Indian Institute of Technology Kanpur
National Programme on Technology Enhanced Learning (NPTEL)
Course Title
Engineering Graphics

Lecture – 17
Oblique projections-Part-V

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Now orthographic projections assemblies sectioning last part.

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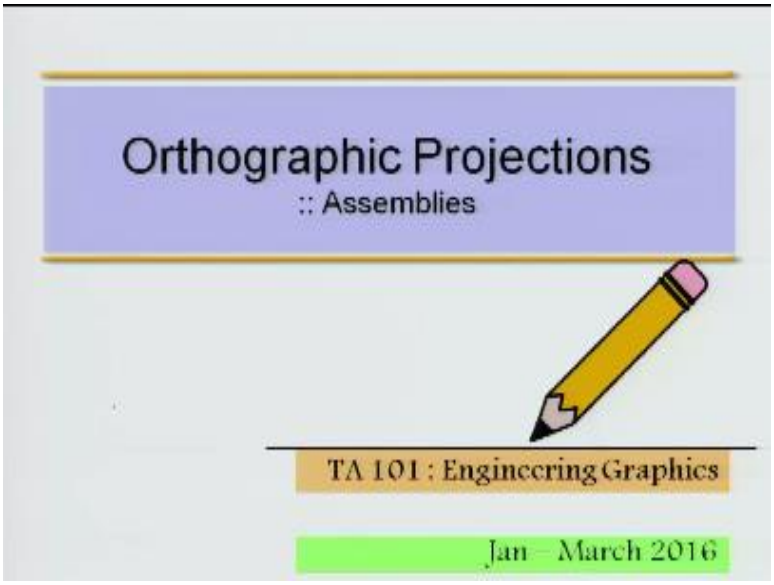

As I said you assemble part by part and make the full object, then take this sectioning then find it out what is there inside.

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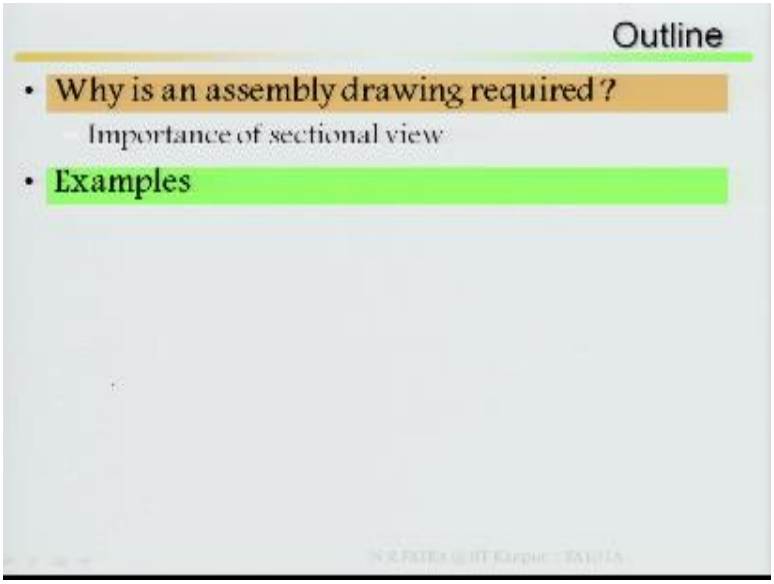

Why is an assembly drawing required importance of sectional view and few examples.

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If you look at particularly for manufacturing making an object made of a group of pieces, how do the pieces fit into each other that is the manufacturing part.

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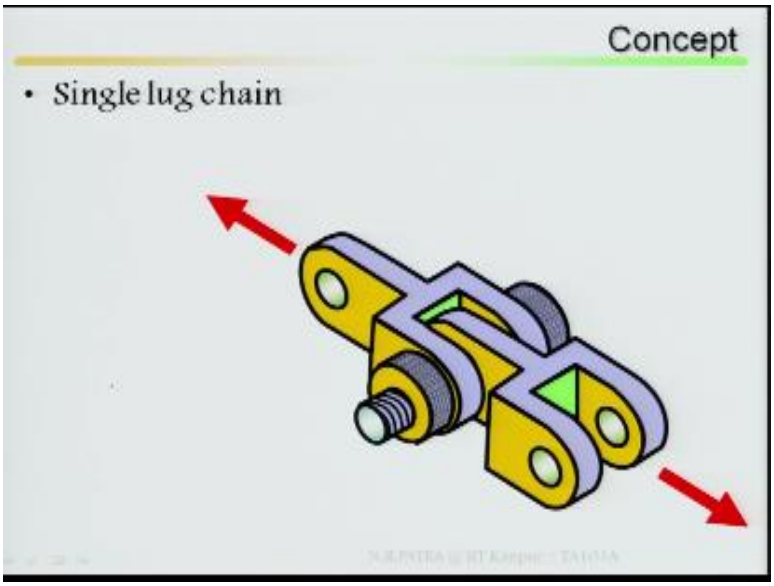

For example concept single lug chain if you look at the single lug chain.

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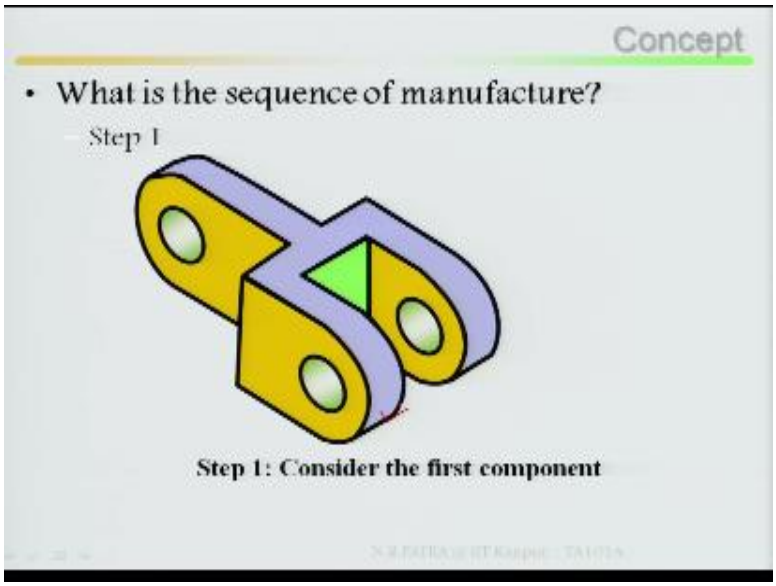

What is the sequence of manufacture, step 1 considers the first component, this is the first component you consider.

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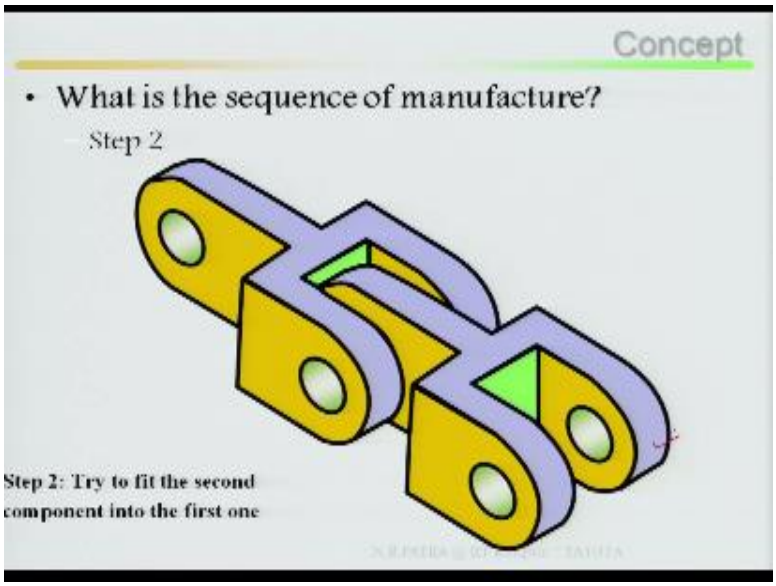

Then step 2, try to fit the second component it is the second component try to fit it whether you can fit or not. Then this second component has to fit into first component by means of what.

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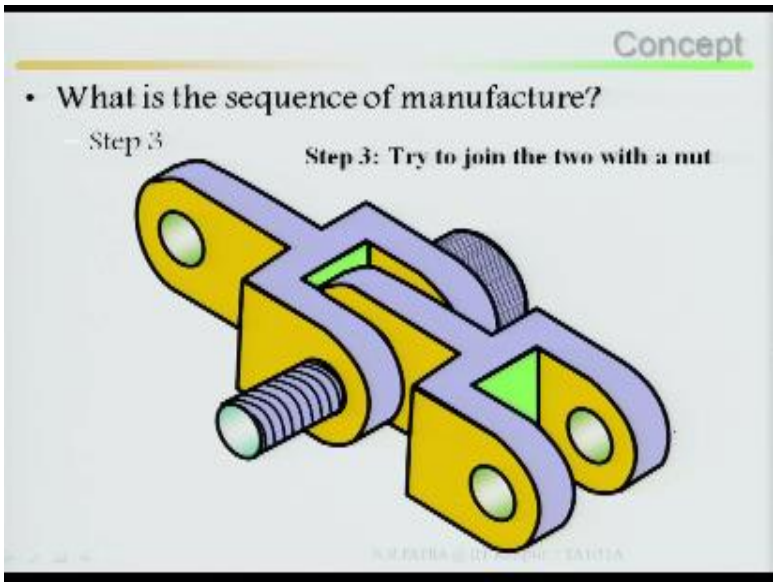

Step 3, join by means of a nut with a single nut both the parts can be joined.

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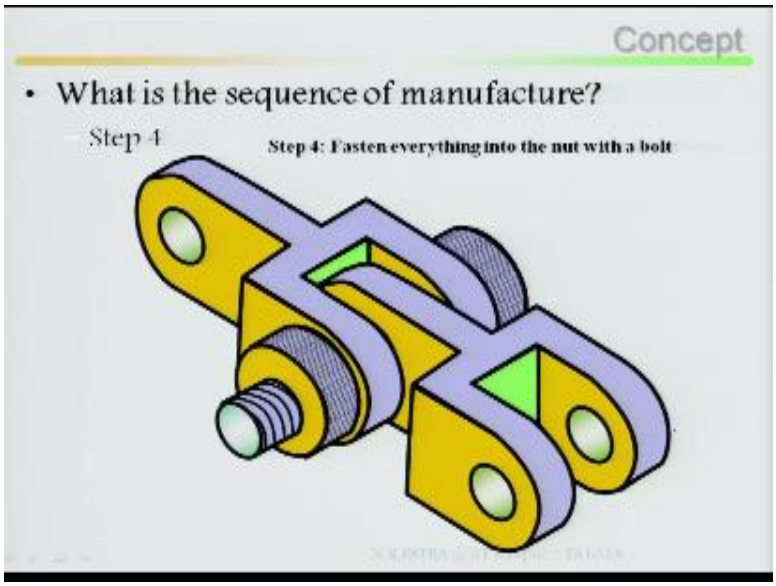

Step 4, then once nut has been pushed inside fastern everything into the nut with a bolt. Basically by means of nut and bolt you connect it both the parts so that if I start it again.

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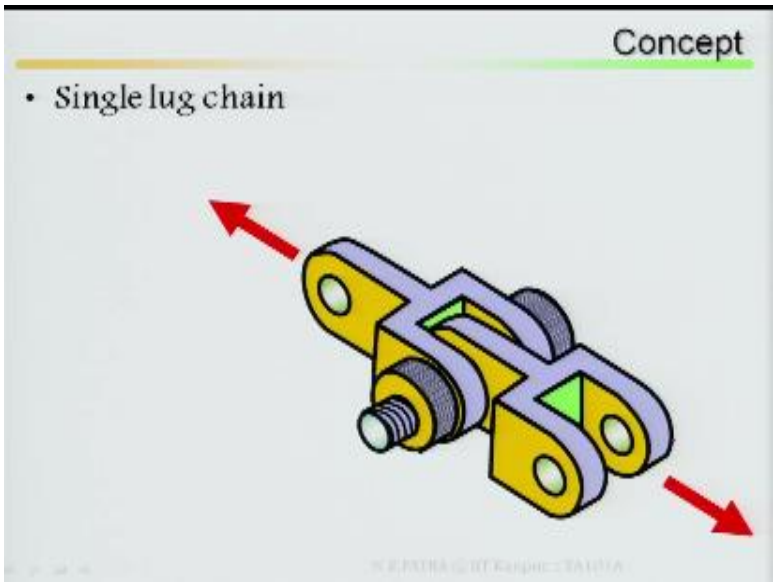

So that it become a single lug chain, once again just going to complicated one.

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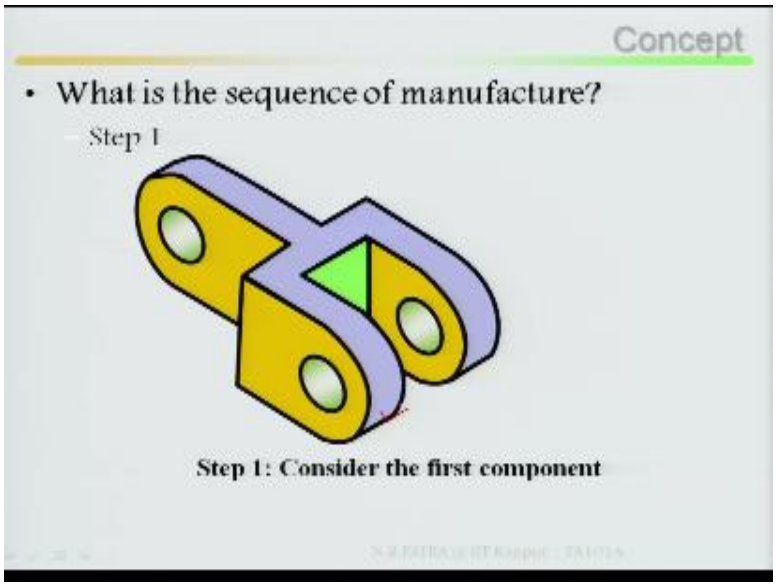

Look this animations step 1, consider the first component.

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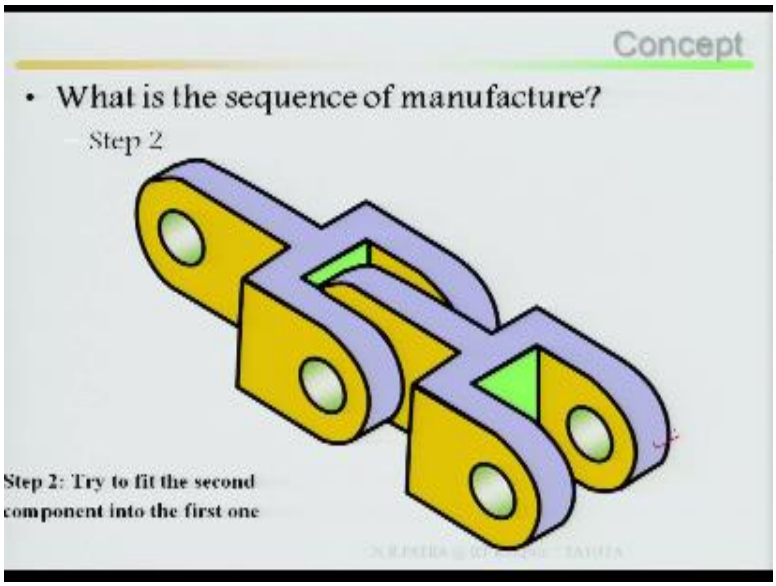

Step 2, try to fit the second component and find it out to fit the second component what is the accessories required.

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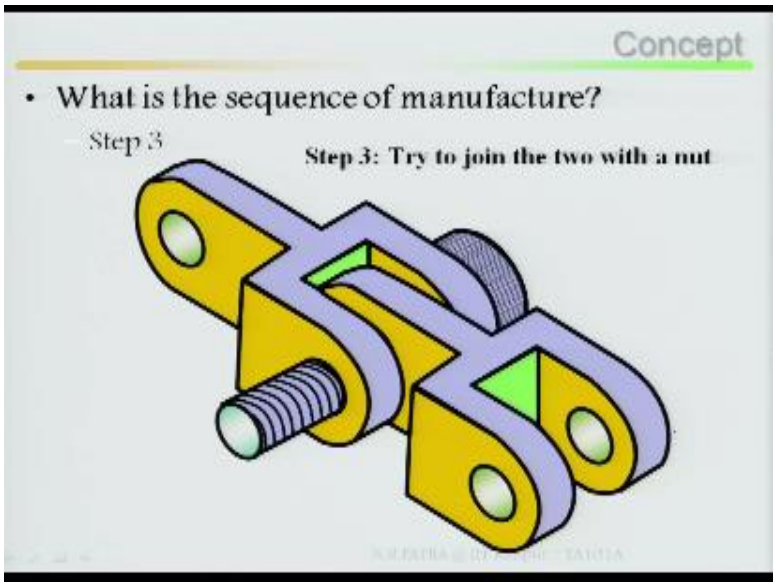

Then step 3 try to join the two with a nut by means of nut.

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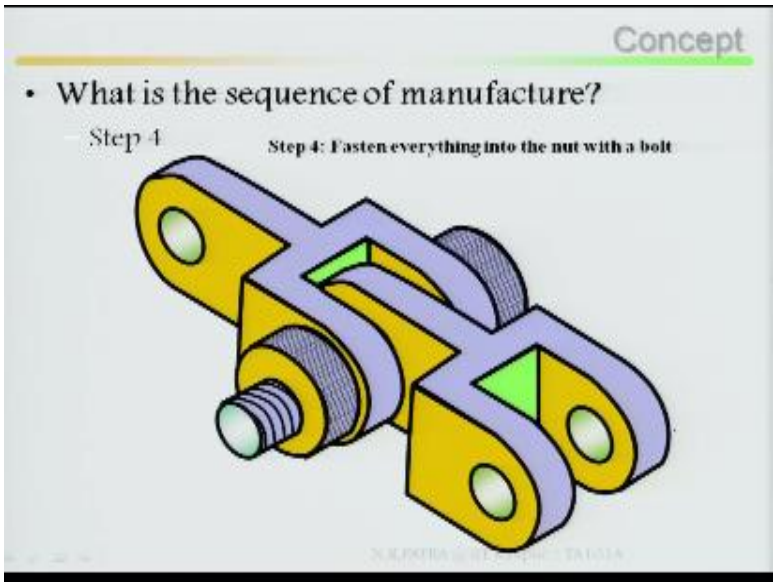

Then fastern by means of nut and bolt. Once it is over this is your complete object after assembly.

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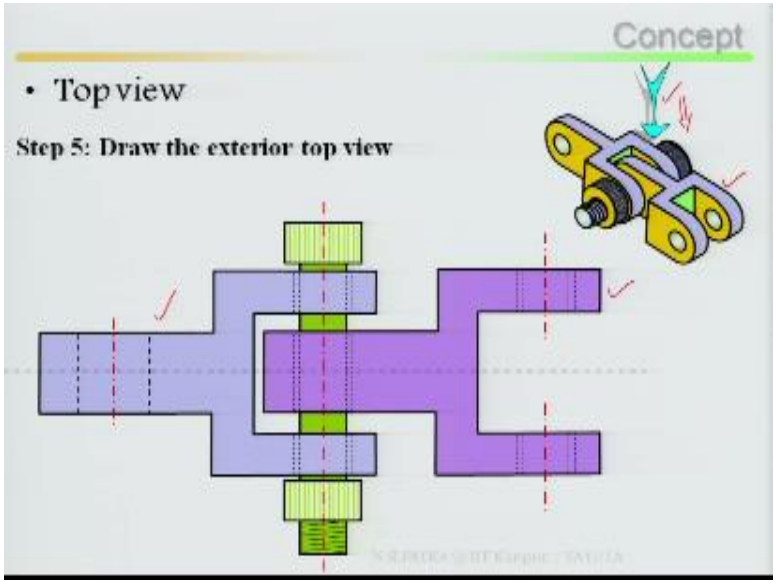

Then look at from the top this is my complete object and looking at from this top this is the view directions, this is the view directions, this is your top view, I am looking at it. How it looks clearly part 1, part 2 it has been connected by means of a bolt with nut. Draw the exterior top view, top view has been drawn clearly mention where is your holes are there and all other features.

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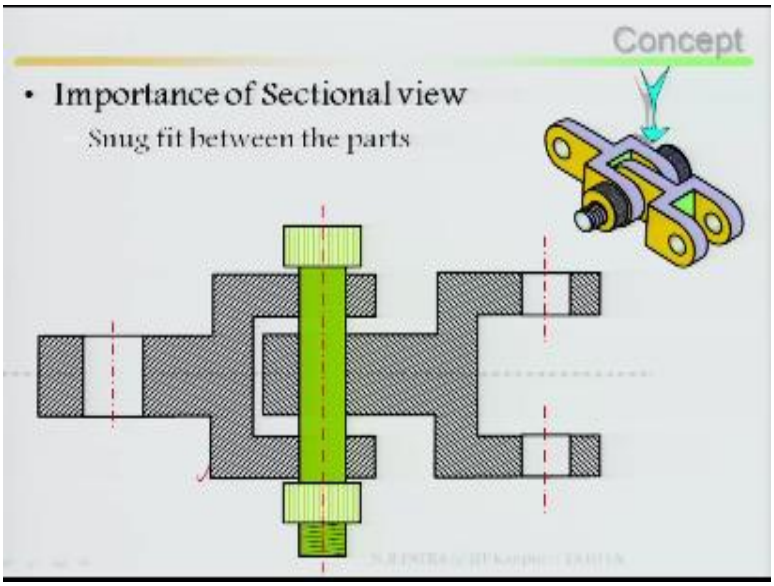

Then snug fit between the parts, try to look at this snug fit between the parts, if this is the sectional view if we look at here arrow mark has been marked here, marked hatching it is not arrow hatching has been marked. And if you look at this, the two parts -- so different hatching. So maybe it may be possible that two parts has not been of same material it maybe a different material.

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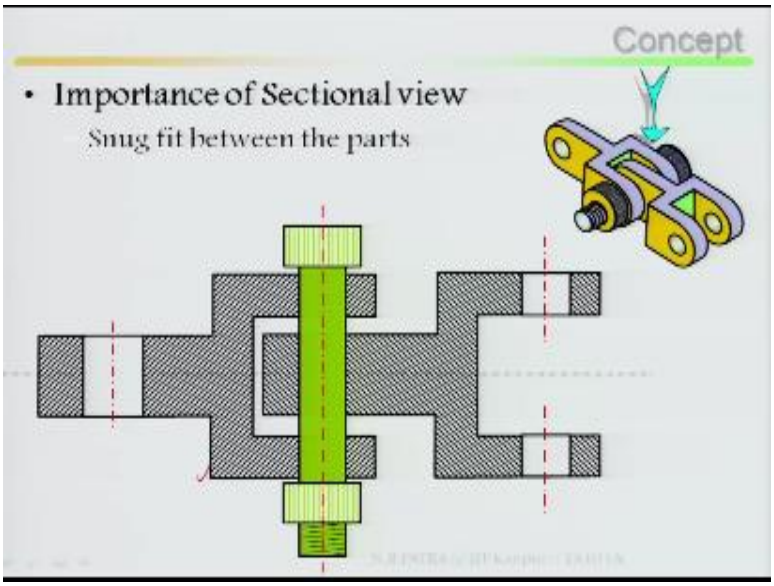

If it is a same material the hatching should be in the same directions.

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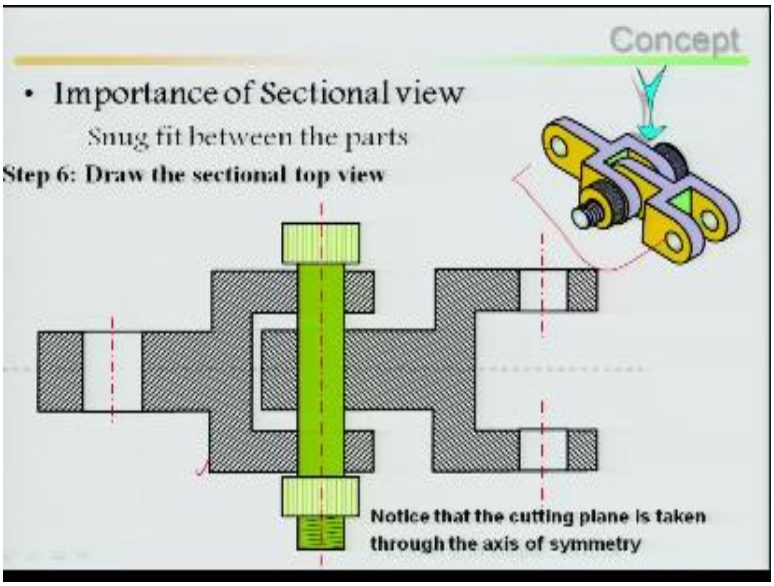

Now draw the sectional top view, sectional top view notice that cutting plane is taken through the axis, draw the sectional top view. Once you are drawing this sectional top view you can notice this sectional view, this sectional particularly cutting plane has been taken through the axis of symmetry, cutting plane is through the axis of symmetry. If I cut it if it is a sectional view at the top.

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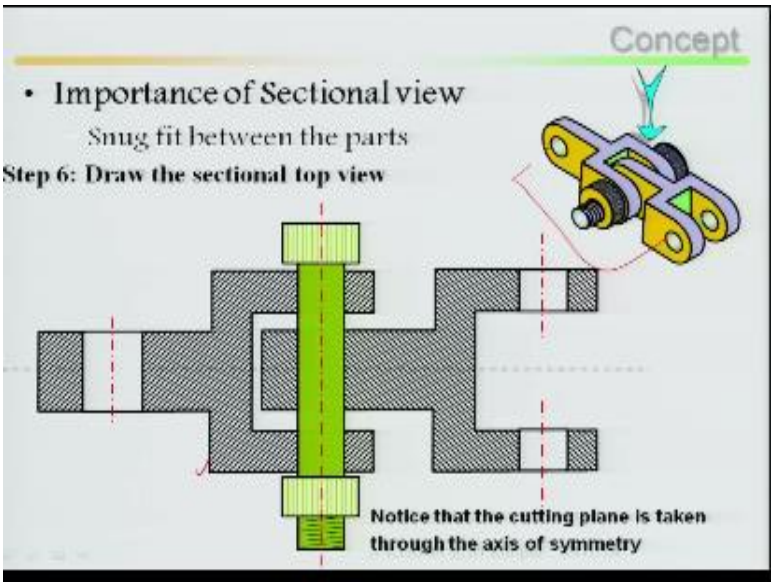

So axis of the symmetry if I am taking this axis of the symmetry here if I cut it into two parts then looking at the top how your sectional view looks like, then let us start with few complicated examples.

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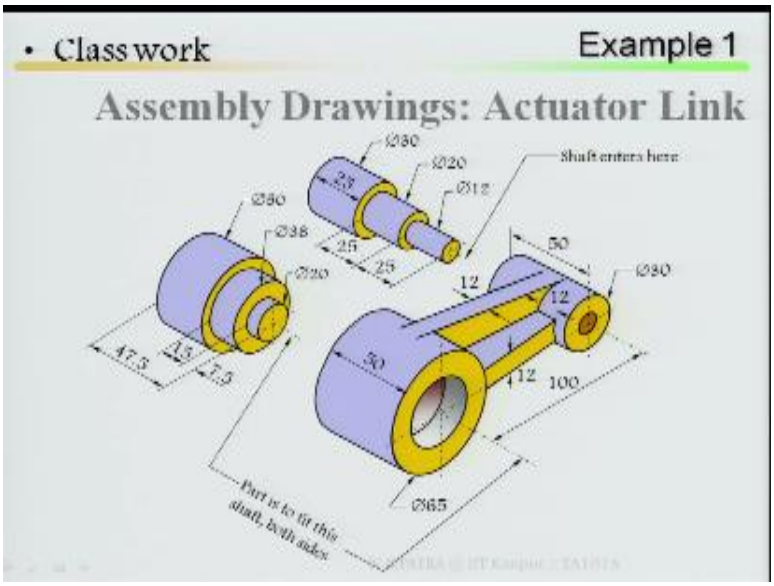

This is a typical class work you can try at your home or maybe at your hostel. Assembly drawing actuator link this is called actuator links. If you look at here there is a shaft here the dimension is given, 25 mm here it is 25 mm. As I said earlier unless or otherwise it has not been mentioned all dimensions are in mm.

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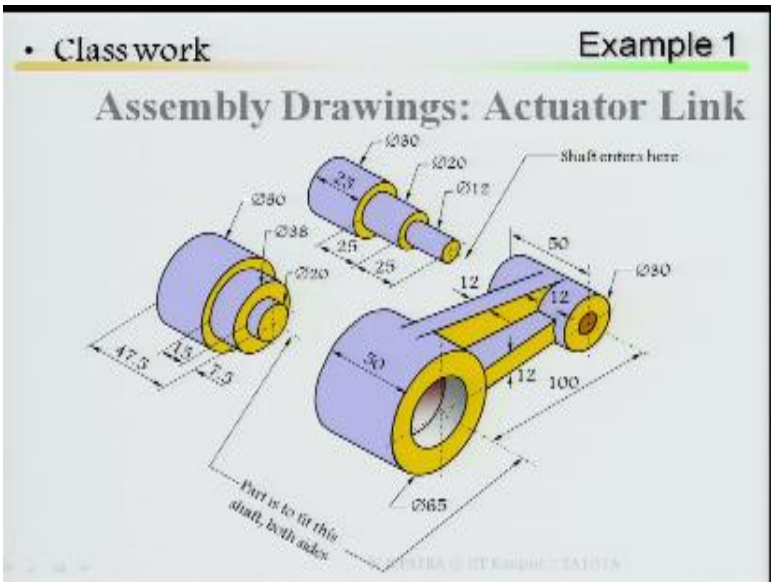

5 this diameter is 12, here 5 = 20 5 =30 here it is 25. Again another shaft 520, 538, 550 then diameter from here to here is means the thickness sorry, this thickness is 15 here to here is 7.5, and here to here is 47.5, and in this case here it is equal to 5 = 65, 5 = 30 then distance from here to here 50, 12. All dimensions have been given; look at the dimensions very carefully before you will start. Imagine how this has been fit inside, part is to fit this shaft both these sides.

Remember these parts has to fit this particularly this shaft in both these sides, that means one will be put this side, other same dimension will put this side. Again this part will also put this side; other object also same dimensions put also this side. Just imagine assembly drawing particularly it is a actuator link.

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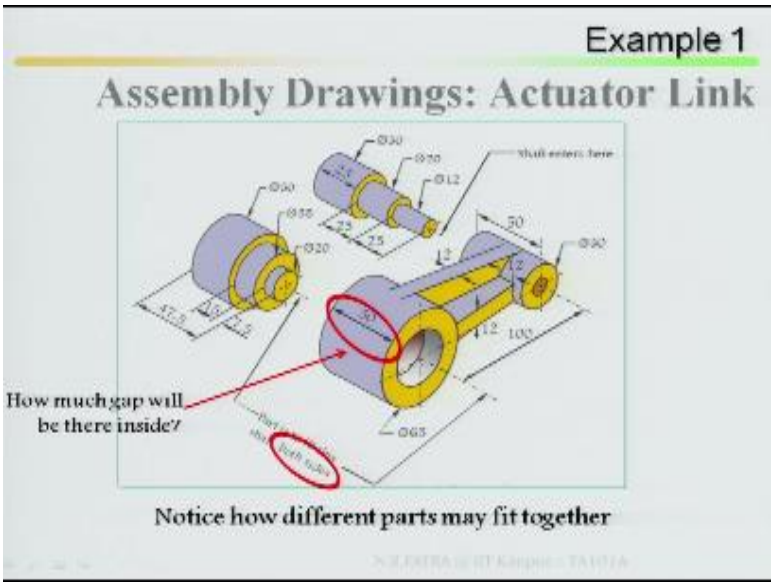

Then look at this, this is your actuator link notice how different parts may fit together, particularly this part has to fit both the sides of dimension of this dimension of your 50 mm. Then how much gap will be there inside, if I fit this object this side as well as this object this side both and there are two same dimensions object I will fit here, I will fit this side what will be the gap there inside.

How do you find it out, it has to be calculated from the beginning otherwise while doing this sectional view then you have to keep the gap also.

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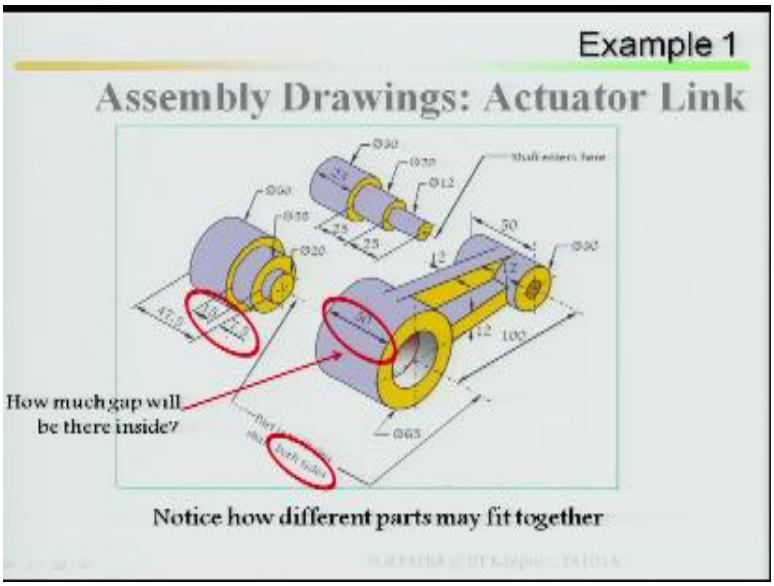

Look at the dimensions this has to fit inside again this has to fit inside that means dimension from here to here will be taken and it has to be pushed inside, then dimension from here to here it will take and push inside, that means it is 7.5+15, 15+7.5 = 22.5, 22.5 and 22.5 from this sides that means 45 in between there is a gab of 5mm similarly.

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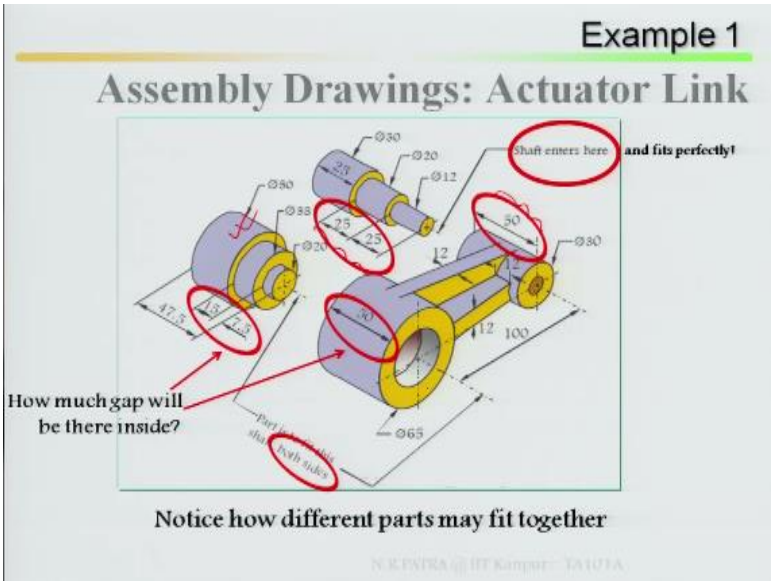

shaft enters here this is your 50mm now if it is enters here look at here now her it is 25 her it is 25, 25 + 25 it is 50 in this case this shaft will be only one side it will be entered because this is your total dimensions will be 50 here it is your 50 this 50 will cross over but in this case this shaft this part will be fixed shaft in one direction as well as in other direction so that there will be a gab of 5mm and exactly this part is fit perfectly inside now.

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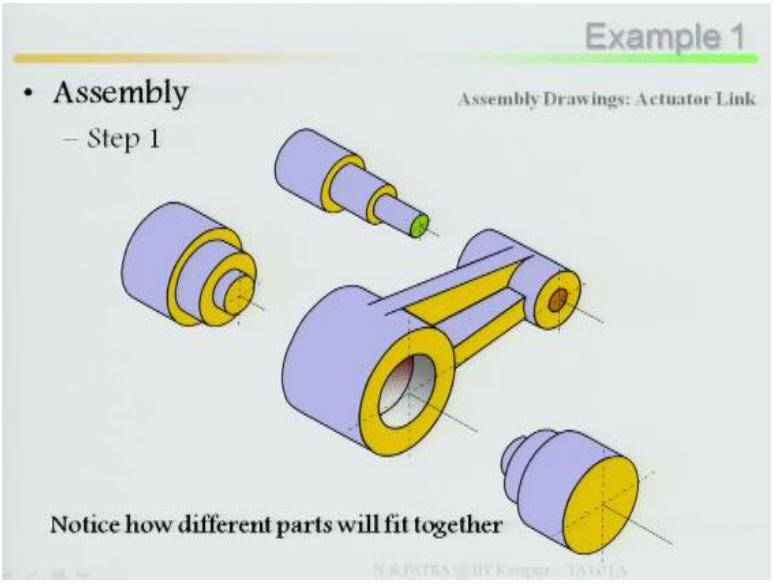

Now look at this animation of assembly step 1 I have taken this is your so shaft I have taken both the object both the sides and this is the part actually to link then notice how different part will fit together look at here you take your time just look at here again look at here now once it is fit how the designer will know what is the gap because already you are motioned this dimensions

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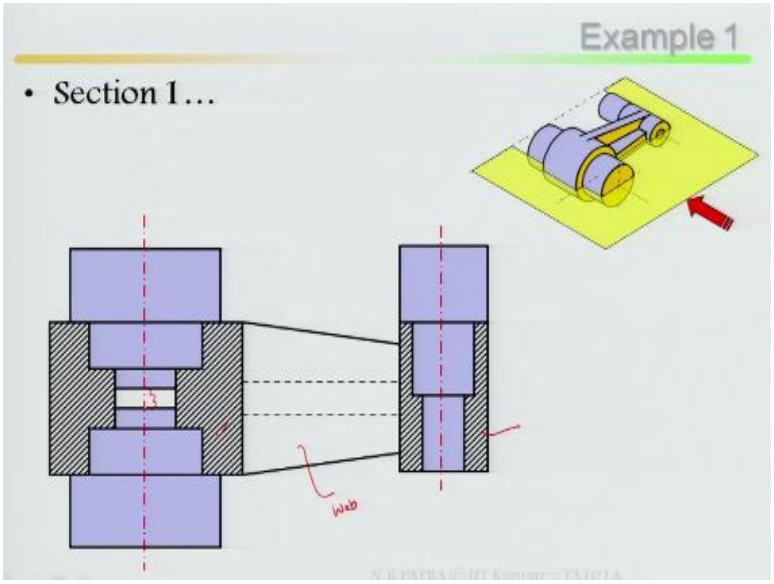

now once it has been fit in between there is a gap of fine but in this case there is no gap there is no gap it fit exactly inside this now section one look at this section how your plane has been put it in the symmetry longitudinally put it two half's now we put it take a section through the axes of symmetric it is axes of the symmetry then once axis of symmetry has been made look at here how it looks I got it a sectional plane has been put it imaginary sectional plane along the axes I got it and make it in two parts and sectional view has been drawn .

how it looks this is your shaft connected with wave connected again there is shaft then it has been pushed by two now this is Gab you have to have to show it once you show it then the designer he can understand there must be a gap in between for manufacturing purpose look at the high-techs imagine the

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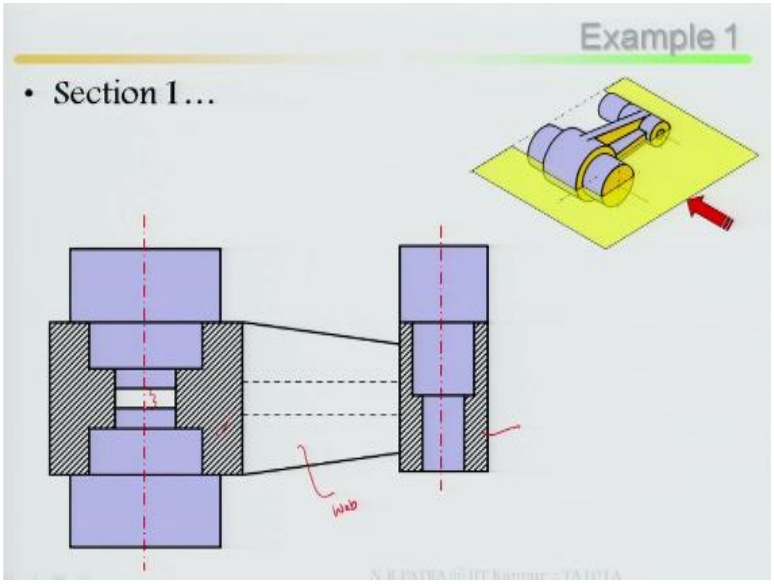

As I said earlier shaft waves hacking has not required hackings are not required particularly in this case wave and links are planes these are only a your wave and this links but the intercept particularly this shaft if you look at here this consists of a same material same hacking as been done that means it says.

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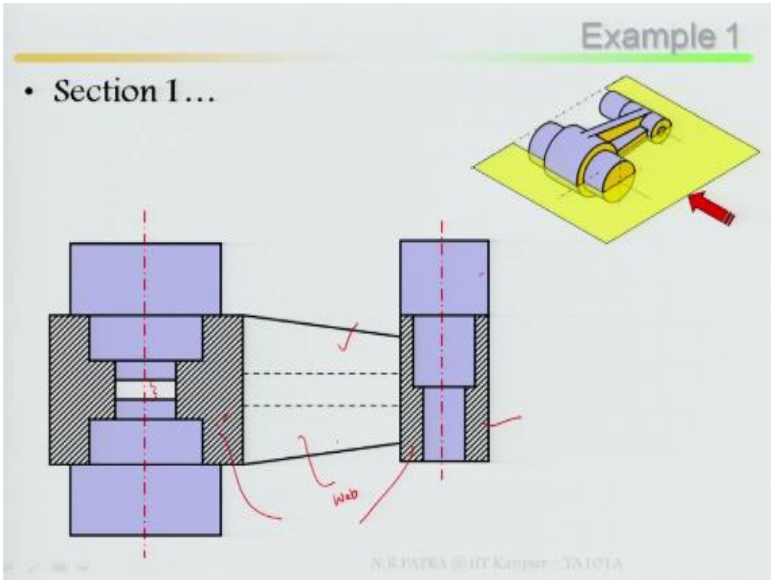

The material of this and this is same however if you look at it this is a wave then there is no hacking is required if you visualize the full object.

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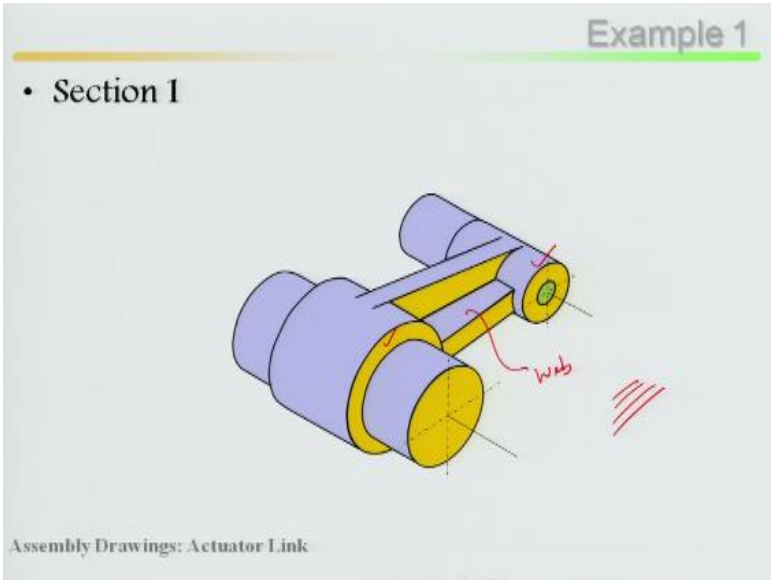

this material and this materiel it is the same materiel as I have said earlier it consists if this kind of hacking has been drawn it consists of milled steel it consists of my steel then this is your web our plant then in that case what will happen this not has to hacked.

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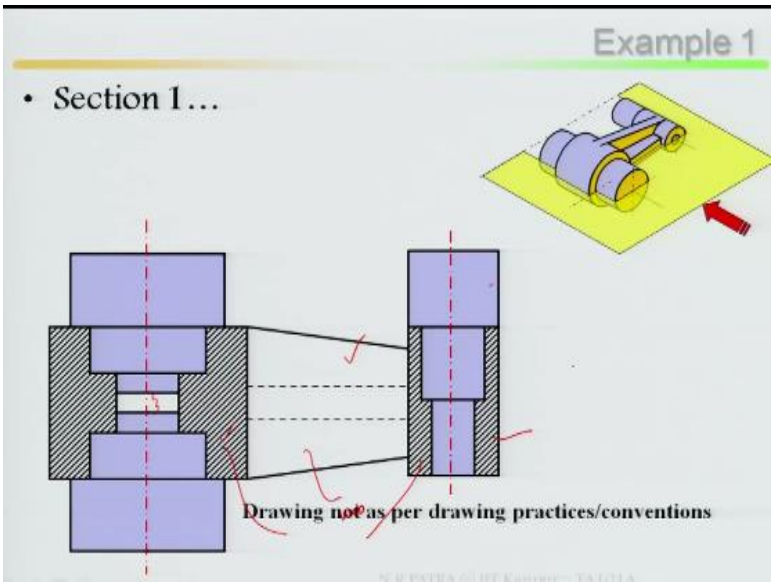

Section one put a sectional imaginary sectional plane along this directions now come.

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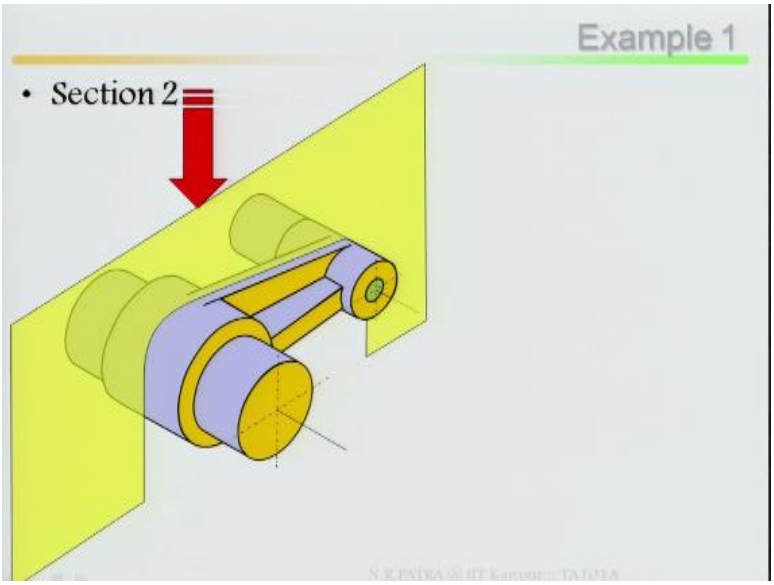

To your section two put imaginary sectional plane along the directions look at here half of the weight has been cut you can take out from the front and look ate from the front what is your front sectional view earlier it was a.

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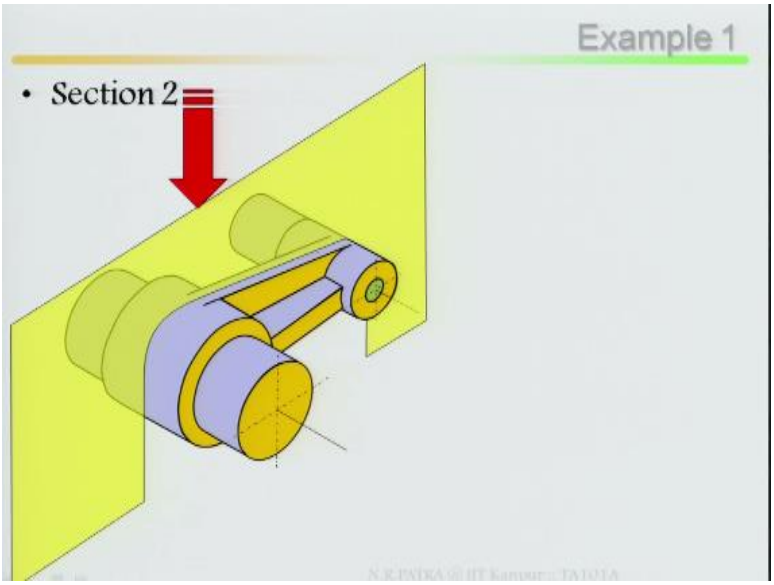

A top sectional view then her it is a front sectional view how I am taking the sectional plane how I am taking the sectional plane depending up on that it will vary now look at the diagram

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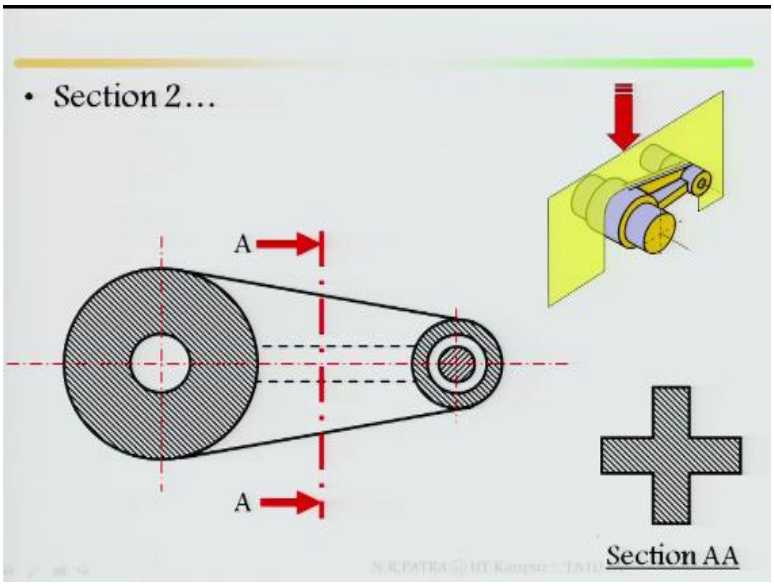

This is your front view then it has been cut it this is your sectional plane it has been cut it and taken out and we looked from the front take a cutting plane through another axes of symmetry then take the cutting a plane another axes of symmetry then once you take the cutting plane then section at AA.

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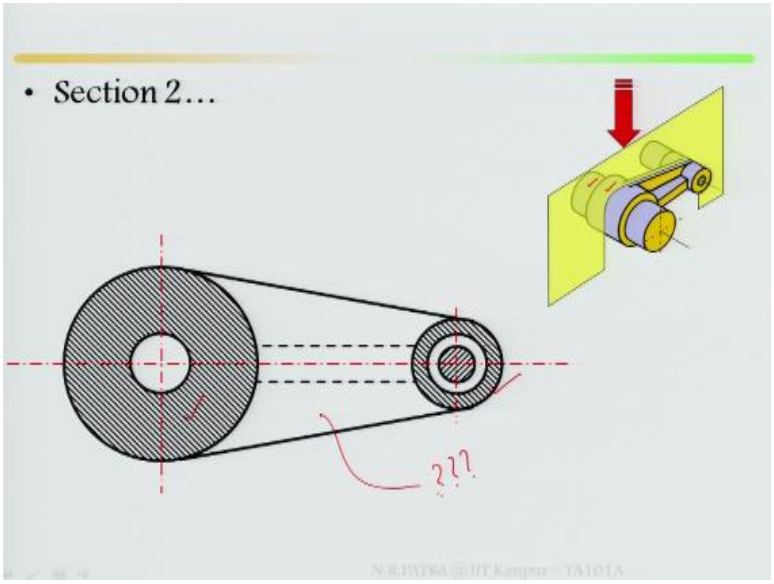

If you look at the here I am taking out here then drawing this exalt view be now this is front sectional view front sectional view the moment I got it what will happen I got it there is a bigger circle and there is a smaller circle so put it at bigger circle and this your made up of steel milled steel similarly here you cut it shaft again shaft and there is a whole this has to be marked only thing is that now in between what is their inside this part is clear part to the this part is clear to manufacturer this part is also clear to the manufacture what happened inside what is inside what is inside look at here what is inside.

Now then you have to do it rotated and removed sectionals rotated it and remove section in that case take a section at any of the.

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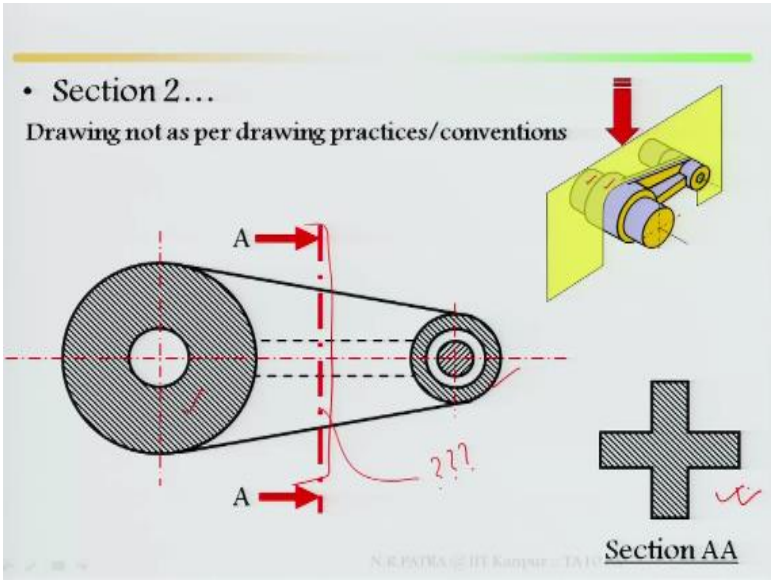

Let us say this plane AA at this position half way then find it out what is inside I have taken a section here AA then find out at section AA part it looks like it looks like this is your section at AA now drawing not as per drawing practice or conventions this is what the complete sectional view of assembly one of the example taking different planes one at vertical plane other at horizontal plane particularly to view sectioning as well as front view sectioning I have shown come to.

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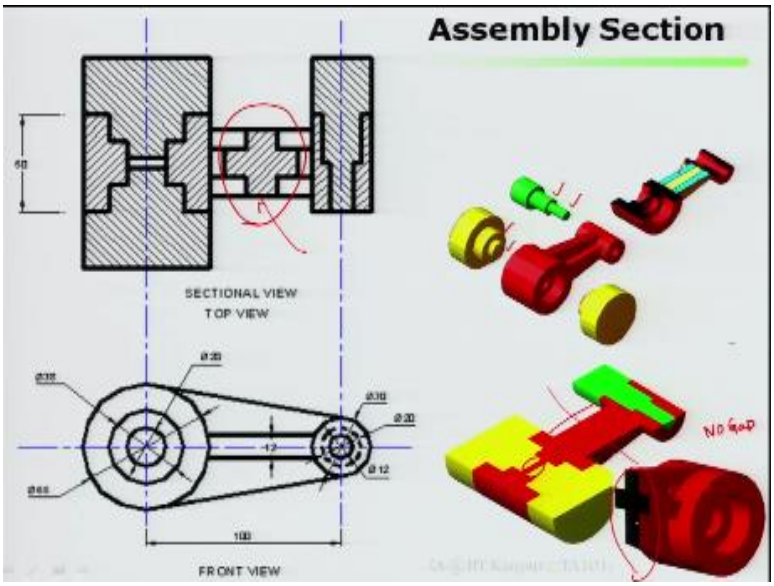

Slightly look at this object look at this object very clearly look at this how it looks if you look at here I have taken a animated part cut it half if you looked at here you see this is this, this is this again there is this there is a diameter her and it has to be pushed both the sides and if you looked at here how in the middle part it looks I have given a color now how it has been pushed and here how it looks after placing and cutting, cutting in a original plain along the axis how it looks I cut it from the top view I looked at how it looks looked at it look at it how it fitted this is your gap this is your gab which I have said it is 5mm then here her if you look at here, here there is no gap, no gap.

Now, look at here sectional top view and sectional front view, you can show it so here this is the middle part I have shown at from this, this part to this part, from here to here how it looks from here to here how it looks, this is the part then it has been put it here dimensioning it has been shown, then front view. What I have drawn here, if you look at here cut it here it there is a section cut it how it looks, with animations, look at it here how it looks, it looks like this.

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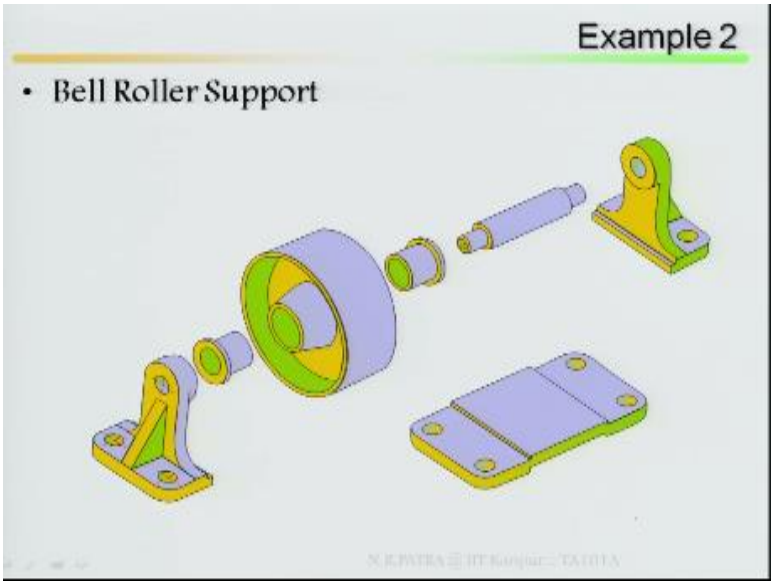

Then come to slightly other complicated example, this is your example 2, bell roller support.

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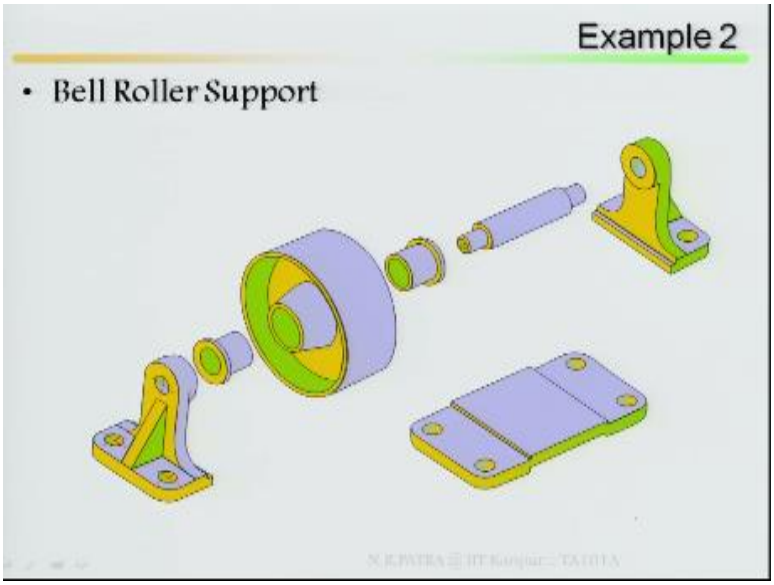

Now this is your case of bell roller support, I have just put it in a way did as it one by one, I just scatted it, how it looks ultimately it has to been fit and assembled here.

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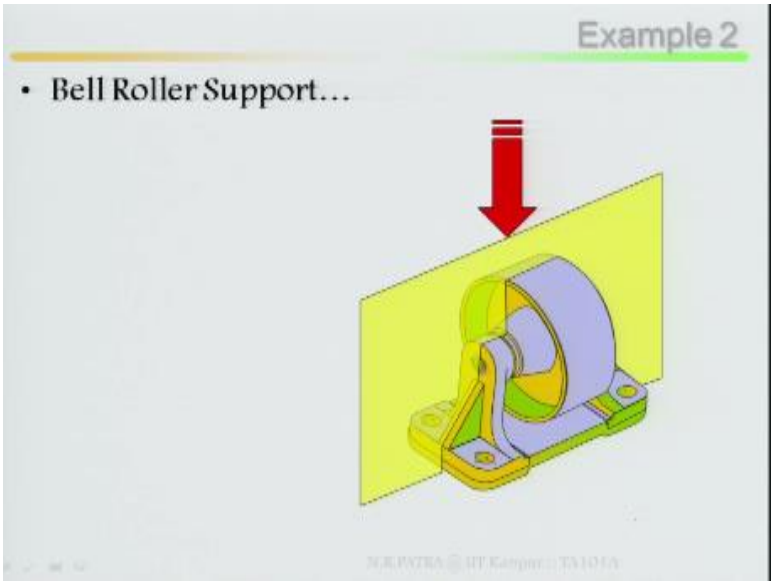

Now after assemble how it looks, it looks like this please look this very carefully, it has been cut it along your vertical plane. Now take a section through axis sub symmetric always you try to take this section through axis of the symmetry.

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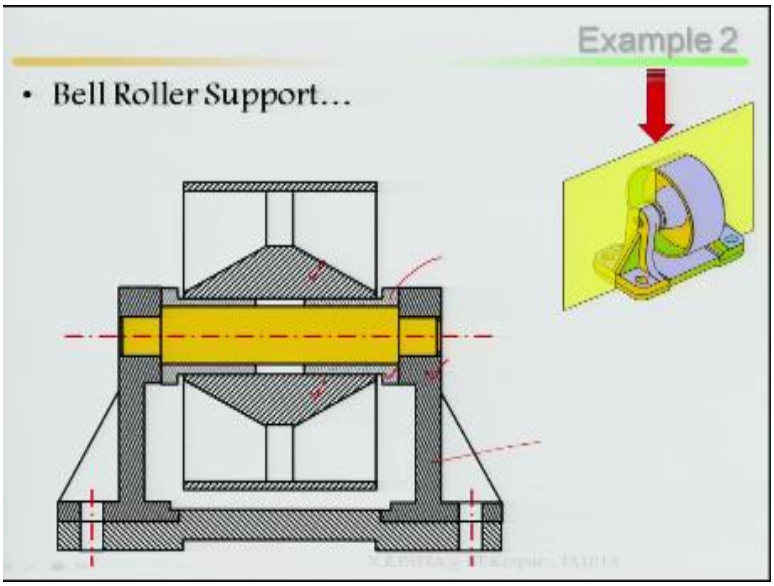

Now how it looks, look at the hatchings this hatching, this hatching, this hatching, this hatching it is completely different, that means this is made up of a different material, this is made up of a different material and this is made up of a different material. However, this and this is made up of same material because this is the same hatching.

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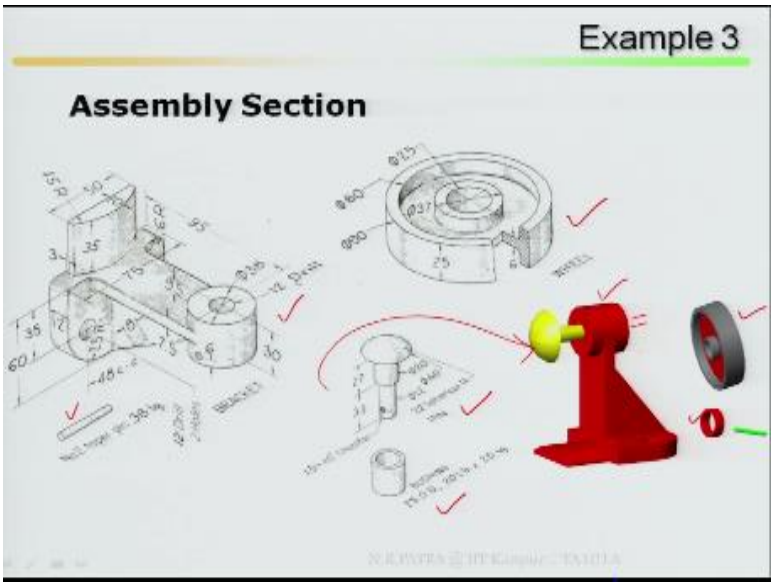

Go to the example 3, slightly complicated look at here, how many parts you can look bracket there is a bracket here, then there is a wheel, there is a pin, there is a pin, these is a pose this is a pose. Once you fit this pin inside another top pin so that it has to be pushed. Look at how it has been fitted. Now this, bracket it can be stand like this then after this bracket has been stand then what will happen in the bracket at the top you put it here, push it here then one side you joined it here. Then enter this pin, push this pin so that it can contact this and this with this, then once you push this pin inside connecting this, this and this.

Then some part will be looking outside, then this small pin will be pushed there is a small pin will be pushed inside, very carefully take your time look at the different dimensions. Unless otherwise you are not going to practice, it is not going to helpful to you, because this is engineering graphics, unless otherwise you do not imagine.

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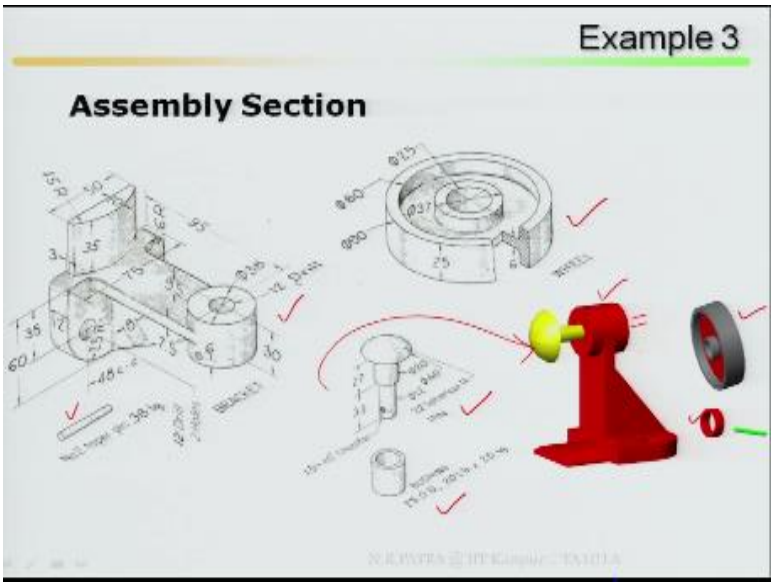

And do the drawing, taking all the dimensions it is not going to be useful. So you try this example at your home or may be at your hostels.

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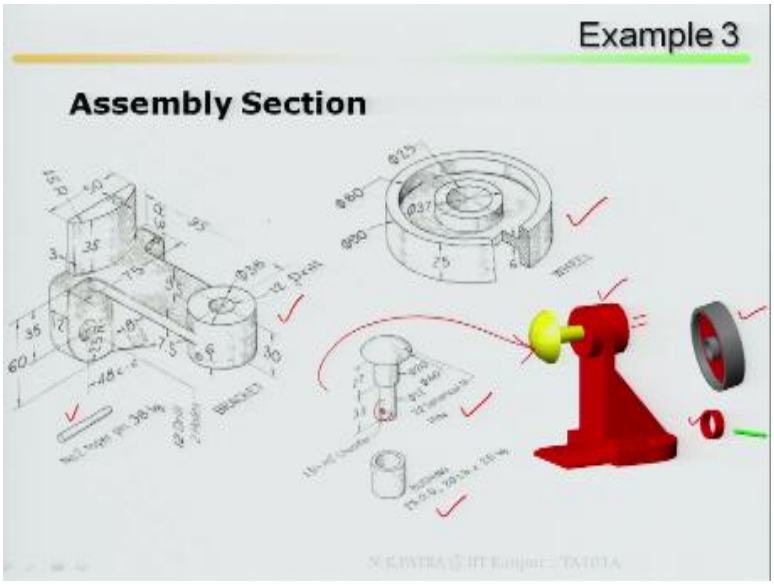

Look at all dimensions have been given, thickness is given this diameter is given, radius is given, this dimension is given, this is given, this is given, this is given and here in the pin it is given at the top or merge here to here how much, here to here how much, here to here how much and there is a pin and there is a pin and there is a pin how it looks like. Now second part of this, this is all about the just scatted part example 3, I put it with different parts. One is your bracket, first one is your bracket it has to be in stand.

Then there is a wheel this wheel has to be connected in the bracket then by means of this wheel has to be connected in the bracket by means of pose. Then once it has been connected how you are going to connect this wheel with this bracket along with your pose, by means of a pin then once you push the pin inside, then this pin has to be fixed then another pin along this hole has to be push inside. So even if the wheel will be rotate it, this pin is not going to out, this is called lock pin.

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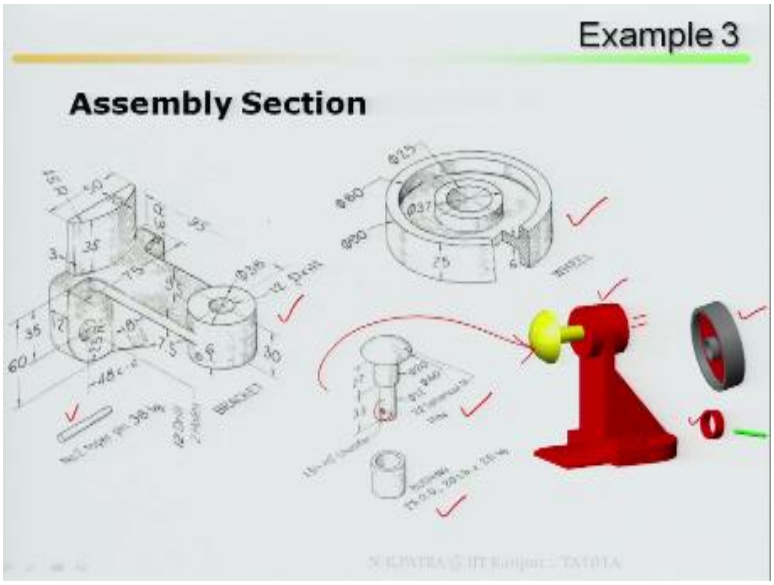

How it looks, whatever I explain here, now look at here.

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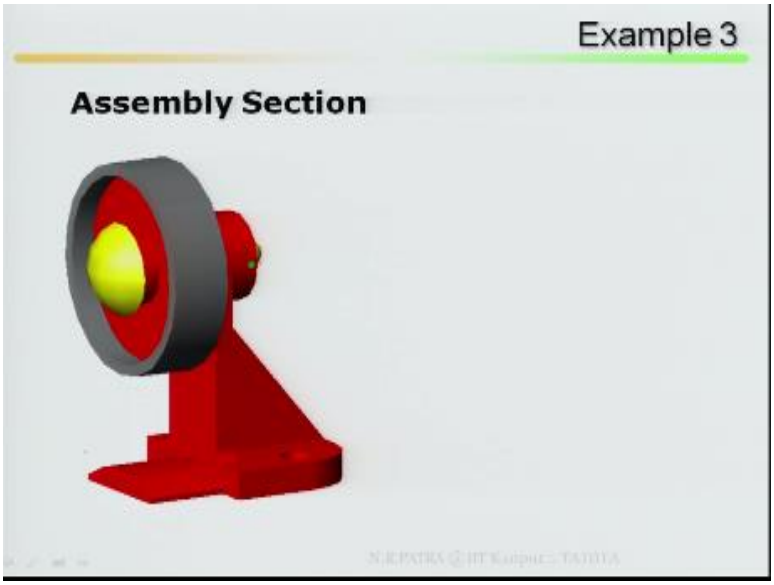

Once I assemble how it looks.

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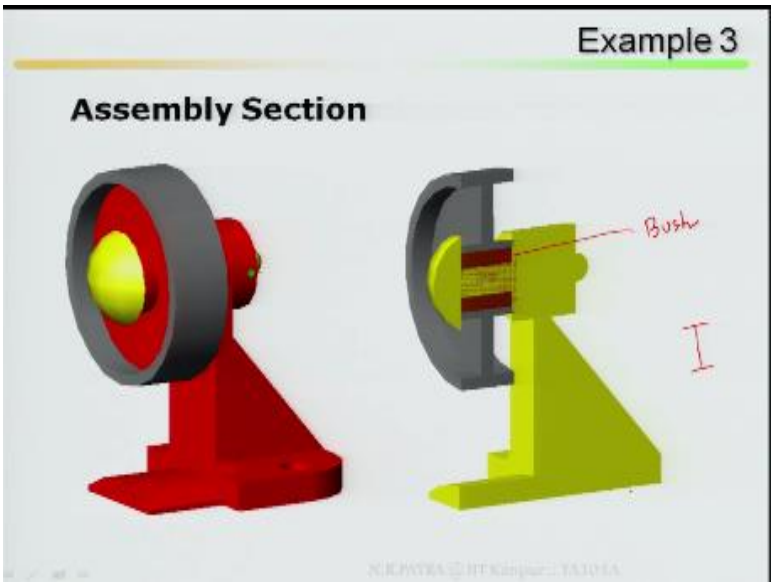

Once again bracket wheel then there is a pose, then this pin has been pushed from this side, then there is a hole along the pin as well as the pose, then there is a lock pin has been pushed. So that this wheel can be rotated, now cut it in a vertical pane imaginary plane cut it take a half and take it out by color I have shown how it looks. Look at your PIN this PIN passes throughout, now this pin passes throughout now your will looks like. Will is consist of a kind of i- section it is i-section inside. Now this is your bush, this is your bracket. Now I cut it along the vertical plane along the symmetry axis and make it to, two halves.

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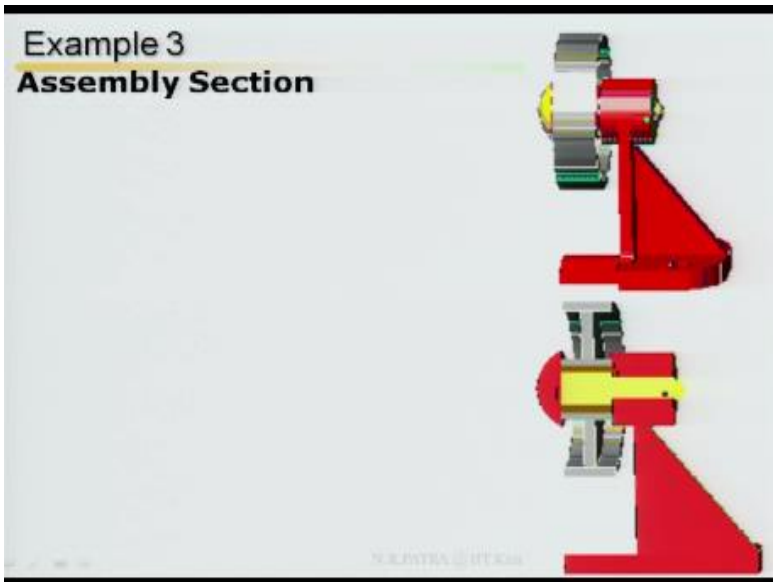

More clearly just I wrote it.

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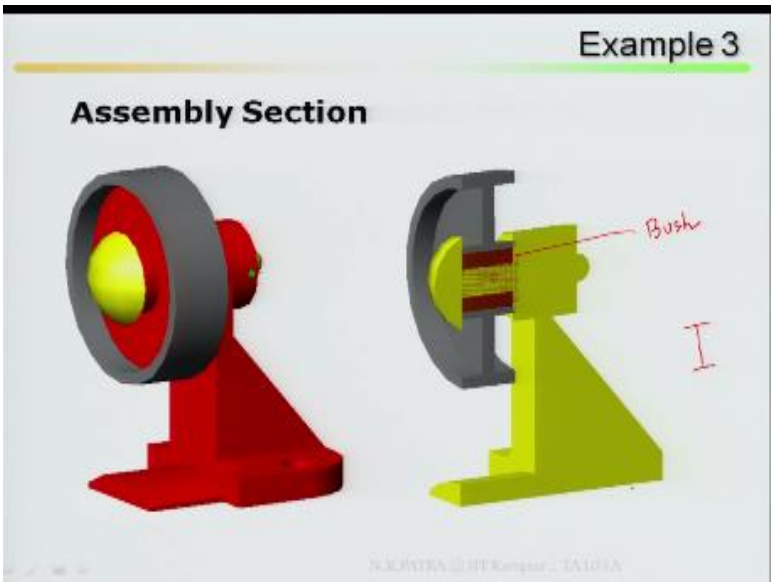

I just wrote it.

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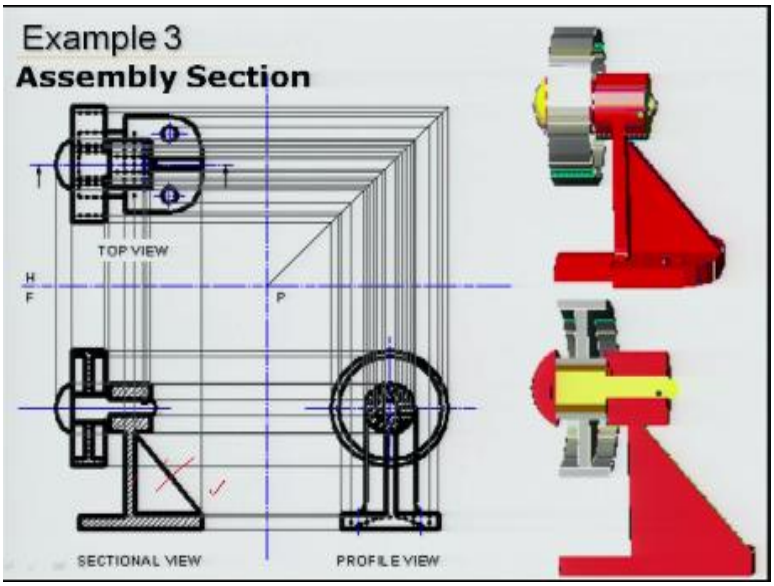

How it looks? Now pin is very clear here pin has been pushed lock pin is there, there is a bush this is a will there is a bracket. Look at your assembly top view looking at here the top view has be drawn profile view has been drawn front sectional view this is called front sectional view front sectional view. Now this is a front sectional view look at here pin has not been hatched then here there is a way.

This has not been hatched, mark the difference this is hashed this is hatched this has not been hatched this has not been hatched and look a here the pin has not been hatched highest this is your complete sectional front view, similarly you can find it out sectional top view as well as sectional profile view.

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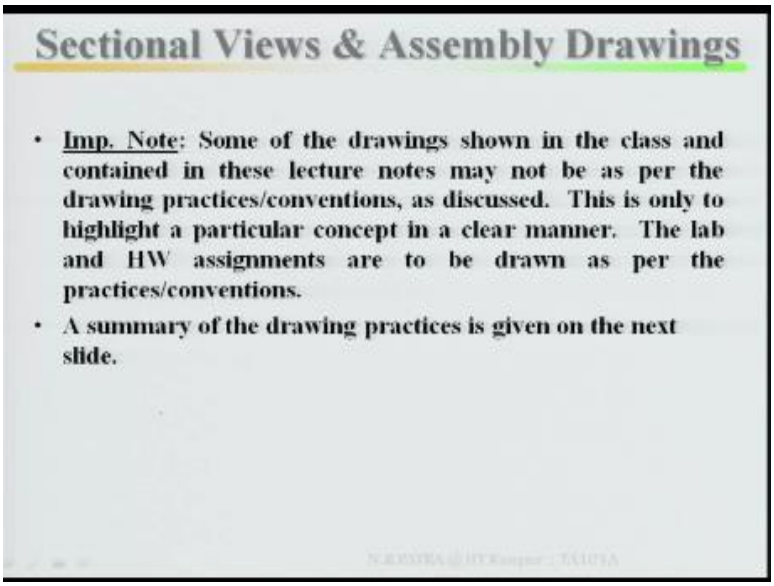
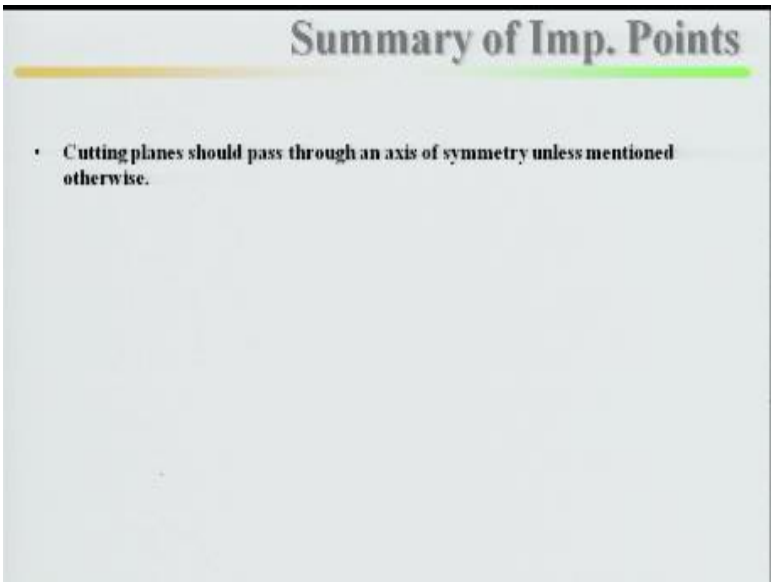


Important note, some of the drawings shown in the class and containing this lecture notes may not be as per the drawing practice or conventions as discussed. This is only to highlight a particular concept in a clear manner the laugh of course there will lab will be there then a summary of the drawing practices given on the next slide.

(Refer Slide Time: 24:21)



If you look at here this a summary of the assembly section, cutting plane should passed through an axis of symmetry unless mentioned otherwise, if it has not been mentioned that means cutting planes should pass through an axis of symmetry.

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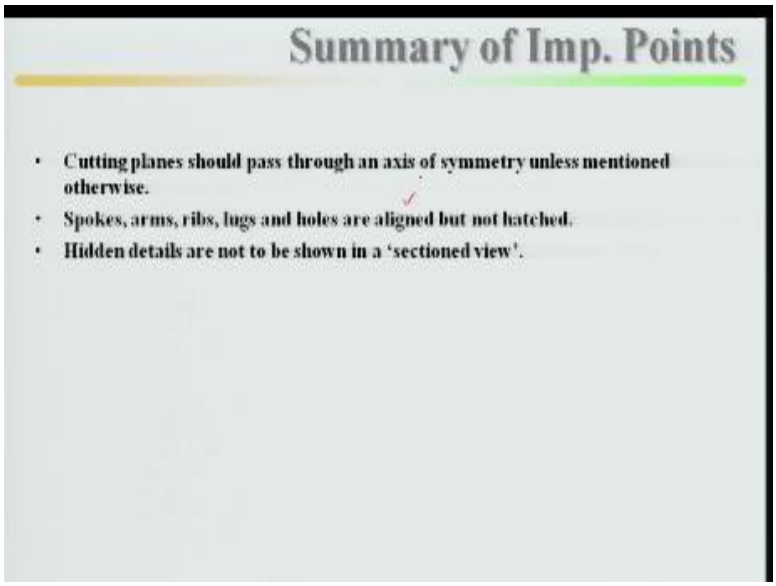

Second point is spokes, arms, ribs, logs and holes are aligned they are all aligned along this centerline but not hatched, hidden details are not to be shown in a sectional view it is not possible kind hidden details you are not supposed to show.

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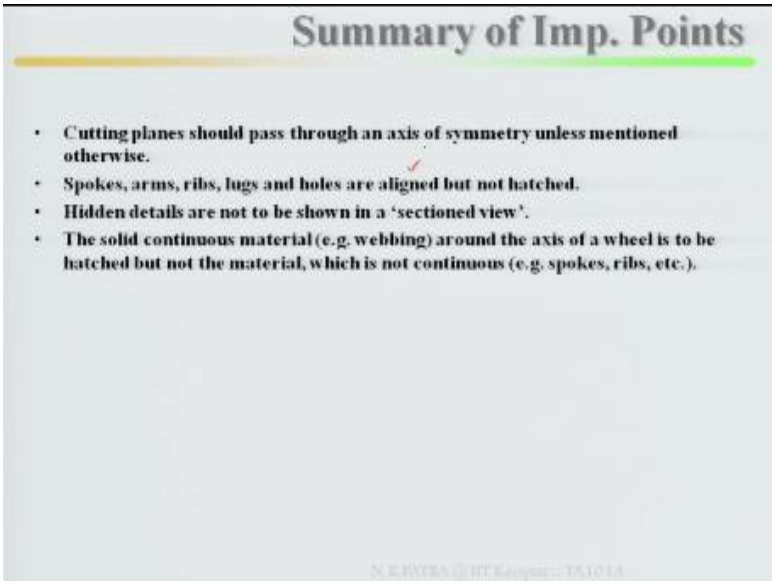

This solid continues material that is webbing around the axis of a will is to be hatched as I explain solid continues material around the axis of a will to be hatched but not the material which is not continuous, remember this solid wave are wave which is not continuous it is not to be hatched.

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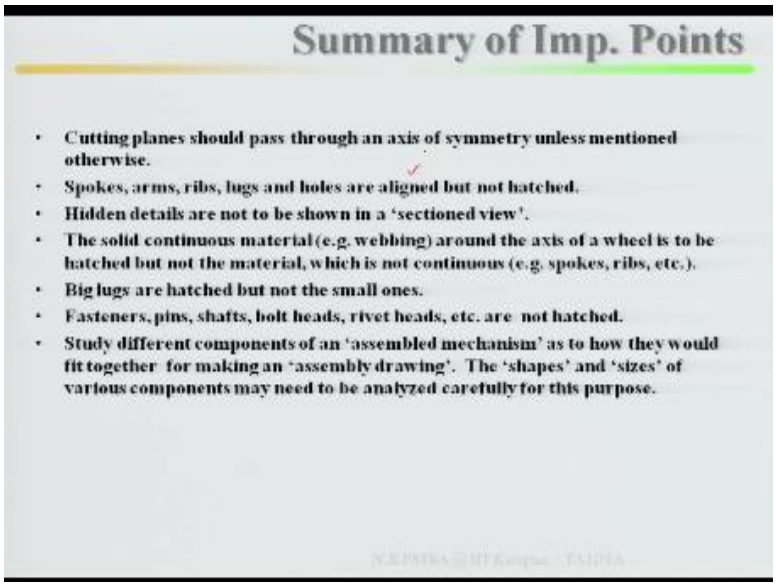

Big logs are hatched but not the small ones. Fastener, pins, shafts, bolt head, rivet heads are not hatched, study different components of an assembly mechanism as to how they would be together for making an assembly drawing, the shapes and sizes of various components may need to be analyzed carefully for this purpose, this shape and size of various companies may need to be analyzed carefully shape and size has to be analyzed first, before you assemble and then you go for sectioning, this is all about sectioning part, next class I will start missing line and missing views, thank you.

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