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

Lecture - 13
TA 101
Think and Analyze

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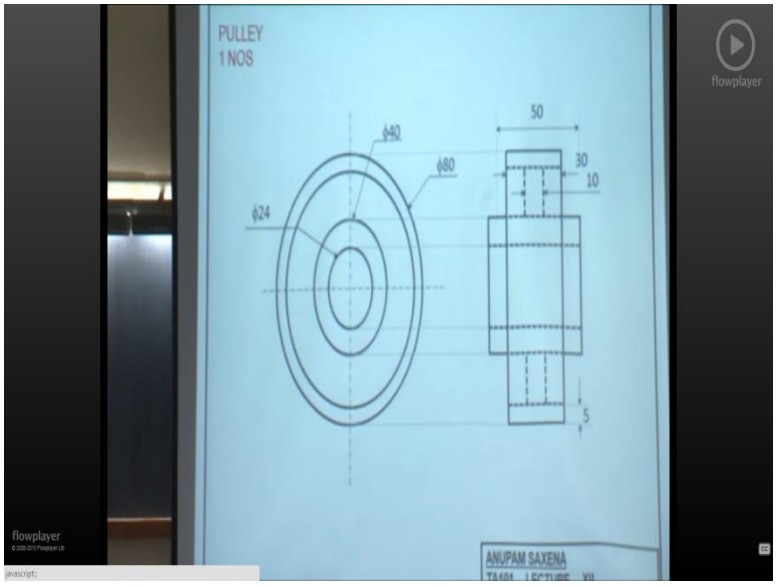

So, can we? Shall we? See question 6.3 look at the right hand side view of this wheel or roller or pulley whatever you want to what I would want to call it. And see if there are any mistakes on the right hand side, are there or are there not? Yes?

Student: Yes

Yes; what is missing? What is there that should not be there, and what is missing? You mean this one? That is missing, what else? Another one; you mean these 2 guys they should be there or they should not be there? They should not be there. Better of course, these vertical lines they were correspond to this arc of the ring. So, these are little or certain mistakes that are very easy to be missed out and unless until you have an eye for the drawing. It becomes little difficult for you to catch these mistakes. So, the more the practice the better for you I am sorry I am making you work a lot, but there with me.

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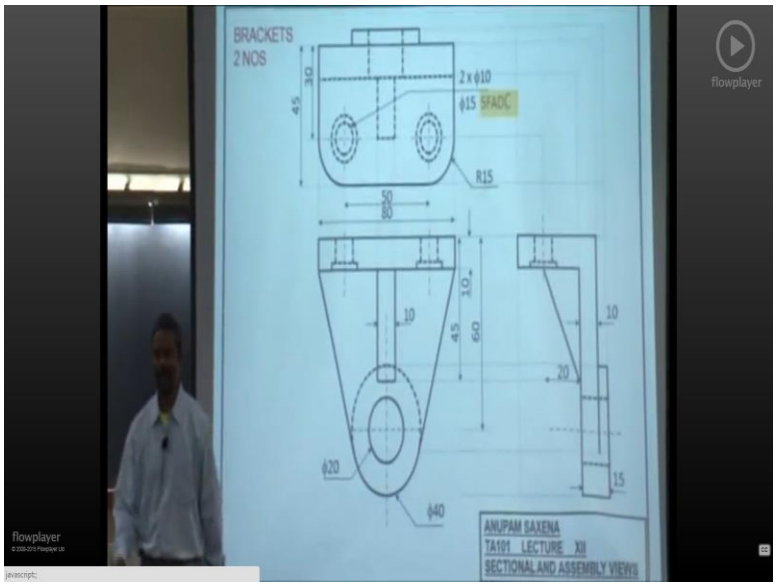

So, quite a few you guys would have rather they asked me what F A D C means. You know when I was working on these drawings I did remember I think what F A D C meant. But I do not remember it now, so I apologies for that. You know I have been asking god since yesterday and I have been wasted about 2 or 3 hours. And god give me a lot of answers; one of them being flight automated digital control. And that had absolutely no relation to engineering drawing, but I will tell you what. So, do not worry about F A D C for now if I get an answer I will definitely share it with you. But what I am telling you is when I was working in these drawings I took this depth as half of 5 that is 2.5. So, as far as you guys are concerned as far as you lots are concerned just take that dimension as half of 5 on that do not worry about.

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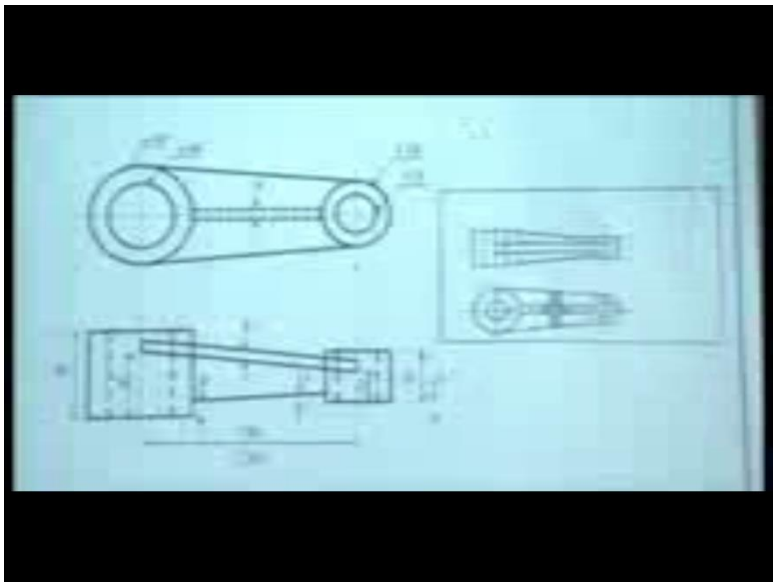

This problem 6.2 which is an optional problem in your lab, quite a few you guys came to me said that if you take the revolve section the section actually covers pretty much the entire thing may be its spills out. So, one option that you can think about is may be take this dimension as 170 instead of 130 for those who have already solved this problem on Monday and Tuesday do not worry about that. For those who are going to be working tomorrow and day after. Take this dimension as 170 and see if you get a proper revolve cross section. And alternative of course, is to show this revolve section in this view. Because you are already have this dimension; you already have this dimension all you need to do is get this dimension revolve it spin it. And show the corresponding revolve section that you would show here over there that is a possibility, any questions so far, any questions?

Student: Yes sir.

These lines you mean these lines? So, they should not be there, because that this slanted part is essentially tangent to these cylindrical surfaces, is that your question was? So, they should not be there. It would be a t no, so this is a slightly different figure here this figure is not the same as this figure for this case the cross section would be a t. But what I am trying to show or what I am trying to say via this figure is that there is a possibility that you can show the revolve section in this view as well. So, I will tell you what so I will talk about sectional views a little more today.

So, see if I am able to address your question if not then will talk about that after class. So, fasten seat belts, another mistake wonderful what here; here? So, it would not be well, so these lines would not be there probably. So, this line and this line they would probably not be there, because it is nicely blend with the that thing, nice side or nice pair of voice, you know my wife is opthamologist, so she is an eye doctor anyhow. So, today's lecture going to be a little long I want you guys to fasten your seat belts, so today will be quite a bit of reading.

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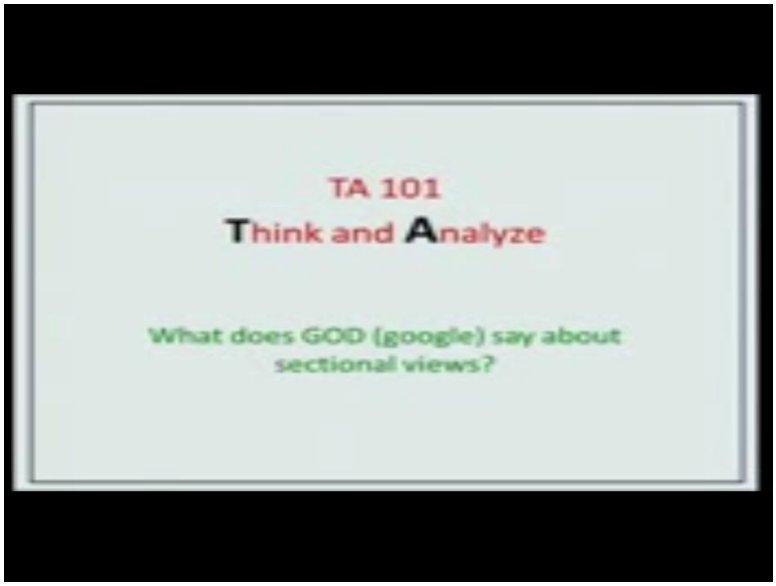

So, I have been giving you so much of assignments and so many problems to solve that I do not think it is fair on my part to expect you to ask god or video bible. So, if you have not found time to ask god about your questions or video bible do not worry I will help you out I did that on your behalf. So, with regard to sectional views what does god or Google say about these views? So, I did a little bit of reading myself ask god.

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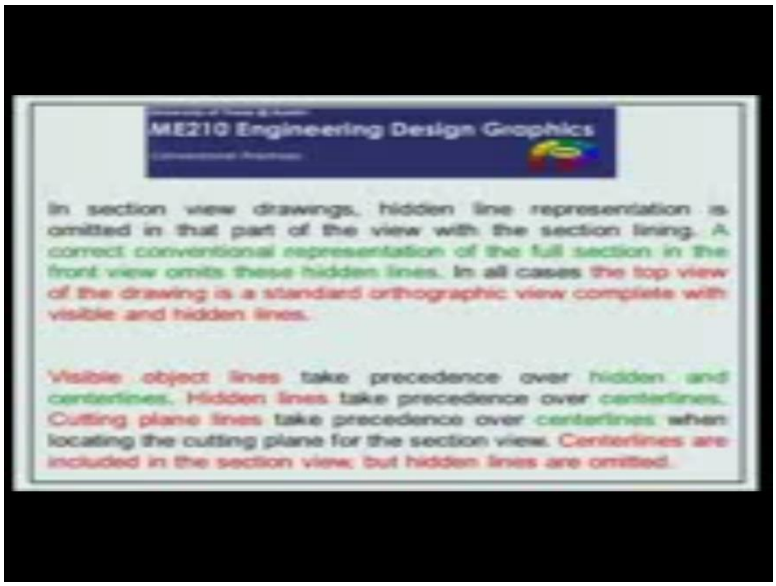

And I got quite a few answers I want you guys to follow me, because I am going to be reading all the text slowly gradually. And the important text is something that I have highlighted or colored using color different than black. In section view drawings hidden lines, so this is from unicef texts adolescent. In section view drawings hidden line representation is omitted in that part of the view with the section lining, this is important. A correct conventional representation of the full section in the front view omits these hidden lines something that you know. In all cases the top view of the drawing is a standard orthographic view complete with visible and hidden lines.

So, front views section view, top view is the entire complete view with all visible and hidden lines something that we know. Visible object lines; this is about precedence of lines over each other. Visible object lines take precedence over hidden and center lines. Hidden lines take precedence over center lines; cutting plane lines take precedence over center lines when locating the cutting plane for the section view center lines are included in the section view. But hidden lines are omitted something that we know some more.

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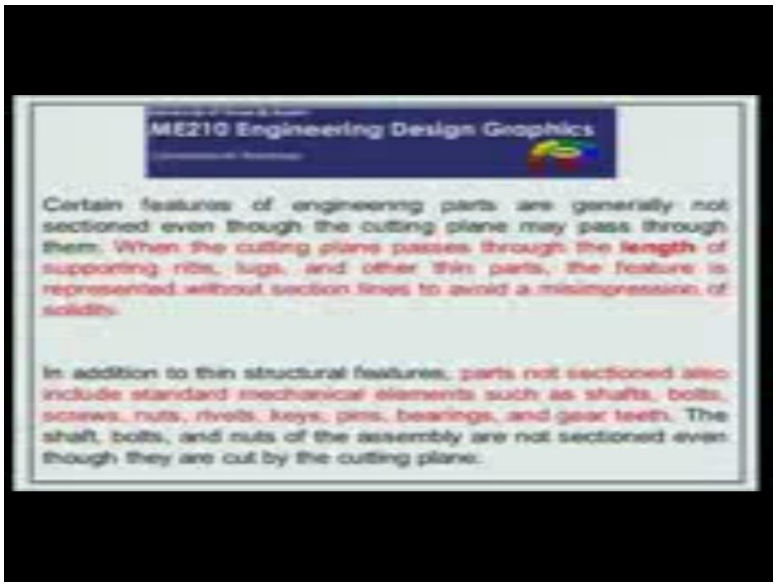

Certain features of engineering parts are generally not sectioned even though the cutting plane may pass through them when the cutting plane passes through the length of supporting ribs lugs and other thin parts. The feature is represented without section lines to avoid a misimpression of solidity. So, this is a new phrase misimpression of solidity I will talk about that what it says is if you have a feature and if you have a section plane that is parallel to the feature for example, this is a rib. And if you have a section plane which goes or which runs parallel to the rib then this guy is not sectioned that is by convention. And the reason is to avoid misimpression of solidity talk about that later. In addition to thin structural features parts not sectioned also include standard mechanical elements such as shafts, bolts, screws, nuts, rivets, keys, pins, bearings and gear teeth. The shaft bolts and nuts of the assembly are not sectioned even though they are cut by the cutting plane. Look at this figure for instance.

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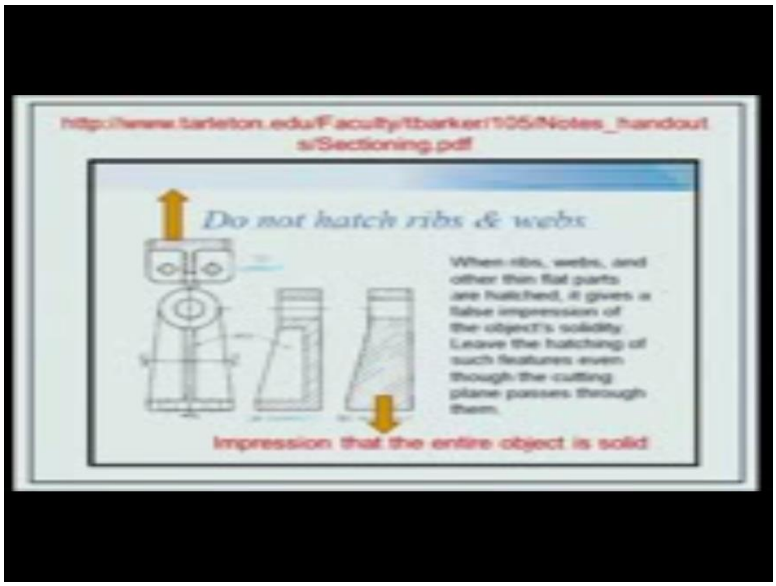

So, you have a little web over here or rib whatever you would want to call it you take another view of this section it look at this part. So, the section frame is running parallel to the web this rib is not sectioned if you section it you would see a picture like this you would see a picture like this. And that would give you the wrong impression that this rib is actually this web is actually quite thick. And runs from here to here it would give you the impression. This picture would give you the impression that material is present here and here as well to avoid that misimpression. We do not sectioned webs or ribs, but on the other hand if your section plane runs perpendicular to these thin features. These thin features they get sectioned parallel not sectioned perpendicular section that is what I told that the figure over there gives the impression. That the entire object is solid the web is not thin feature, but on the other hand it is to hatch this guy over here, because the cutting plane is perpendicular to the rib or the web.

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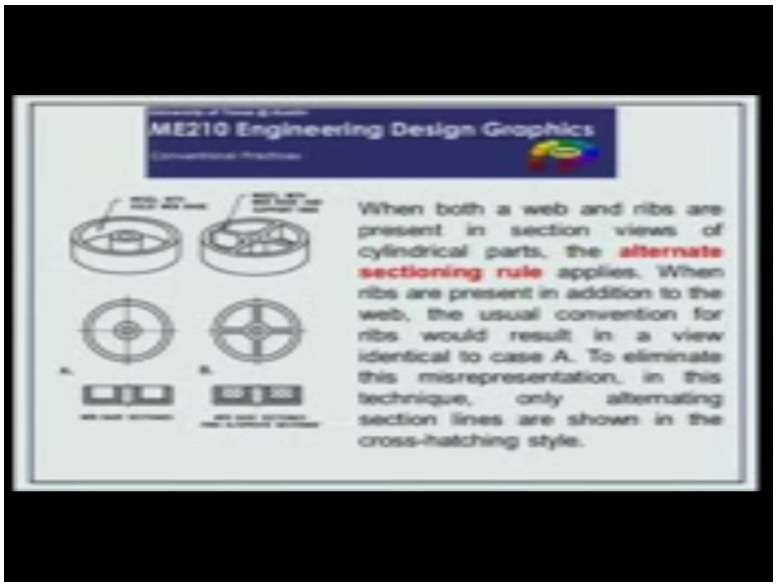

Some more when both a web and ribs are present in section views of cylindrical parts for example, and this roller you have got only the web. But not spokes or ribs on this case you have got both the web as well as spokes. When both a web and ribs are present in section views of cylindrical parts the alternating sectioning rule applies something that I have not talked about. When ribs are present in addition to the web, the usual convention for the ribs would result in a view identical case a. If you section this guy section this guy you would see this part cross hatched not this part. So, this is a case where only a web that connects the hub the center part of the roller to the rim the outer part of the roller.

But on the other hand if you also have these ribs what we do even if the section plane is passing through these ribs or even if the section plane is parallel to these ribs we have to section it. Because if you do not section it if you do not section this guy and this guy; this section view would be identical to this section view. That would give you the impression that you have only a web and not ribs or spokes in that when ribs are present. In addition to the web the usual convention for ribs would result in a view identical to case which is what means to eliminate this misrepresentation in this technique only alternating section lines are shown in the crosshatching style. So, these guys they are also sectioned alight so even if the section plane is parallel to ribs in this case to avoid the misrepresentation between these two cases the ribs are sectioned.

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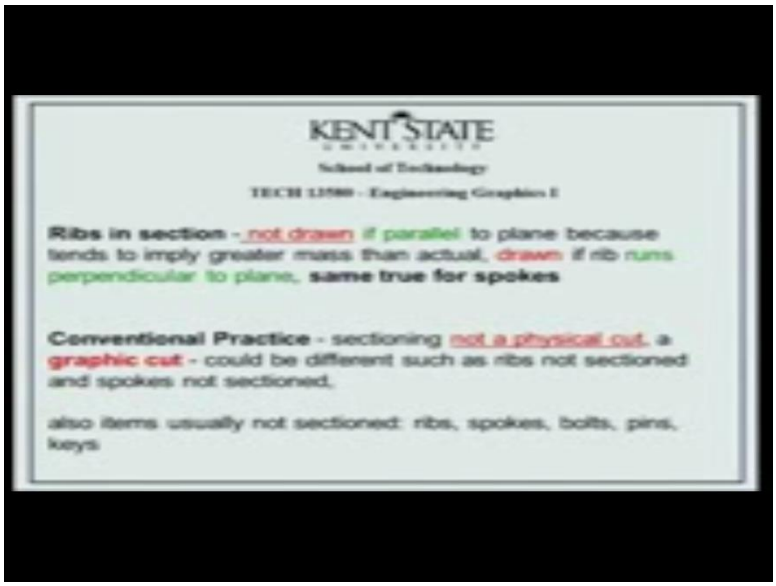

So, this is from other source Kent state university I will go little fast ribs in section not drawn if parallel to plane. Because tends to imply greater mass than actual drawn if rib runs perpendicular to the plane and same true for spokes. Conventional practice sectioning is not a physical cut this is something that I liked. So, sectioning is not actually a physical cut but it is a graphic cut. So, the physical cut and the graphic cut could be different from each other they could be identical or different. Could be different such as ribs not sectioned and spokes not sectioned also items usually not sectioned are ribs spokes, bolts, spins and keys which one. Well, you then get the true thickness of the rib you then tend to get the true thickness of the rib over here, you would not get the true thickness of the rib but over here you will. So, that misimpression of solidity would not be there well that is what the convention is. So, keep this in mind sectioning is not a physical cut, but a graphic cut.

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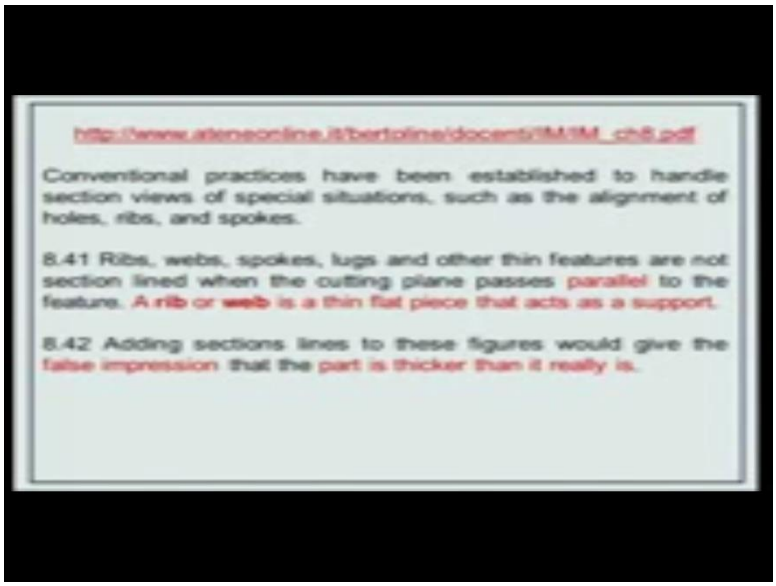

Another source conventional practices have been established to handle section views which was talking about conventional practices have been established to handle section views of special situations. Such as the alignment of holes ribs and spokes they have described these conventions in 4 parts 8.4.1 ribs, webs, spokes, lugs. And other thin features are not section lined when the cutting plane passes parallel to the feature again something very similar. A rib or web is a thin flat piece that acts as a support something that I have been talking about quite some time supporting elements 8.4.2. Or rather 8.4.2 adding section lines to these features would give the false impression that the part is thicker than it really is.

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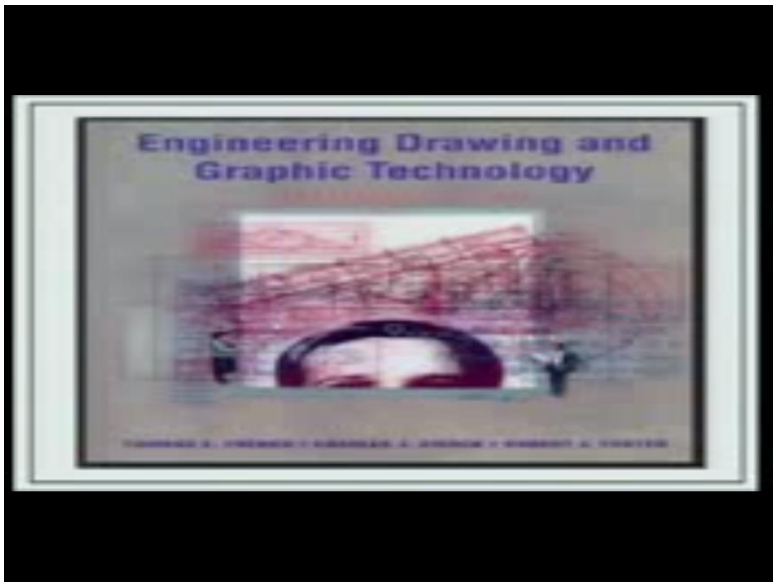

Something that I have covered, do not worry about it what would the bible say this is what god said, what would the bible say?

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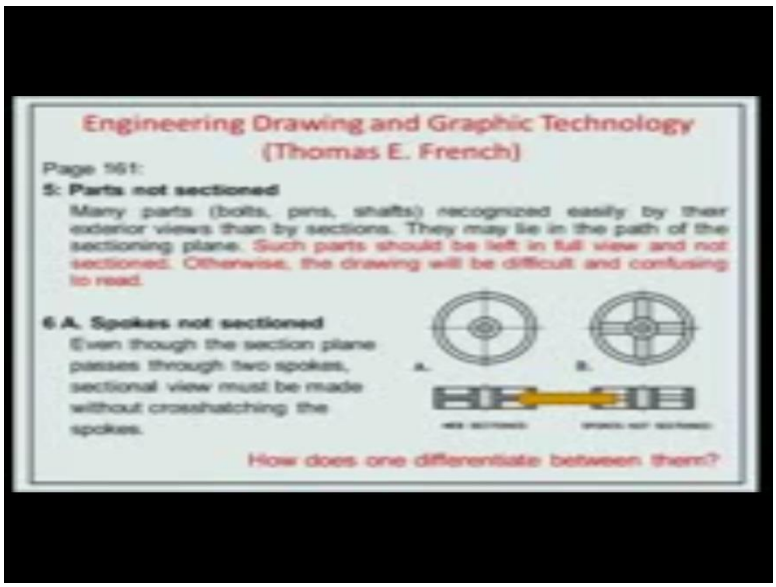

So, if you look at page 161 section 5; parts not sectioned many parts bolts, pins, shafts recognized easily by their exterior views than by sections. So, it is better to recognize these guys by their exterior views than by sections. They may lie in the path of the sectioning plane such parts should be left in full view and not sectioned. Otherwise the drawing will be difficult and confusing to read 6 a spokes not sectioned. Even though the

section plane passes through 2 spokes sectional view must be made without crosshatching the spokes something very similar. So, this guy actually differentiates between a web and a spoke if you section the spokes these 2 figures they will essentially be identical. And you will get an impression that this entire thing is actually a web which is not true. So, to differentiate between these 2 cases, where you have a web and where you have only these 4 spokes. These 4 spokes where the these spokes they are not sectioned while or whereas, the view is sectioned the web is sectioned.

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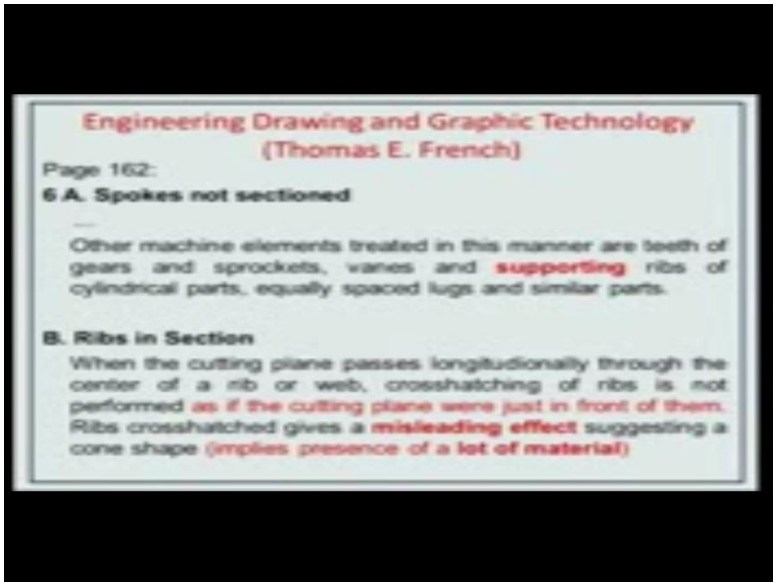

Page 162; 6 A; spokes not sectioned other machine elements treated in this manner are teeth of gears, sprockets, vanes and supporting ribs of cylindrical parts equally spaced lugs and similar parts. 6 B; Ribs in section when the cutting plane passes longitudinally or parallel through the center of a rib or a web crosshatching of ribs is not performed as if the cutting plane were just in front of them. So, even though the cutting plane passes through a rib hatching is not done. Because we treat the cutting plane to be in front or behind ribs crosshatched gives a misleading effect suggesting a cone shaped implies presence of a lot of material.

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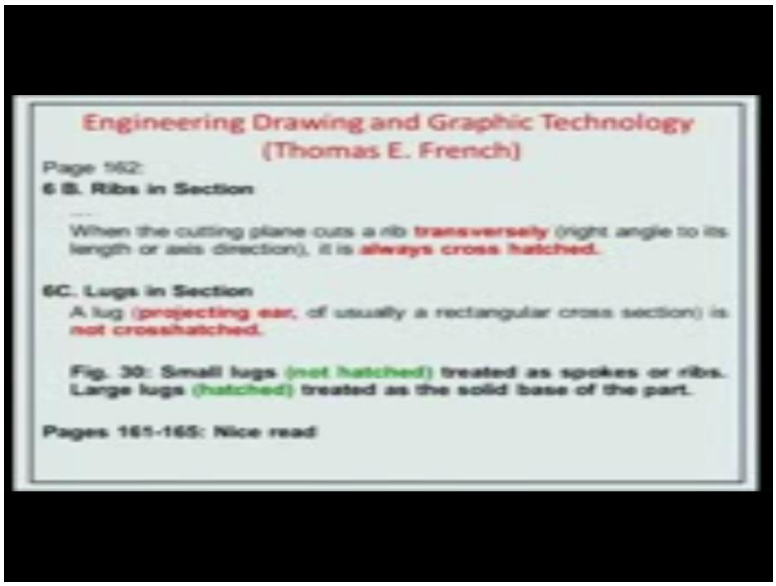

When the cutting plane cuts a rib transversely right angle to its length or axis direction it is always crosshatched. Lugs in section a lug which is very similar to a projected ear or projecting ear that is what the bible calls of usually a rectangular cross section is not crosshatched. If you look at figure 30 and the title of that so small lugs they are not hatched they are treated as spokes or ribs. Large lugs that are hatched they are treated as the solid base of the part and pages 161 to 165 if you get a time they are nice read.

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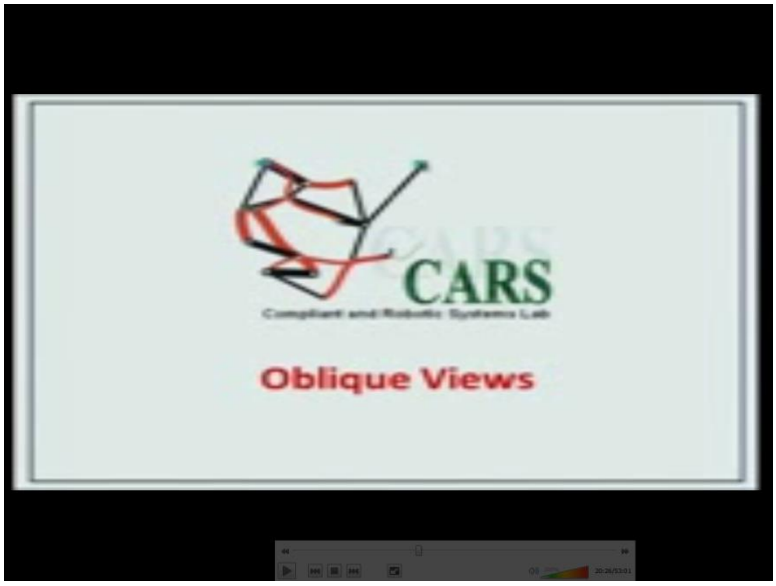

So, if you guys dosing off wake up, have some water we will take a little break. And if you have any questions feel free to ask and then we will start with the oblique view. So far so good with regard to sectional views, so these are the conventions that you need to keep in mind, back to pictures enough text. So, we will talk about oblique views today.

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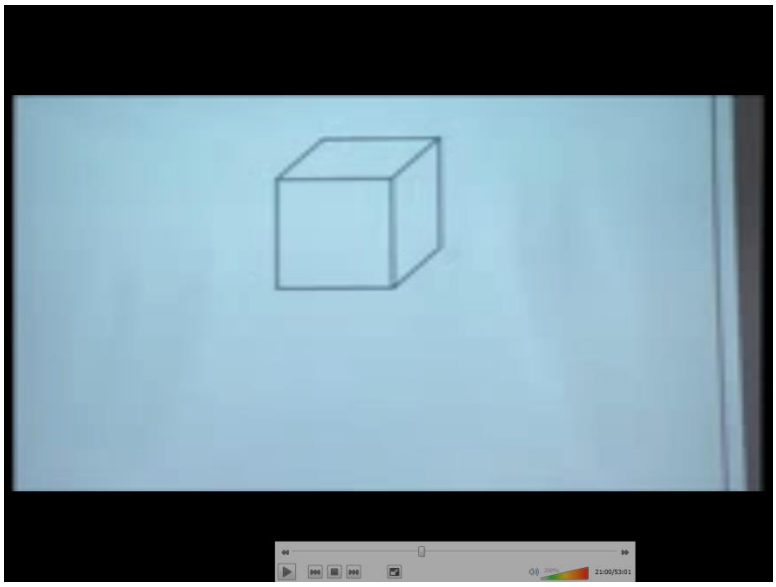

You know when I was a kid I was a naughty guy never was not interest in studying I always use to pick my bat and step out to play my father had a hard time. So, when I was may be in the third grade, fourth grade, fifth grade as said I did not studied at all. My father used to wake me up at 1:30 in the morning or 2 in the morning. And he would make me go through the answers make me read of course, he is he was also reading. And the exam was around 7 O clock, 8 O clock, 9 O clock the next day or the very same day. He used to wake me up with 2 cups of tea and that is how I am a tea person, but nevertheless whenever he used to draw a cube he would always draw the cube this way. And I love to draw this way and when I did my one or one equivalent when I was your age first year I came across the isometric view of the cube. And I wondered why was of that my father do the cube this way and not the actual isometric way so that perplexed me until I read about oblique views I will share what I read.

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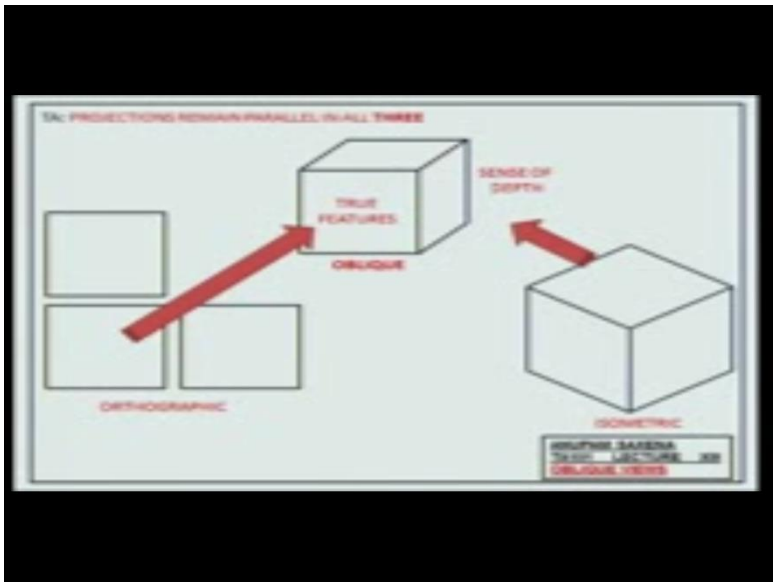

You know the 3 faces of a cube in orthographic views they are shown like this front top left right orthographic in the isometric you have seen the cube looks like this. And if you think about it if you think about it oblique view is a nice blend of orthographic views and isometric views. So, just imagine that faces which are parallel to the view plane they get transfer directly in the oblique view faces which are parallel to the screen or which are parallel to the view plane. They get transfer directly over there and you get to see the depth impression through the isometric views. So, it is a nice blend of both these of course, when I say it is a nice blend I get to see true features in a single view. And I also get to see the sense of depth in this. So, once again oblique views are a nice blend of orthographic and isometric views, but if think about it the projections or projectors are parallel in all the 3 cases. You have seen that in orthographic views, how about isometric are they parallel or not they are they are?

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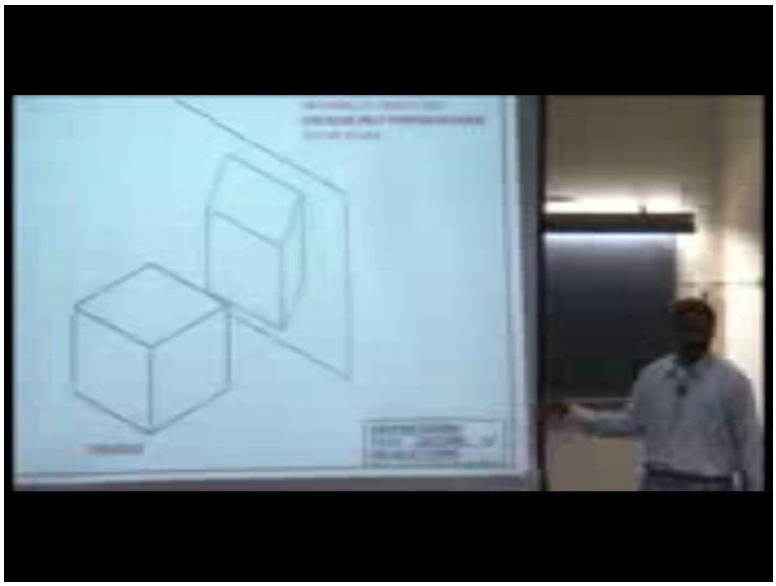

So, an isometric you know that you rotate an object twice to captured on the plane of screen. So, once again if you have this object you rotated this way you rotated this way and this is your screen. And your projectors are coming straight out perpendicular or parallel to each other, but perpendicular to the screen so the projectors are still parallel. They all perpendicular to the screen orthographic parallel projectors are perpendicular to the plane which is parallel to one of the principal planes of the object.

So, this is the view that you would see in case of orthographic projections in case of oblique projections things are slightly different, what is the difference? The only difference is the projectors are parallel, but they are not perpendicular to your view plane. Once again they are parallel to each other they go parallel to each other, but still of being perpendicular they go oblique and hit the plane of view there is an angle involved which is not ninety degrees like. So, if you take the projections for the first face which is closer to view you get to see a phase like that was again these projectors are not perpendicular to this plane they are oblique.

And that is the reason why it is called oblique projection, if you take the same projectors parallel to the previous ones you get to see this phase which is slightly offset to the previous views. And that actually gives you the sense of depth these are your edges along the depth direction. Once again you would see certain edges you would not see certain edges just like in case of isometric views. So, edges that you see you draw edges

that do not you see let go what is the advantage? So, if you compare oblique views with isometric views what is the advantage I can see one. You do not have to draw ellipses if they are many of them you do not have to draw ellipses.

So, the true features well remain true features in oblique projections there is a trick to avoid that. I will talk about that if there is a circle here and there is a circle there Google help you, God help you. So, you choose your frontal plane in such a way that you have many many features which are circular. So, that you are able to avoid those features along the depth direction. So, the first advantage that I see is you do not have to draw ellipses you have to you can deal with circles. And that that should be and the second advantage is that it would still the impression that you would get by looking at these views you would still get the three dimensional impression somehow.

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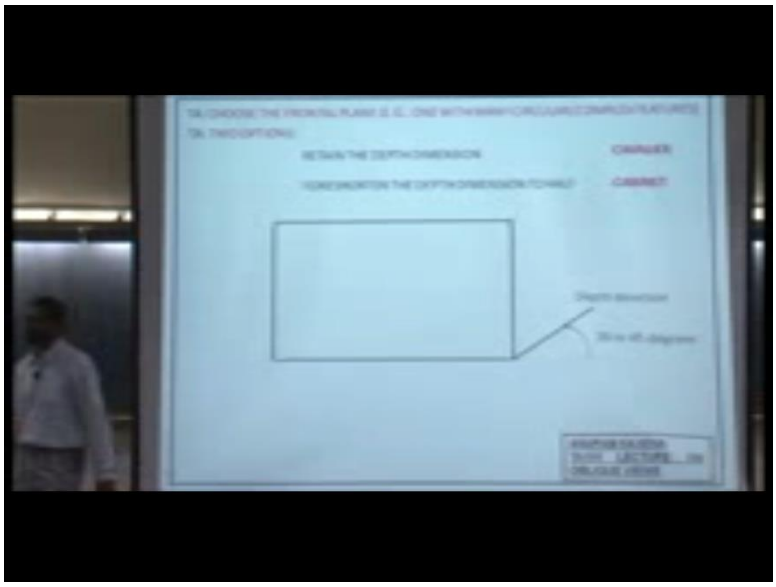

So, this is where your question comes you have to choose the frontal plane in such a way that you get to capture as many circles as possible as many arcs as possible as many complex features as possible. Because drawing ellipses along the depth direction would be quite difficult. So, this is your frontal plane this is your depth direction the direction of depth could be 30 degrees 45 degrees 60 degrees as specified best to choose 30 to 60 range. And I got 2 options; option 1 is to retain the dimension along the depth direction and if you do that we call that oblique view the cavalier view. And if you foreshorten the depth dimension to half the view is called the cabinet view cavalier oblique view cabinet.

Oblique view in the first one this dimension remains the same as the third dimension of the object. In the second case this dimension reduces to half of the actual depth dimension of the object I think its possibly one of the simplest amongst the three of drawing I could be wrong.

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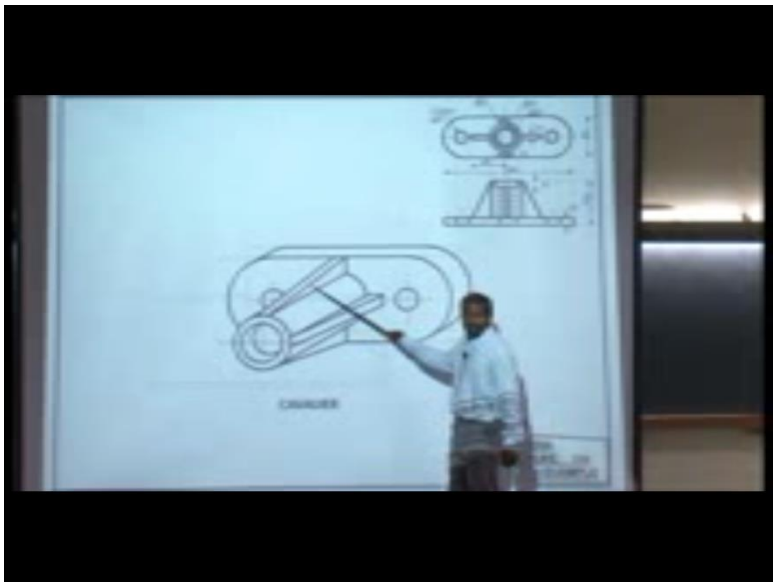

So, let us look at the first example; maybe it will be a nice idea for you guys to work it out on your sketchbooks if you have them if your eyes are heavier may be that will wake you up. So, you got this object in frontal view 2 views of the object is shown, which one would you choose as the frontal view to draw the oblique view? Great you guys are wide awake. So I will draw cavalier, what should be the dimension along the depth direction same which is what? Look at the figure 100 good. So, this is the bounding box that would that would encompass this face of the object I choose this angle as I think 30 degrees the depth direction.

What is the length of these guys, what is the length of these guys? 100 and behind I draw another bounding box. So, your object is going to be, what is going to be j within this box? It is going to be encompass within this box, what would this plane correspond to? So, this plane correspond to this guy here this plane is this name. So, the first thing I would do is I would draw a bunch of circles I see three circles I will draw three of them this fine is this fine? Now, this is the plane that I job behind this looks like there is there

is this cant to board here someone be drawing this circle here behind which is pretty much like this. I am drawing another circle on which plane this plane.

And this circle corresponds to this guy over here I have drawn this arc on this plane likewise I have drawn this arc on this plane. What am I doing? I have drawn this circle here now on this plane I have drawn this circle here the bigger circle behind the plane on the behind plane center lines the arc over here the corresponding arc at the extreme real plane. So, this is like a cylindrical feature I am drawing the ribs now I am drawing these four ribs now. And I start drawing the drawing once again the processes are very similar to the way you would draw an isometric drawing get see this circles you see a canto bar. So, the inside circle you start drawing the ribs solid lines second rib, the third one you essentially draw.

Whatever you see, see this arc; see that part of the circle on the left you see the entire right circle see that arc you see the arc behind see the arc on the left. You see the arc on the right draw tangent line and in a sense finish this drawing. There would be one more circle we all looks like where would that be over here there would be one more all of you with me it is the length of the rib this guy here, here over here. So, the mirror of this ribs on the other side what are you taking about you mean this guy. You mean this guy this rib here the other one here this one it is what I cannot here if you if you this rib ends eight units over here you mean this one; this one I understand. So, this guy would be a little this guy would be a little I am permitted to make mistakes, but this actually gives you the essence of oblique view right. So, go back to your hostel rooms and draw the correct version of this drawing.

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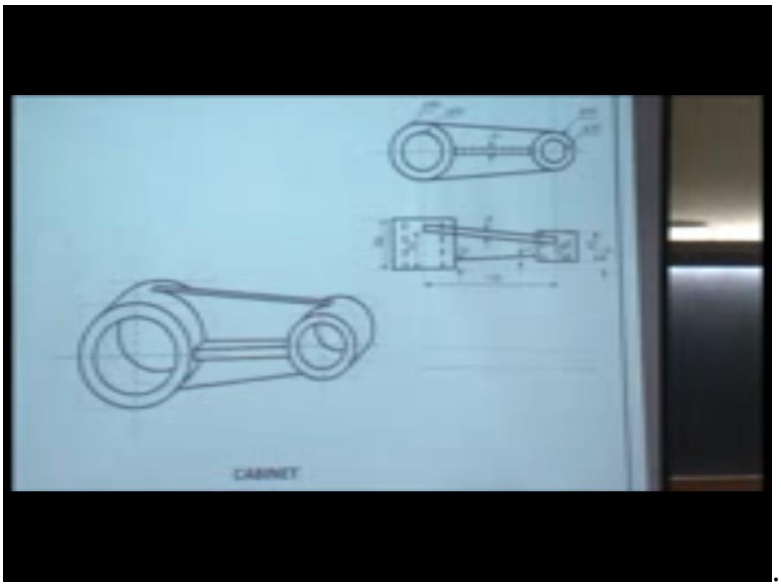

Another one this time; this time I would not say a word my presenters are going to be doing the thing. All you need to do is like conquer or disagree you have seen this optic before I am going to drawing the cabinet view. And the depth direction is going to be half of what is shown it is going to be half of what is shown stay with me. Which view should I choose as the frontal view?

Student: Bounding box

Good bounding box for the circle on the left. Well, I was not supposed to say a word here you go, shall we? Do not worry about that I am doing on the right something that I just needed to figure about the depth of this part. But you can follow this thing up in your slides I did not want to do any trigonometry. So, I just want to solve it with draftly just do not worry about that. So, once I do with this little exercise I figure out the depth am I done? Thank you

Student: Why are both the circles are not in the same line?

Why are.

Student: Why are both the circles are not same?

Why are both the circles are not in the same line?

Student: Centers of the both the circles are not in the same line.

Centers of this guy and this guy, are you asking why are they not on the same plane? Look at the figure on the right correct. So, the cylinder on the right is post slightly backwards. So, one very nice thing about oblique views is that it gives a reader the sense of the correct dimensions and also the sense of depth which one here view or the bottom view. So, I am looking at this object from the other side, because if I do not draw that rib I am missing something well my intent is my intent. What is my, you now I am so glad you guys are participating, but just give me a second give a second. A moment of silence please; a moment of silence please, thank you. Well, what is my intent? My intent is to show the object as clearly as possible. So, I got 2 goals here; number 1 to be able to show the true features as well as pretty much all the details of the object. And also to vendor the object some sense of three dimensions so my goals are three fourth.

So, I captured the true dimensions on the plane which is parallel to the screen along this dimension I captured the depth. And I choose the orientation in such a way of the object that I get to show all the details of the object. How does it matter does it matter? No the object remains the same I just stepped it and stepped it around have not I? Whether you got 2 questions you are raising 2 hands; 2 questions anymore questions? Eyes heavy, should not this circle be completed? Should not this circle be completed is that your question is? Well it is so part of this cylinders hidden behind this surface. So, you got be very careful something very similar to the isometric drawings when you draw I mean got to be very careful what you see and what you do not see, which rib? The dimension, the question is why are we having the depth?

Student: Half.

Half? In isometric view what happens? There is something very important you need to hear me out. And you need to hear what happens in isometric view? The length become foreshortened right. So, to give that sense foreshortening in the depth direction, but you know something that I will actually share with you there is something really interesting nature. You guys know numbers 1 2 and I do not now till when syllabus, language you guys know that, how about nature? Does it know numbers? You think it knows numbers you think it knows the rules of mathematics that we have learnt? Since we have since our first grade second grade third grade, how does nature work? Laws of motion that is our

understanding a what nature what we think nature, have nature functions right. But nature I mean it does not function with numbers or language in my opinion I could be wrong. But in my opinion the way I see it you see a bird flying; you see yourself walking; you do not apply equations of dynamics; you do not apply full mechanics when the bird is flying you do or nature does not do that at least. So, mathematics it is good so long as you are able to understand something it is great, but you do not have to apply mathematics everywhere. So, just relax take it as nice blend of art and analysis. So, what is your question? Are you allowed.

Student: Inside the rib

Inside the rib.

Student: Inside the drawing.

Inside the drawing well, you can always use an arrow head like this an arrow like this; an arrow like this possibly and dimension outside. You can do that? You can do that if dimension inside I mean nobody stopping you from dimensioning inside just to make sure that your figure is very clear. And it is not interfering with the dimensions that you choose to dimension outside the figure, but if you have to dimension inside the figure you are permitted to do so. Any other question?