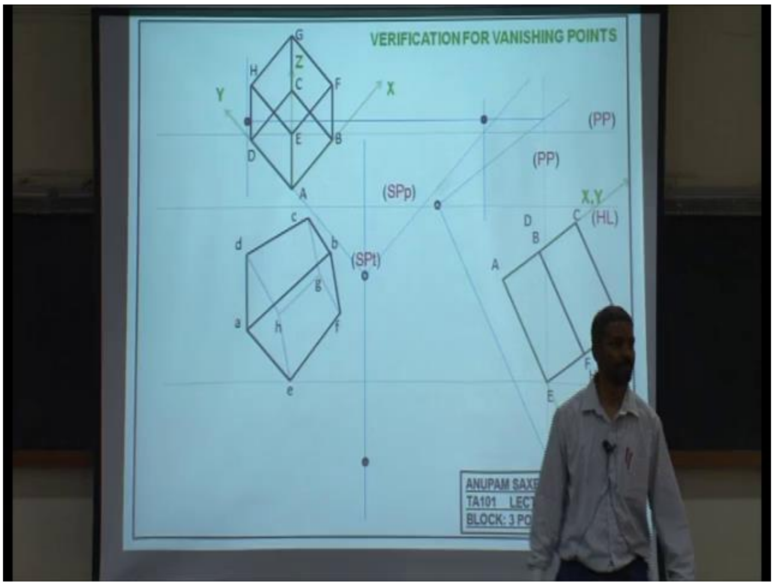

So, I am gonna be stretching to a new slide; and what you will notice is that I will retain these 3 vanishing points. And, i will try to justify that they are indeed the positions that will get when we are drawing a 3 point perspective here we go. You see those 3 dots you do yes or no come on.

Student: yes sir.

Good. Now, this is what I will do; I try to verify these vanishing points. I am gonna go little fast; so try to follow me. So, this my X axis of the object, this my Y axis of the object; the vertical is my zee axis of the object, this is in the top view. And, the corresponding station point where I am standing the position of the viewer is here S P t. Now, what I do is; I look along the X axis at an object, at infinity that would hit the picture plane. Likewise, I look at an object at infinity along the Y direction and the zee direction. These 3 blue lines they are gonna be hitting the picture plane and they are gonna be releasing the respective verticals right.

So, on these verticals I expect my vanishing points to lie; fine with me.

Student: ((Refer Time: 06:00))

Good. I will do the same thing with my profile view; this is what? What axis are these? X and Y and this would be my zee axis. I take S P p the station point in the profile view; I draw a line parallel to the X, Y axis and hit the picture plane over here. And, I draw a line parallel to the zee axis and hit my picture plane over here. From here i am gonna be releasing what? The horizontal projections right; once, I do that or realize that my vanishing points are essentially the intersection points between the respective vertical projections and the horizontal projections convinced.

Student: ((Refer Time: 07:01))

So, I did not make a mistake last time.

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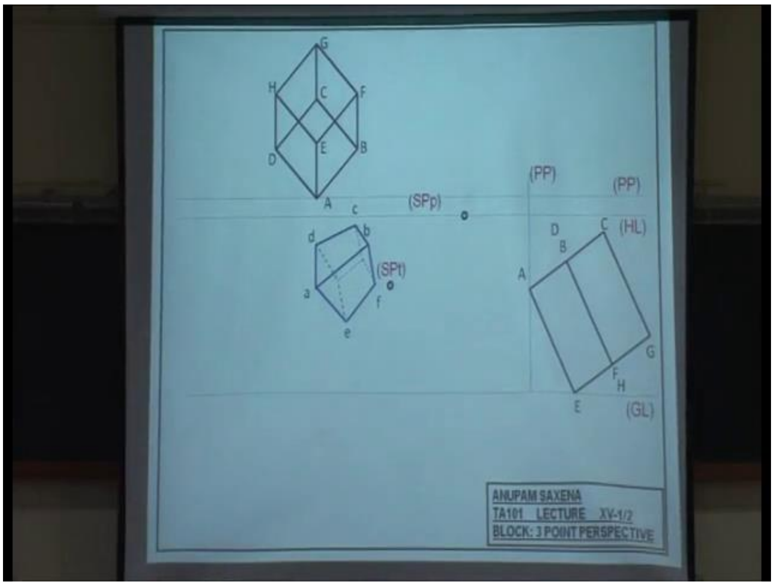

Now, you solve another example; and you would see those slides on my web page. So, in this example I took my picture plane to be passing through vertex A not vertex E. But vertex A; both in the top view and in the profile view ok here. What I got was this perspective; the dashed lines are behind they would not be visible; but they are there for me to verify the vanishing points. I start drawing these lines they tend to converge to 3 different locations.

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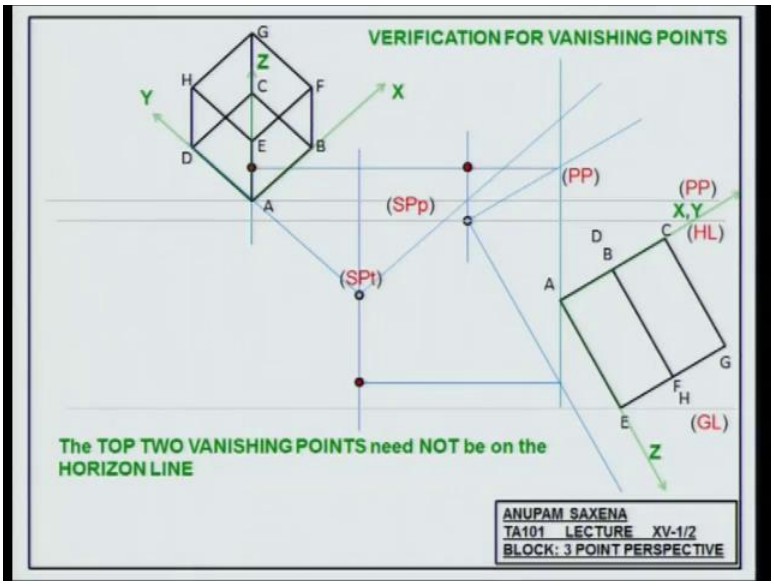

And, if I do the same exercise; if I retain these positions or vanishing points from my X axis, Y axis, zee axis in the top view; using S P t draw 3 lines parallel to the 3 respective axis allow them to hit the picture plane here get the verticals. And, then using S P p the station point in the profile view draw rays parallel to these 3 axis here X, Y and zee. And, I release the horizontal projections from there i tend to see that my vanishing points are you know the intersections between the vertical projections and the horizontal projections. Mr. Kishore; so you said that you did not have prove; but now we have won. So, it works.

Let me tell you I have a wonderful team; I am very fortunate I have a wonderful team of tutors and T a s. And, I am sure you are benefiting a lot in their presence and with their knowledge. So, this is something that I did not think about, I did not analyze about; so Mr. Kishore helped me to think about this and so wonderful very elegant way of getting a perspective. The only problem is that we have to figure how to draw the true top and profile views; that is the only problem that involves 2 rotations of the object. And, once you have that perspective is straight forward. So, this is what the bottom 9 was where we all got stuck Friday; the top 2 vanishing points need not be on the horizon line or the picture plane.

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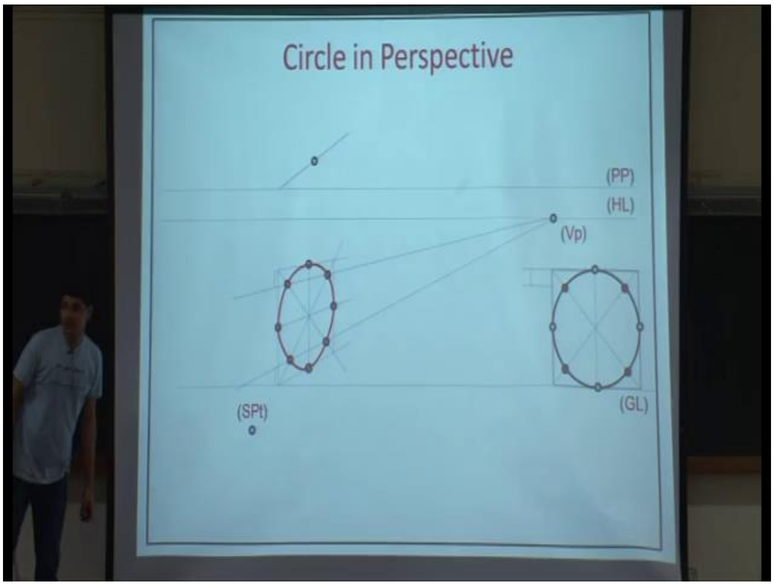

Yeah, Ayush; so Ayush sent me a link on you tube teaching me how to draw a circle in perspective. So, I will let him teach you guys; oh, we cannot switch the laptop I have be

Student: ((Refer Time: 10:24))

So, we will probably do that at the end of the class may be. But perhaps; what you can do is that you can use this animation and explain how to draw circle in perspective yeah. Because that would involve switching time; where are the slides, I have the slides.

Student: yeah.

Wait, I have to give you a mike; what do you have this for?

Student: sir, I do not have this; it is not mine.

A a

Student: It is not mine.

Ok.

Student: So, suppose we have a circle and we have to draw an frontal view; then

The right button they get the animation first.

Student: So, the simple thing is that suppose that circle and axis in the perspective view; what I will keep? 8 is the boxing square and first all 8 in the perspective view. So, this is the bounding on that circle this is the perspective view like this. And, I will also have each 2 points, as these 2 points is the perspective view. Now, what I will do is that I will then join 2 directors; where that point of intersection of these 2 lines.

Yeah ok.

Student: It is not complete; but let me explain it. I do not know the longing square in the perspective view; then I will joining the 2 diagonals, having known line such as; actually, these angles, this angle, this angle, this angle goes to this and this angle goes to this. So, what I have this? This longing square these are the 2 diagonals, these are the2 co diagonals. Then, I will join this to this point, this to this point, this to this point and this to this point this to form a diagonal.

As in I can say that the point of this is this one; this point, this point, this point. And, suppose this is the diagonal of this smallest version; there is a mid point of this point and this point and same for all the other squares and the circle. And, now I have 8 points; I can join them to form a circle. So, this is the much easier way to draw circle in perspective as compare to making parallel way to intersection with the projector.

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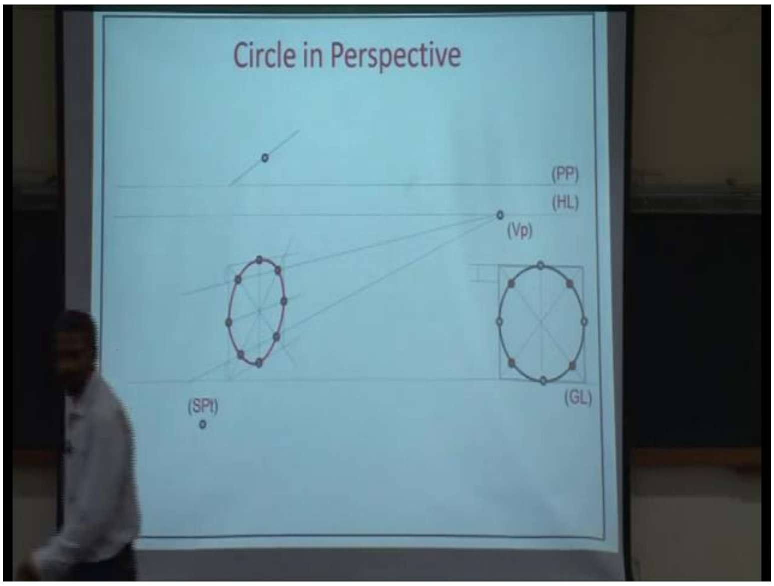

So, actually speaking what you have are 2 methods right in front of you to draw a perspective in to draw a circle in perspective; so method 1 is what you see on screen right. So, you have the bounding circle enclosing bounding box including enclosing a circle; you have 8 points on the circle. So, corresponding to this bounding box you draw this box in perspective; you locate these points corresponding to these great points here. The first method you draw these 2 diagonals; and then locate these red darks on those diagonals ok.

Now, corresponding diagonals in perspective would be these 2 diagonals joining the opposite vertices. Now, you would know that this would be in true length; you take this distance from here to here measure these 2 distances here. Project a ray starting from here up to the vanishing point; and then another one starting from here up to the vanishing point. These, 2 rays are going to be intersecting the 2 diagonals at 4 at point that is method number 1.

Method number 2 is what Ayush proposed instead of doing that instead of having these; join these 4 points you will be making a diamond. And, then you would have this square, this square, this square, this square; you have a diamond here, here, here and here. And, then what would you do Ayush you have a midpoint.

Student: ((Refer Time: 15:47))

You would have a midpoint of this.

Student: Yes.

So, you have a midpoint of this, midpoint of this, midpoint of this, midpoint of this; you will get these 4 points. And, then draw another circle; yeah.

Student: The second method is what exactly is?

Yeah, yeah.

Student: ((Refer Time: 16:07))

Yeah. So, the second method; of course, is probably not exact. But it is verifiably faster than this method; this method happens to be a little more focalized yeah, ok.

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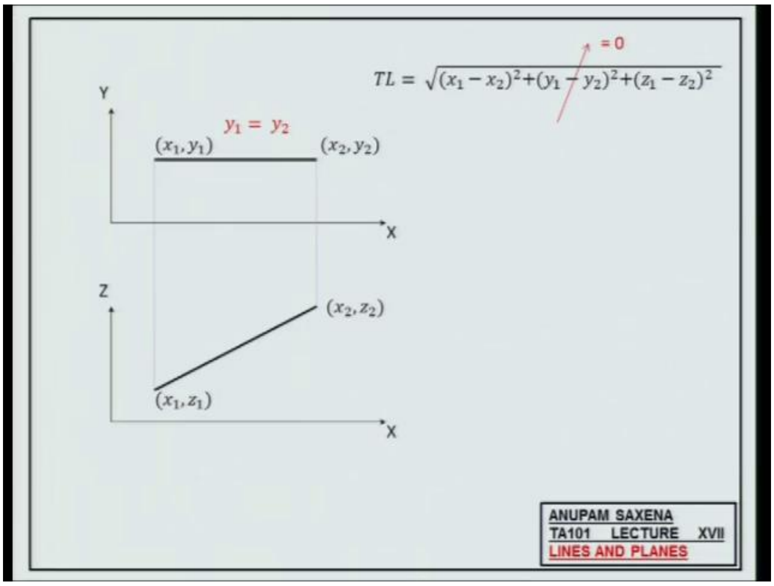

So, straighten your back if you have seat belts buckle yourself and get ready to sleep. A new topic space geometry; 1 request that I would wanna make is I tried to explain this as best as I can. But just in case if I am not clear enough; do raise your hand and if I cannot see your hand do getup. If I still cannot see you use the chair stand up on the chair raise both hands and say sir stop I did not understand. And, I will be happy to explain that to you.

So, I want your attention, I want your eyes and I want your ears over here. And, I want you to prompt me if you are with me every time; things will be a little confusing all right. I will start with the orthographic projections; this is the X zee plane, this is the X, Y plane almost all discussion will be with the third angle projection scheme in mind, all those are not important. So, which view is this, which view would give you?

Student: ((Refer Time: 17:58))

Front view, which view would this gives you.

Student: ((Refer Time: 18:01))

(Refer Slide Time: 18:05)

Top view; wonderful; the front view, the top view. The front view will be on a vertical plane; so I would call the bottom plane as the vertical plane, the top view will be on the horizontal plane and I will call that as the horizontal plane. So, there will be a switch in notations in terminology that you need to understand ok. So, this is the front view or what plane?

Student: ((Refer Time: 18:32)

Top view and what plane?

Student: horizontal plane.

Good. Imagine that I have a line whose projection in the top view is a horizontal line. And, the same line in 3 dimensions; whose, projection in the front view or vertical plane is an inclined line ok. A little bit about coordinate geometry very simple; let us say this is x 1, zee 1, let us say this is x 2, zee 2; the coordinates of this vertex x 1, zee 1, coordinates of this vertex x 2, zee 2 ok. In the horizontal plane; let us say the coordinates are x 1, y1and x 2, and y 2 all right.

What would be the length? Rather, the true length of this line; whose projections are given there.

Student: ((Refer Time: 19:45))

This delta x the whole Square plus delta y the whole squared plus delta zee the whole squared root of that ok. Now, since the projection of this line in the top view is horizontal y 1 is equal to y 2. And, if I said this to 0; my true length will be delta x the whole squared plus delta y the whole square right. Sorry, delta Z the whole squared, delta zee the whole squared with me all right ok. Now, do you see the projection of a line where you can find this length on a screen?

Student: ((Refer Time: 20:44))

Yes, which one is it.

Student: ((Refer Time: 20:47))

The…

Student: ((Refer Time: 20:50))

The front view; this one here x 1 minus x 2 the whole squared plus zee 1 minus zee 2 the whole squared this is in true length all right. So, if this is not clear; I have this pointer here it is oriented in some way in space, what you see is the front view of this. In the top view I would see a horizontal projection of this line; this is what these 2 projections are with me, with me.

Student: Yes, sir.

Good. So, this is just for your understanding in your laboratory exercises; you will not need coordinate geometry, you will essentially be work with geometry. So, this is in true length and I label this length as T L true length.

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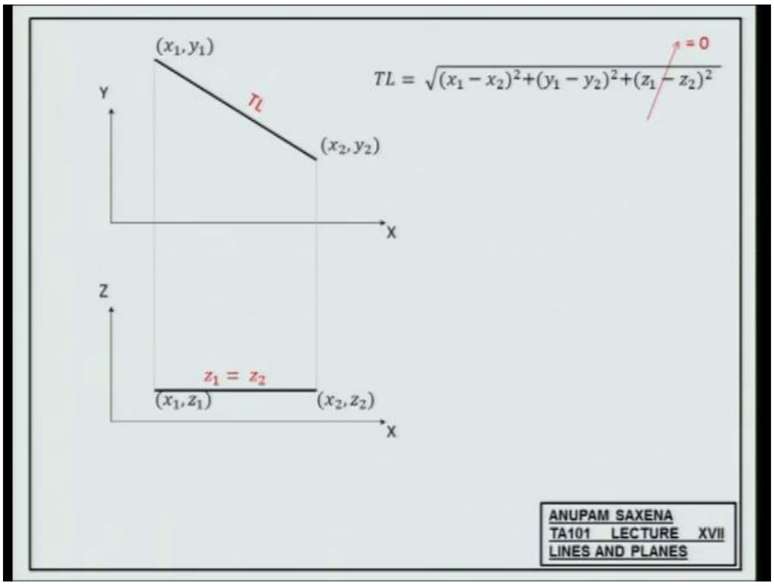

Another scenario X, zee plane, the front plane or the vertical plane and X, Y plane, the top view or horizontal plane; this time in the horizontal plane I have a line or the projection of a line inclined differently, it is not horizontal. And, in the front view that projection is horizontal coordinates x 1 zee 1, x 2 zee 2, x 1 y 1 and x 2 y 2; the x is remain the same the zee s in the y s they get changed. Now, what do you expect the true length of a line to be in this case?

Student: ((Refer Time: 22:46))

In the frontal view or in the vertical plane zee 1 is zee 2; look at that equation of yours from coordinate geometry zee 1 minus zee 2 the whole square is 0 ok. So, your true length is delta x the whole squared plus delta y the whole squared which actually you can get from here; so this is T L ok. Now, these 2 examples should tell you something. If I have the projection of a line which is horizontal either in the front plane, in the vertical plane front view or it is horizontal. In the horizontal plane or the top view I would be getting the true length of that line in the other view; do I make sense, do I make sense.

Student: Yes, sir.

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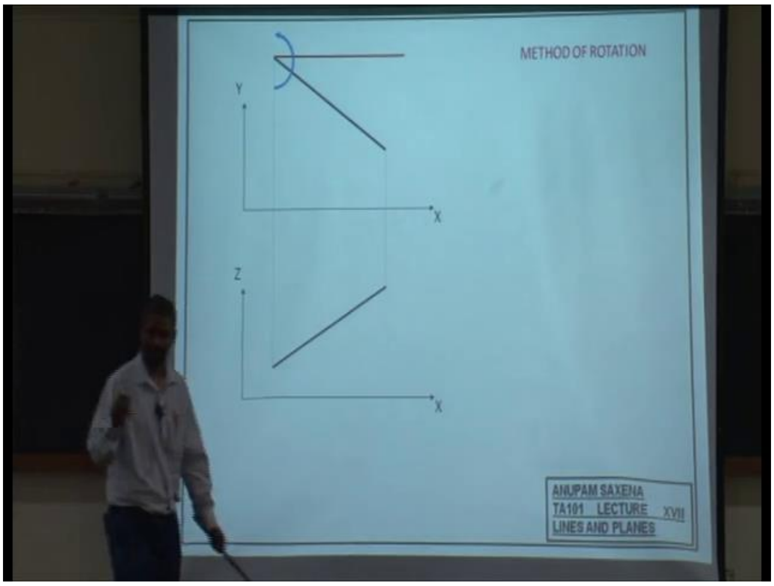

Good. Now, imagine this line in space. And, this line is oriented in such a way that you get the projection which is not horizontal in the front plane, in the front view, vertical plane; and it is not horizontal also in the top view the horizontal plane. What you do in that case? How do you find the true length? You can use the experience from the 2 previous examples; yeah, you can make one of the projections horizontal. If you do that the other projection will give you the true length of that line yes or no.

Student: Yes, sir.

Ok. So, what we have is the method of rotation for that; let us say you rotate the projection in the horizontal plane of the top view by it is an angle, that rotation is about what axis?

Student: ((Refer Time: 25:13))

The zee axis; this axis over here. So, when you are rotating that what is gonna happen to that line? It get is rotated and you gonna make this projection horizontal. So that you can get the true length of a line over here right. Now, what happens after that? What happens to the corresponding projection of the line here? Any idea; let me get back. Let us say you are rotating the line about this point, about the zee axis. So, this point remains fixed; let us go up what happens to the x, y, and zee coordinates of this point; would the x coordinate change? Would the y coordinate change?

Student: Yes, sir.

Would the zee coordinate change?

Student: No, sir.

The zee coordinate will not change; come back to this view ok, the zee coordinate of this point would not change. So, you can expect the zee coordinate to be lying somewhere on the horizontal green line true, true.

Student: ((Refer Time: 26:43))

Ok. And, you are already have the position of this point in the top view; use this projection get this point. So, if you have rotated line; so that this projection happens to be horizontal this would give you what?

Student: ((Refer Time: 27:05))

The length of the red line will be the same, the length; so if you are rotating this line the length does not change, yeah. So, this green line here would represent what? The true length of this line in 3 dimensions; do you agree?

Student: Yes, sir.

Do you agree?

Student: Yes, sir.

Who does not? Yeah.

Student: ((Refer Time: 27:39))

So, remember that these 2 black lines, these are projections number 1. So, if you are rotating the line about the zee axis it is projection will also get rotated; what is your question?

Student: ((Refer Time: 28:09))

Yeah, in the top view.

Student: ((Refer Time: 28:15))

It is not getting rotated about the y axis; perhaps, let me come back to the other example that would help you understand this well better; this is ok right.

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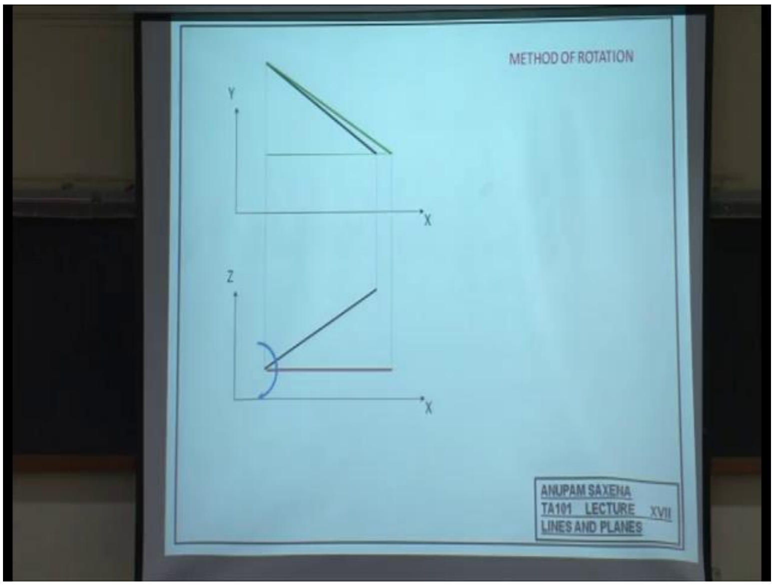

This is the same example ok. Now, let us say you have this line, now you see the projection of this line in the front view. I am gonna rotate this projection in such a way that it becomes horizontal; this rotation is about what axis?

Student: ((Refer Time: 29:20))

The Y axis; now, of course this length would not change? This length what you see would not change? What would happen to the y coordinate here?

Student: ((Refer Time: 29:41))

No change. I am rotating the line about this point; so this point remains fixed in space, the white coordinate of this line does not change. I already have this point located over here I take it is projection; this what give me the true length of a line. Now, what do I essentially mean by true length. Let us say I have this line and what you see is this line in this plane; yeah. Now, if I rotate this line; so that this line becomes parallel to the plane of site, it is only then that you are gonna be getting the true length of this line not otherwise right.

Once again, if I make this line parallel to the plane, to the vertical plane it is only then you are gonna be getting the true length of that line, yeah.

Student: ((Refer Time: 30:47))

What is that?

Student: ((Refer Time: 30:52))

I cannot hear you.

Student: ((Refer Time: 31:04))

Yeah.

Student: ((Refer Time: 31:07))

We are using both planes for a view. In that example the line becomes parallel to the horizontal plane; that is the reason why you get the true length of that line the horizontal plane. In the previous example the line becomes parallel to the front plane that is the reason why you get the line in true length in the front plane.

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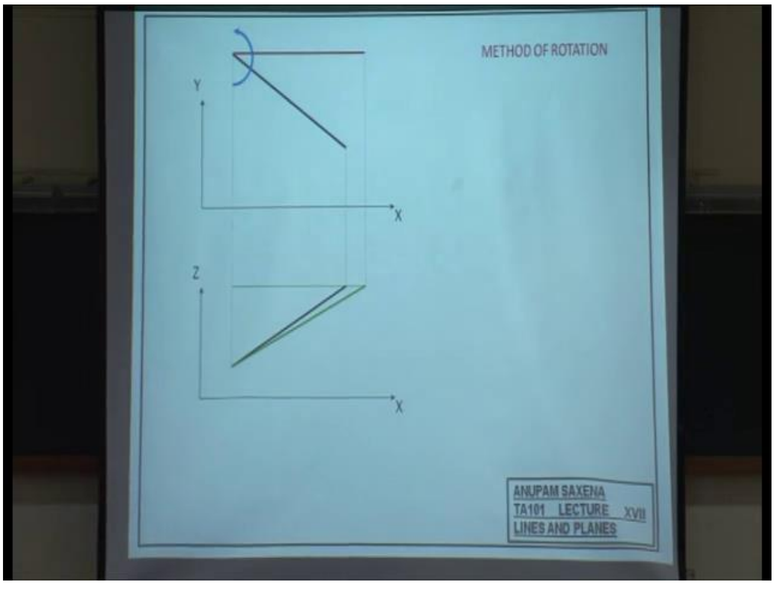

You know, you guys are tired; I guess from the galaxy thing. So, I would suggest that you would take out your notebooks and pens and start scribbling. Because this is not very difficult; so with that you will also follow what I say a lot better. And, then I will keep you active, and then I will keep me active ok. So, is this method of rotation clear to you all, is this clear; should I go back and go through these 2 examples again?

Student: No, sir.

Yes or no sir?

Student: No, sir.

Everybody with me?

Student: Yes sir.

I will go back all right. So, have your sketch packs on in front of you have, your pencils or pens in front of you; draw the projections of a 3 dimensional line in front of you top view like what you see done ok. Now the trick is very simple you want to see one of the projections either in the front view or the top view to be horizontal. If you see that the other projection will ensure that you are 3 dimensional line is parallel to the plane; and therefore, you will be getting the true length of the line fine all right.

In this example rotate the top projection; so that it becomes horizontal. When you see that you are rotating this line about the zee axis; so the zee coordinate of this point does not change, you are rotating the line about this point so this point remains fixed in space. If the zee axis here does not change; sorry, the zee coordinate does not change then this point has to lie on the horizontal. If it lies on the horizontal you already have this point located in the top of a projection you get the new point. And, therefore you get your line parallel to this vertical plane; and therefore, in true length fine all right.

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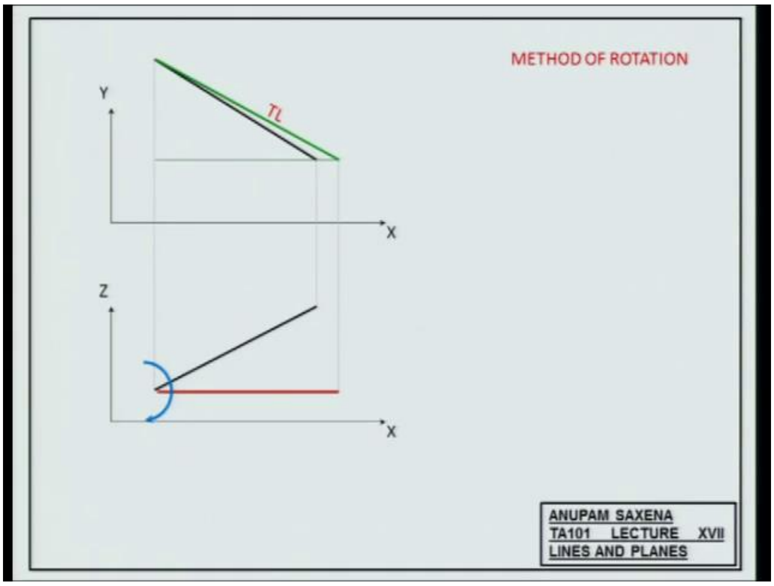

Let us do the same thing; but reverse the same example. Now, what I would want to do is I want to see this projection to be horizontal. So, I would rotate this projection about this point and about the Y axis the length of this projection does not change. Now, if I am rotating this line about the Y axis, the Y coordinate of this point does not change. So, this point has to lie on this horizontal fine. And, then I already have this point located over here; I take the projection up, I locate that point, this line now becomes parallel to the horizontal plane straight forward all right.

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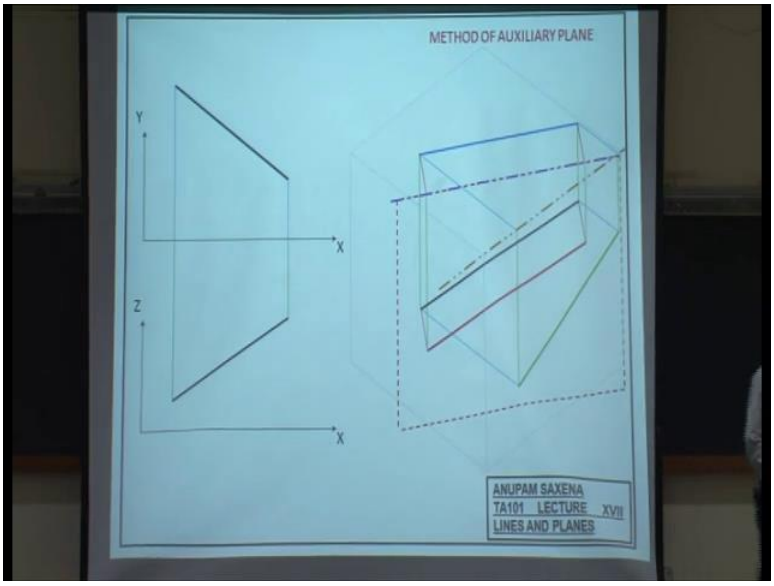

This is going to be very boring or could be interesting; depending on how you take it. So, given these 2 projections of a line oriented arbitrary in 3 dimensions space; let me try to locate the actual line in space. So, I have this box stay with me this is my what? What is this?

Student: ((Refer Time: 36:26))

Front view or vertical plane that is my top view or the horizontal plane. Let me get this blue line, let me work with the horizontal plane first and mark it over here, little blue line mark it over here; this length is the same as this length. So, this blue line over there represents this guy with me, with me?

Student: Yes, sir.

All right. Let us do the same exercise with the vertical plane, the green line mark it there second green line mark it there and this green line is actually this guy here. You got a 3 dimensional box, you got 2 projections; is it possible for you to locate the actual?

Student: Yes, sir.

Line ok, possibly like this, like this; do you agree that this is the actual line?

Student: Yes, sir.

All right, good. So, let us say my method of rotation is boring; it is not good enough. How do I get the true length of this line; the only way that I can get the true length of this line is to make sure that I am visualizing that line from a plane which is parallel to the line not otherwise the plane has to be parallel to this line fine. So, I have to figure out that plane first; of course, that black line will be in true length fine. Now, imagine that I have a plane that contains the blue line on top, the blue projection. Imagine that I have this plane here that contains that blue projection.

Now, my question is very simple; would the actual 3 dimensional line which is the black line within that box would that line be parallel to this plane?

Student: ((Refer Time: 38:59))

Or no.

Student: Yes, sir.

Rather, let me replace would that black line actually lie on that plane.

Student: Yes, sir.

Do you all agree?

Student: Yes, sir.

So, if I view that line from that plane that of plane will I be getting the true length of the line.

Student: Yes, sir.

Yeah.

Student: Yes, sir.

Good. Do you all agree? It does not really matter where I locate that plane space; so long as that plane is parallel to itself. So, instead of using that of plane; perhaps, I can shift that plane forward or backward. So, long as I ensure that the plane is parallel fine all right. Now, what I do is; I drop verticals from the corresponding projections on to that plane. So, these red verticals from this projection which is over here on to the plane; and I can shift that black line to actually lie on this plane right fine all right.

I want you guys to be attentive here; I want you guys to follow this carefully. This is the hinge line that separates what from what?

Student: ((Refer Time: 40:51))

The horizontal plane from vertical plane good; what I would want to do is; once, I have located this plane in some way and this plane is inclined to both the vertical plane and the horizontal plane. What I would wanna do is I would imagine that there is a plane here; and there is a hinge line between say the horizontal plane and this plane. And, just as what I do in case of orthographic views I flip these; what I call the auxiliary plane up. So, this red plane is the auxiliary plane here; so this is what I do. And, if I flip it up and if I have that red line contained on that plane, this one I would be able to get true length ok.

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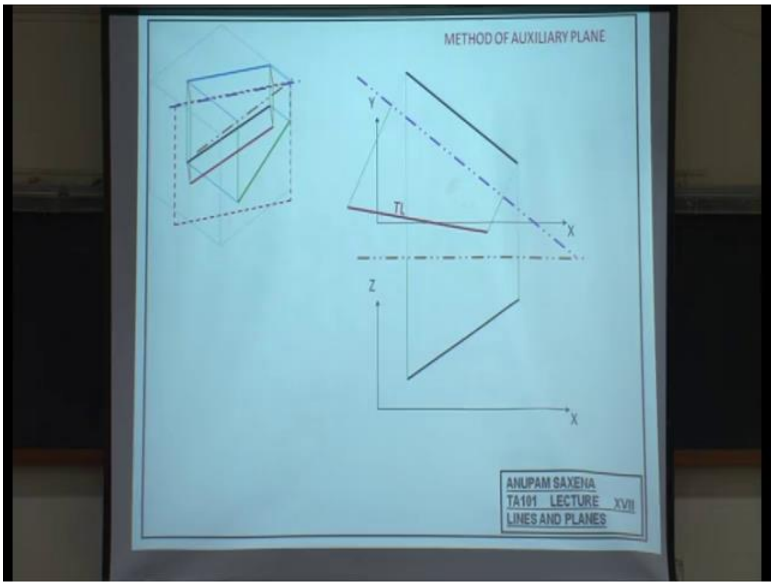


Let me go back and explain this again; this is for your own good. So, this example here I got the projections of a 3 dimensional line on the vertical plane, on the horizontal plane. I try to locate the actual 3 dimensional line; within a 3 dimensional box. So, what I do is I first draw the projection on the horizontal plane; I draw the corresponding projection on the vertical plane. And, then I extent those projections and I get the actual 3dimensional line. And, then what my proposal is or what my proposition is that if I draw a plane which passes through that blue line on top. I would be able to capture the actual 3 dimensional line which is the black line; within that plane.

And, that black line of course is true line. Therefore, it would be having a true length; so I would be able to capture. So, if I let, if I draw a plane that passes through this blue projection; which is this one here; I capture this black line the actual 3 dimensional object on that plane. And, does not really matter if the plane is there or if it shifts it by some amount; I can always shift my black line and ensure that it is still lies on that plane.

And all I need to do is process what I call this new plane as the auxiliary plane; in such a way that I can see the true length of the line ok. So, the first thing I would do is I would identify 2 hinge lines you already know one of them; the purple one is the new one. Now, this is quite tedious I would wanna work with this figure over here, and I want you are attention. So, this figure I have it on the left for reference; follow the color codes, the brown hinge line is this one; do you agree?

Student: Yes, sir.

Ok. Now, notice that this purple hinge line is parallel to the projection of that 3 dimensional line in the top view; notice that do you agree?

Student: Yes, sir.

Good. Now, of course the projections are gonna be perpendicular to the hinge lines wherever they are right. So, I draw projections from this projection of the line perpendicular to this purple hinge line fine; all with me so far all right. Now, look at this line here look at this distance here; this distance is of this point from this brown hinge line. So, this distance here what I would do is; I would take the same distance measure from this point of the hinge line and get this point.

Look at that small distance I would stay on this projection line and take the same distance from here to here and I will join these guys. And, then I will say that this is the true length of my 3 dimensional line do you agree?

Student: Yes, sir.

Yes, do you agree or you lost?

Student: ((Refer Time: 46:18))

Good back again; so far so good here. So, you see I have 2 hinge lines; one is the brown hinge line and the other one is the purple hinge line. The brown hinge line is relating the front view and the top view the purple hinge line is relating the horizontal plane here. And, the red plane the auxiliary plane; so I draw this purple line here. So, go back to your understanding about orthographic views; so what you do here. So, you have your front view here, your top view here; you just flip this guy over do not you?

Student: Yes, sir.

Yeah. Now, imagine that you have your top view here and you have your auxiliary plane have some inclination to this like, like this yeah. We are doing essentially the same thing; we are flipping this guy over in relation to the horizontal plane. We are flipping this guy over; we are doing exactly the same thing yeah. Now, look at these green lines, look at these green lines; they measure the distance of this point from this brown hinge line.

And, they measure the distance of this point from this brown hinge line; so far so good, so far so good.

Student: Yes, sir.

So, these are my corresponding green lines fine. Now, go back to your 3 dimensional boxes here. And, try to identify and try to verify; if this distance is the same as this distance from the purple hinge line is it?

Student: Yes, sir.

Likewise, for this try to verify if this distance is the same as this distance from the purple hinge line it is, it is or not?

Student: Yes, sir.

Which is what I do here; so what I have done is I have drawn an auxiliary plane. And, I have related that auxiliary plane to the horizontal plane. So, I have this purple hinge line here and I have taken this distance and this distance and measured this and this to be the same. Of course, the projections have to be perpendicular to the hinge lines; so these great projections are perpendicular to the purple hinge line. And, if I flip that auxiliary plane over, that auxiliary plane is going to be containing the true 3 dimensional line hence gonna be. Therefore, in true length do you agree?

Student: Yes, sir.

So, a little bit of practice and you will be ok. You know I can only imagine how you are trained in coaching classes; so this is that version of it the instructors pardon me; if I am wrong. But the instructor can one of you coaching classes who say well you know what forget about this it is too tedious; you do not understand that you do not wanna waste time on understanding that. This is a quicker version you have these 2 views all right. You, have this hinge line yes or no?

Student: Yes, sir.

Good. Step number 1 is that true?

Student: Yes, sir.

No, whatever I am just acting; draw a hinge line which is parallel to the projection in the top view step number 1. So, you have this hinge line it could be here, it could be here; does not matter fine. Step number 2 make projections perpendicular to this hinge line from both these points. Step number 3 measure this distance and mark a point on this projection with the same distance as this. Number 4 measure this distance; mark this point over here on this projection line with the same distance.

Step number 5.

Student: ((Refer Time: 51:57))

Yeah, Step number 5 you can go.

Student: ((Refer Time: 52:05))

No, stay back man.

Student: ((Refer Time: 52:07))

Yeah.

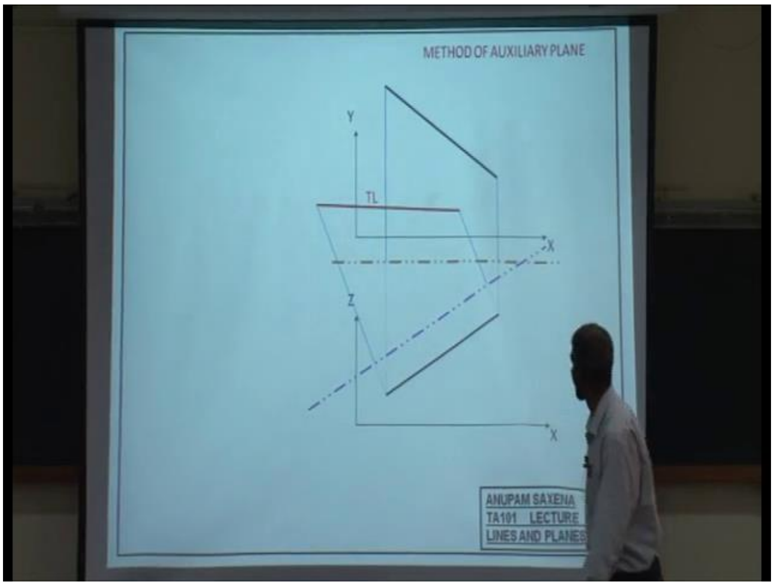
Student: ((Refer Time: 52:10))

Somebody here asked me what is the benefit of drawing that purple line if you can draw the projections directly from that black line? And, I will tell you what the benefit is? So, if you do not draw this line and if you take projections directly from here; this is the very simple example. But in more complex examples you are gonna be need this view not once, not twice; but for a few times. When you need this view you do not want to lose this projection; if you lose that you are confused right.

2 more minutes; and I will let you go, sleep and get ready for galaxy in the evening. I can follow the same 5 steps with reference to the vertical plane not from the horizontal plane. But with reference to the vertical plane; this is how well I already done that yeah fine may be I will yeah. It does not really matter where you position this purple line; you can position at anywhere you will still be getting the same true length of a line.

So, this is 1 quick example; so the purple line is close and out of the projection in the horizontal plane, the same exercise 5 steps you can get the true length. And, if you compare with the line in true length from previous example this was this. So, in fact these lines are gonna be parallel ok.

(Refer Slide Time: 54:26)



I can do the same thing in reference to the vertical plane of the front view nothing changes step 1.

Student: ((Refer Time: 54:32))

No, no, yes sir. Step 1; what is step 1?

Student: ((Refer Time: 54:37))

Draw hinge line parallel to the projection in the vertical plane. Step 2 draw projection lines stay with me, stay with me. Step number 3 measure that distance and mark that distance over here. Step number 4 measure this distance and you are gonna be measuring these distance from the hinge line; mark that distances over here. You got 2 points, join these 2 points you get a line which is going to be parallel to the auxiliary plane. And, therefore it is gonna be true length. So, this is the 3 dimensional line which is parallel to the auxiliary plane; and therefore, in true length.