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

Lecture – 15
Oblique Projections-Part-III

by
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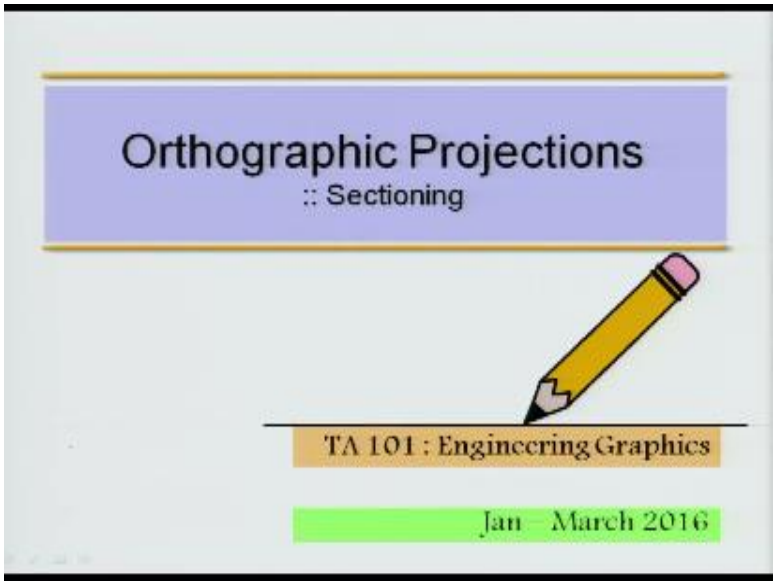

So we will start orthographic projections sectioning.

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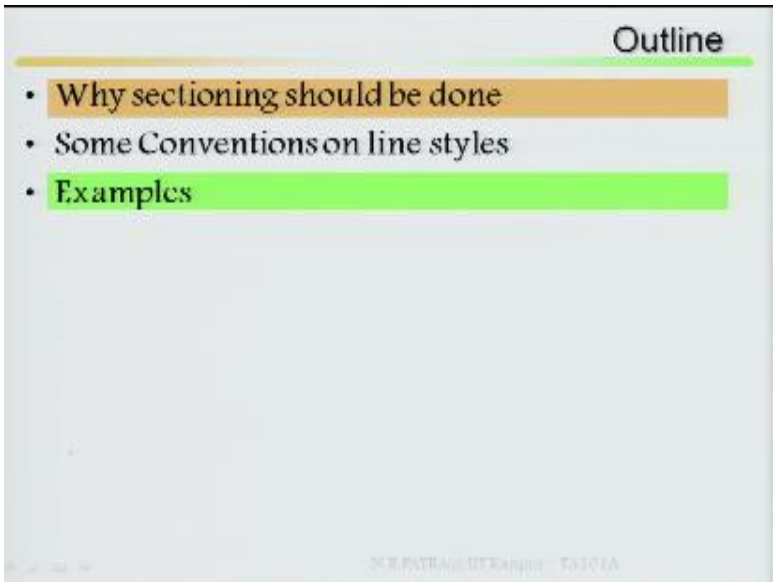

In this chapter why sectioning should be done outline, some conventions there been atleast there are some conventions on line styles and few examples how to do sectioning. Let us start with this basic part of the sectioning, sectional view.

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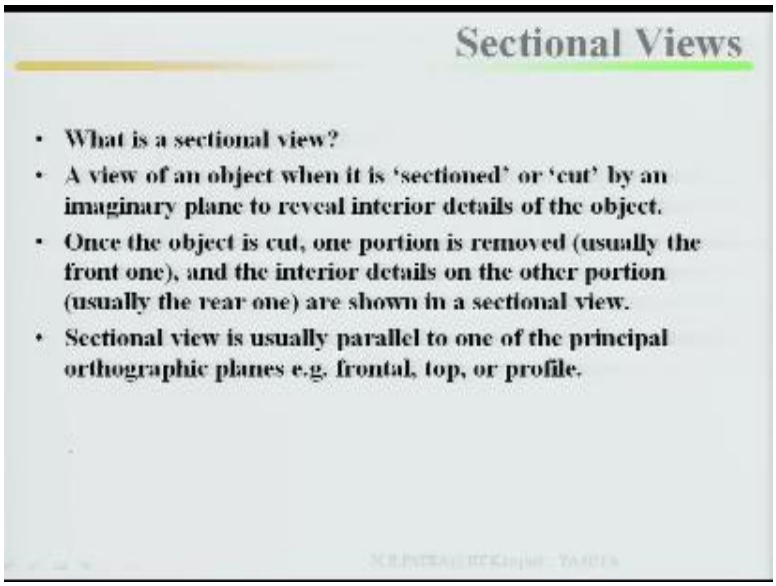

What is a sectional view, first question you asked what is a sectional view? A view of an object when it is sectioned or cut any object, when it is sectioned or cut by an imaginary plane to reveal interior details of the object. Once the object is cut, one portion is removed usually the front one. The interior details on the other portions usually the rear one are shown in sectional view. Sectional view is usually parallel to one of the principal orthographic planes.

Remember third one sectional view is parallel to one of the principal orthographic planes that means frontal plane, top plane or profile plane. So basically sectional view if I summarize with this sectional view has been done to look at the interior parts of the object, interior parts what is inside you can cut it any of the plane and take out the front part then you can visualize and do the sectional drawing.

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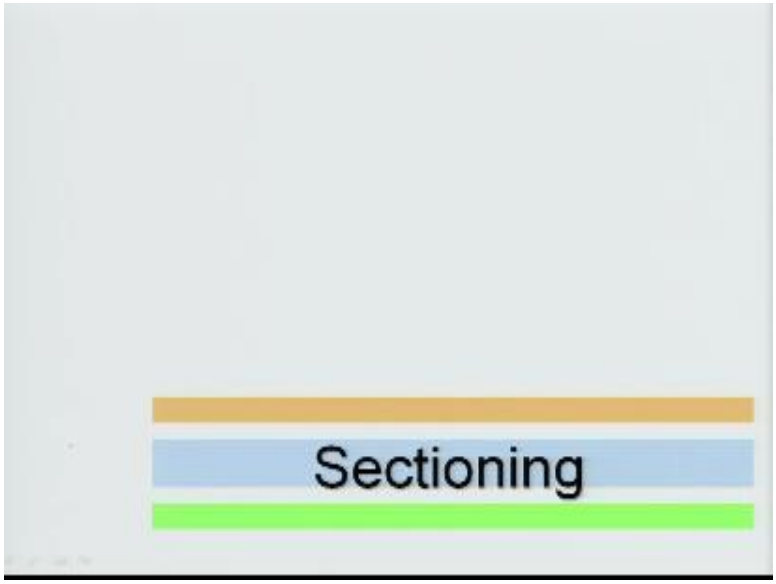

Sectioning.

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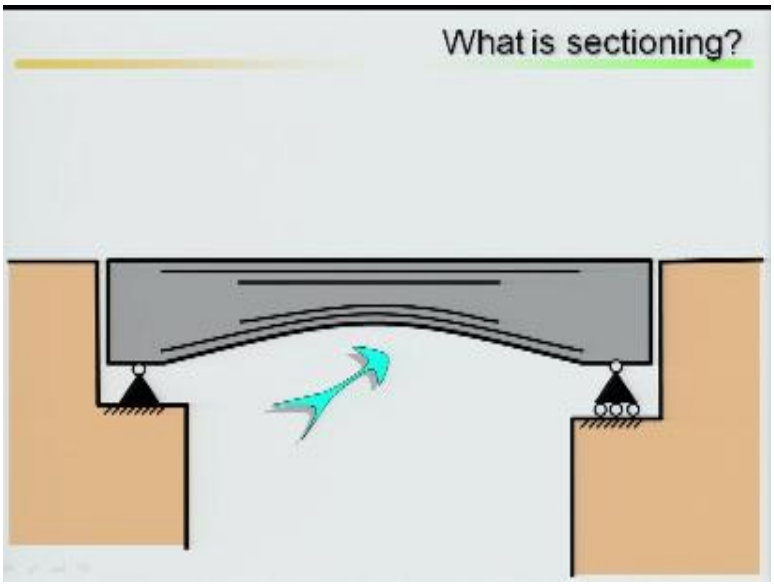

Let us start with simple example a bridge is there, then a beam or rider is there with a roller as well as support, roller support as well as a hind support.

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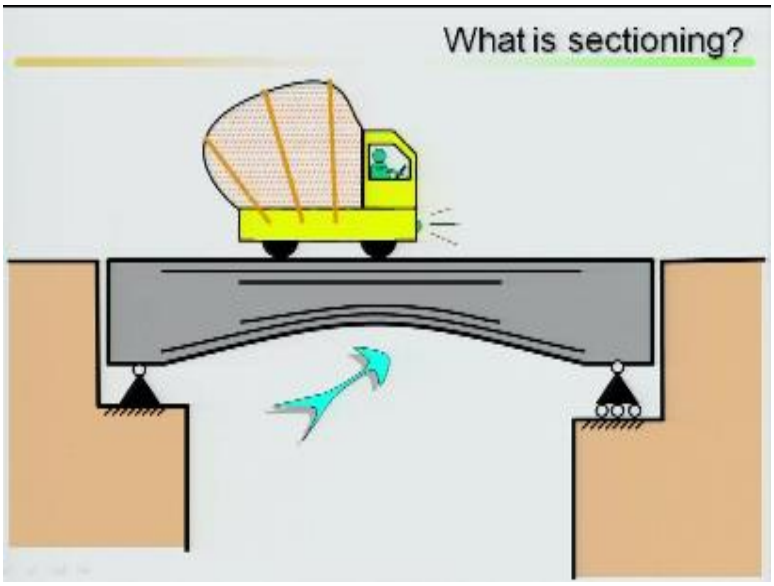

Look at here, it has been constructed a road or maybe communications passing through one end to other end.

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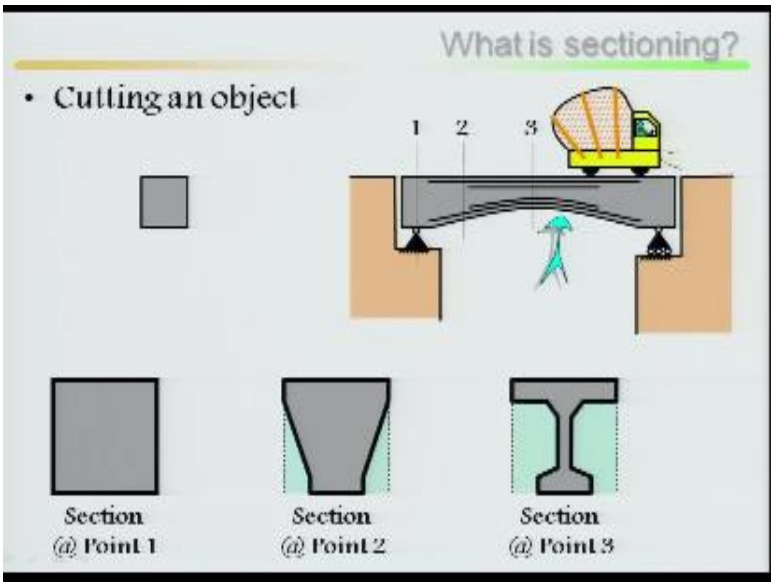

If I take it cutting an object this is your object, this beam I want to cut this object at different sections. Outside it does not look good, if I cut it look at here section 11, at these section, section 11 how it looks. The section 11 section is simple, rectangle or square section 11. Come to this section 2 at point 2, I can write it 11 at point 2 I cut it, look at there, section 22, look at this how it looks section 22.

Then go to the section 33, how the beam section changed from the both the ends simple support, a roller or hind support from one end to other end, simple rectangular section or square section to it go to the I sections on section 3. Unless if you are not going to do or show this sectioning the designer cannot understand what is there inside. This is the basic features required as far as section is concerned.

So each if you feel, if you think in a beam there are different materials at different sections then we will have to go for sectioning at different planes 11, 22, 33 I can do it 44 in this case. But in this case we have taken symmetry, because the sectioning 1, 2, 3 what is there this material other side if I take the symmetry other side it will be same at that interval.

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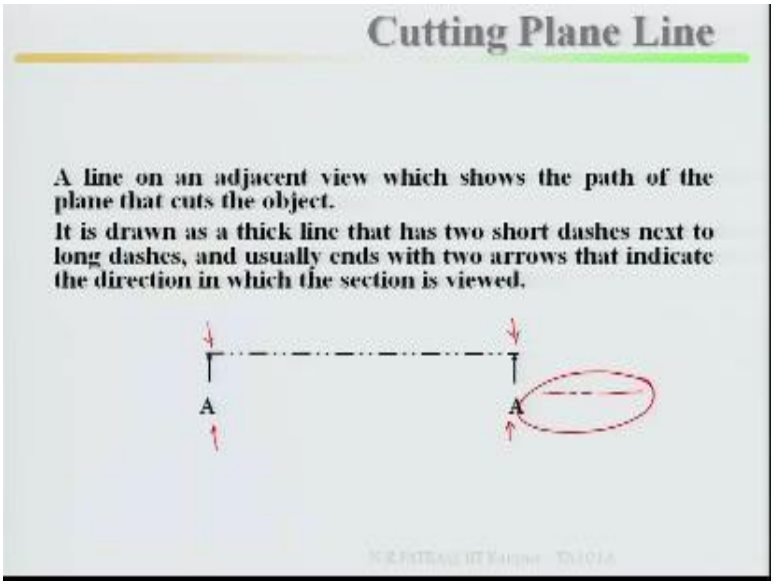

Then once sectioning is over them cutting plane lines, cutting plane. A line on an adjacent view which shows the path of the plane that cuts the object. Just I am just reading it, you just look at it. It is drawn as a thick line that has two short dashes next to long dashes. And usually ends with two arrows that indicate the direction in which this sectioning is viewed. If there is a object, generally what we are going to do it says two short dashes next to long dashes, this is long, one short, second short dash then another long.

It has its own meaning, if I show this it means the object has been sectioned or cut in that line or in that plane. Once I show this arrow, once I show this arrow this arrow means object has been cut or sectioned in this way forward. If I show this arrow in this way object has been cut downward directions.

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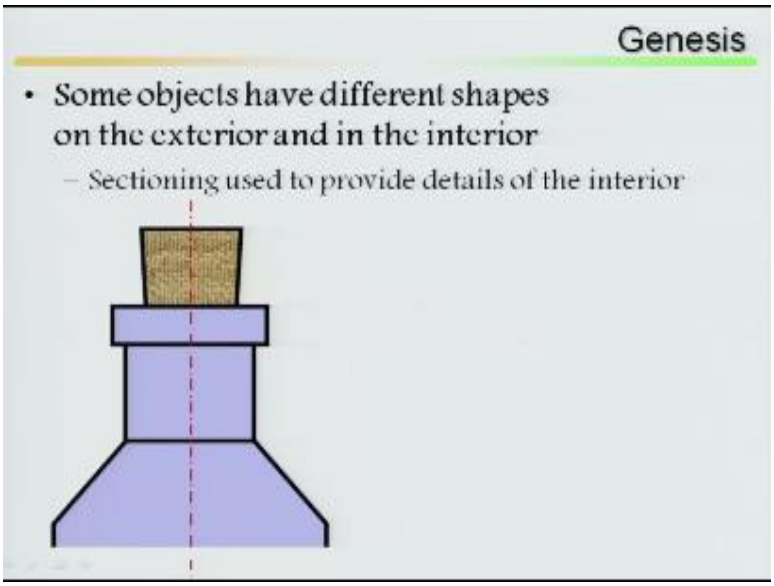

Let me go to the next section. Genesis, some objects have different shapes on the exterior and in the interior. If you look that here, there is a bottle and there is a cork. So exterior this is a bottle or maybe bottle made of glass or maybe steel this simple bottle, preserve your water or chemical. Then at the top there is a cork that means two different objects here the object is different material wise your object is different.

Sectioning used to provide details of the interior that is our first principal which should cut it, you should know what is their exact inside.

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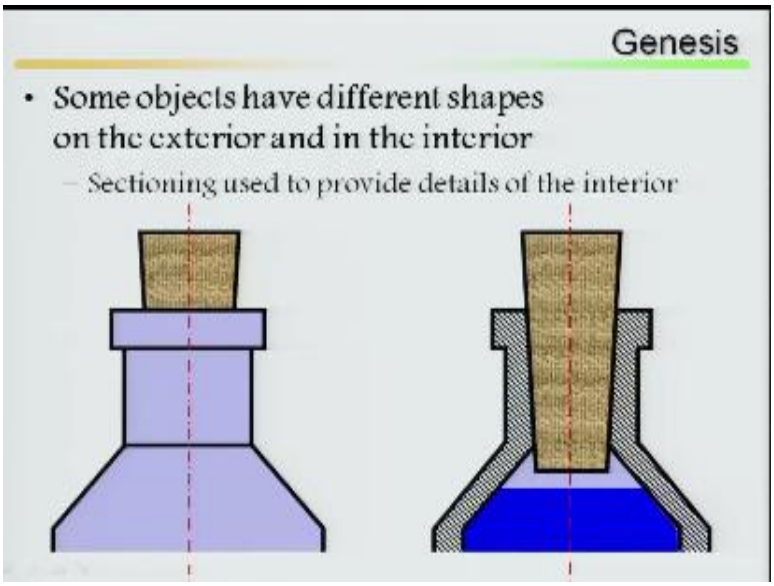

If I cut it longitudinally, if I cut it longitudinally then I am able to know if there is a cork how far it has gone inside, what is its depth inside this bottle. So outside it doesn't reflect anything, but if I cut it at longitudinally looked at their – the cork has been penetrated here or pushed inside up to this depth here. So this is what you are going to show in sectional view.

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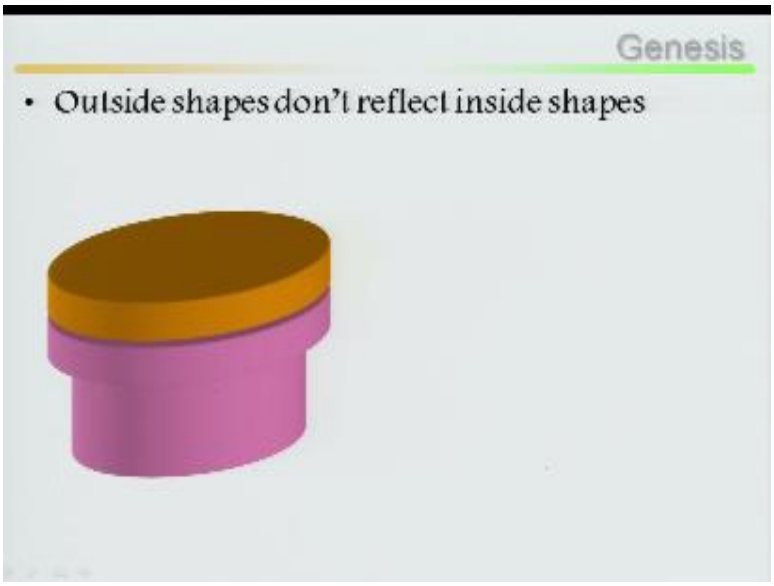

Second point is outside shapes do not reflect inside shapes, looked at here outside how it looks cylindrical shape cap is there, at the top there is another cylindrical circular feature is there.

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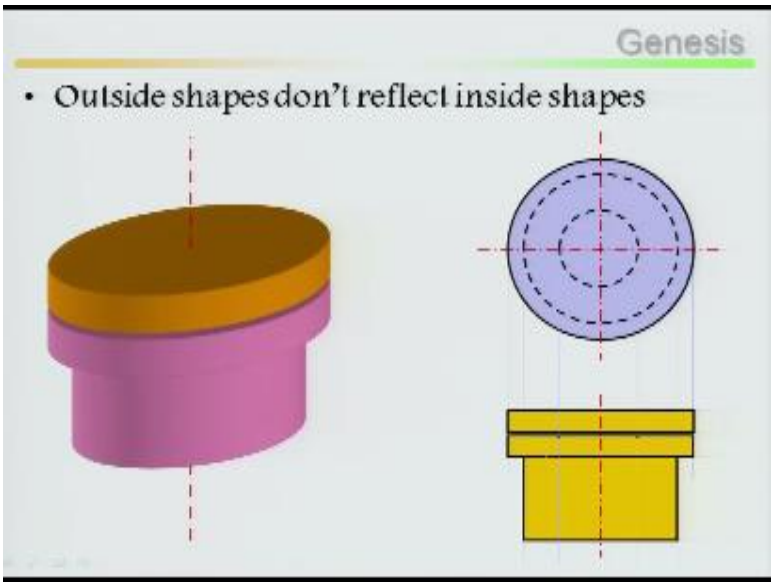

Then if I cut it longitudinally how it looks.

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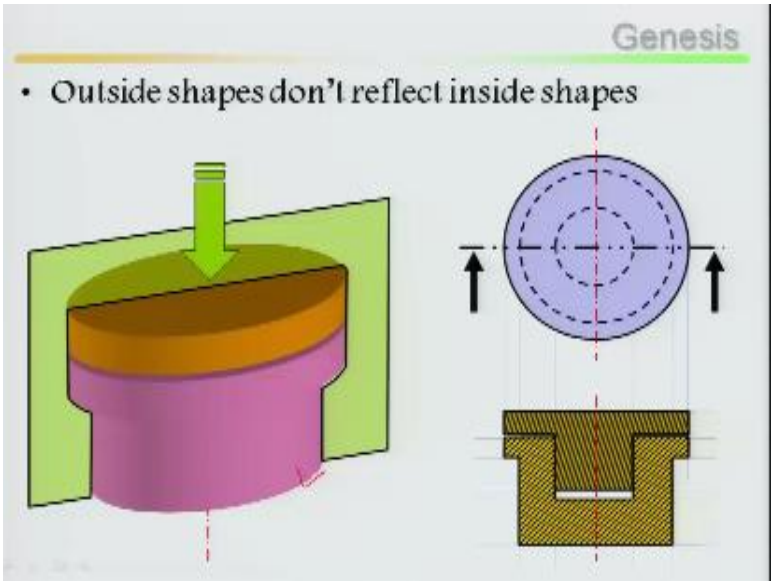

Let us cut it longitudinally along the arrow make the half, do the sectioning. Now once do the sectioning you can imagine this is not the thickness throughout, outside cap is not thickness throughout there is a thickness, then there is a cover narrow down then it has been pushed inside. Again in this case there is a gap at the top, so it is a air tight or maybe tighten from the top it has been pushed. So it reflects inside shape of the object.

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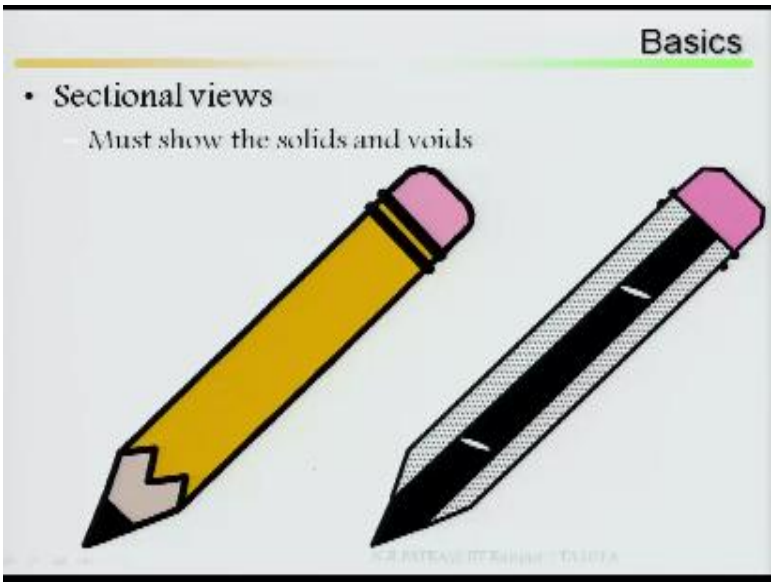

Sectional view you should show this solids and voids, simple pencil if you take it, simple pencil. Pencil is made of what? Simple example, solid covered by wooden lead covered by the wooden. So wooden is a different material, lead is a different material lead has been covered by this wooden and there is cap backside sometimes pencil cap is there, there is a simple pencil this is a wooden and here I can see the lead whether this lead is throughout or not I do not know.

And there is a cap, if I cut it then I can find it out this lead is throughout and there is a wooden, then this is your cap, this is your basic.

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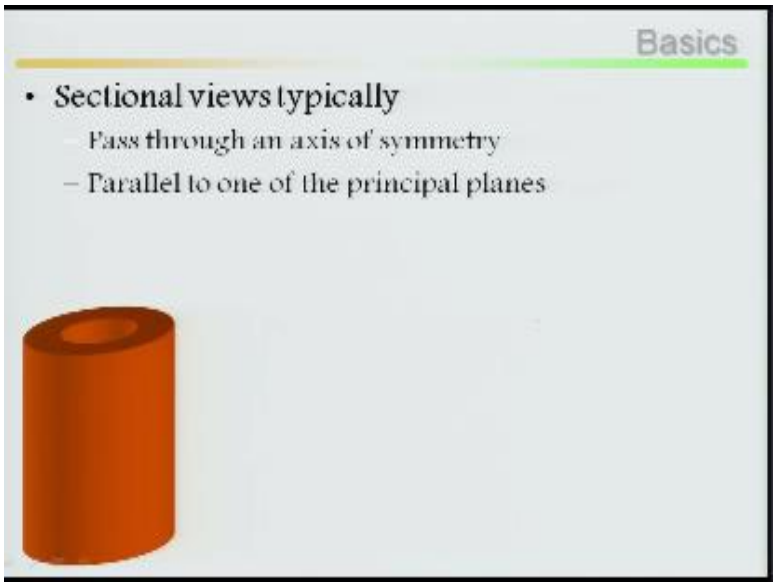

Sectional views typically pass through an axis of symmetry as far as possible pass through an axis of symmetry parallel to one of the principal planes. I have said in the beginning parallel to one of the principal planes.

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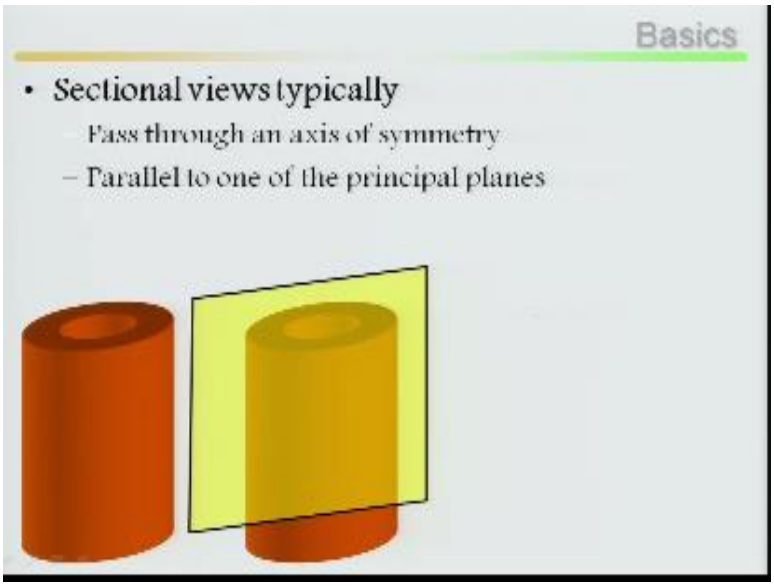

This is in frontal plane, if I am looking from here frontal plane otherwise you can say X, Y or Z.

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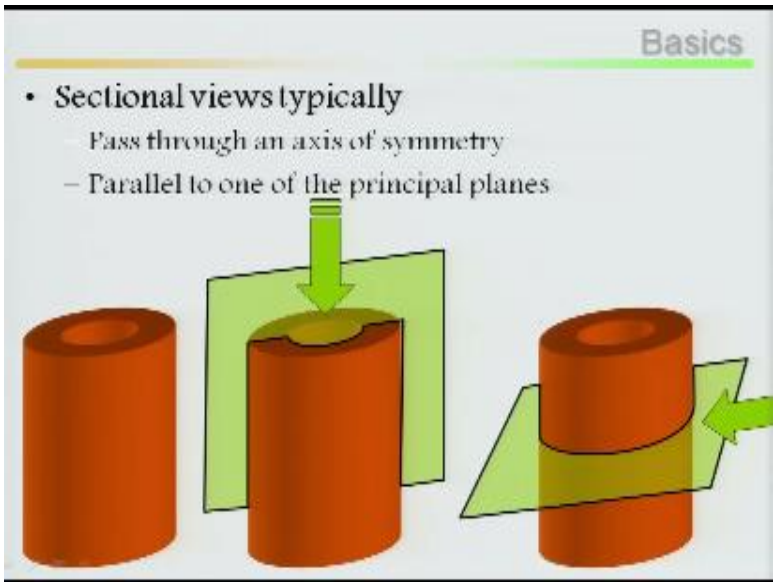

Then this is at your top front view that was longitudinally you cut it, make it longitudinally two parts first one, so that you can see in front face what is inside. Then at the top you can cut it, top you can cut it at the top or maybe at the middle, I can cut at the middle. So parallel to one of the principal planes.

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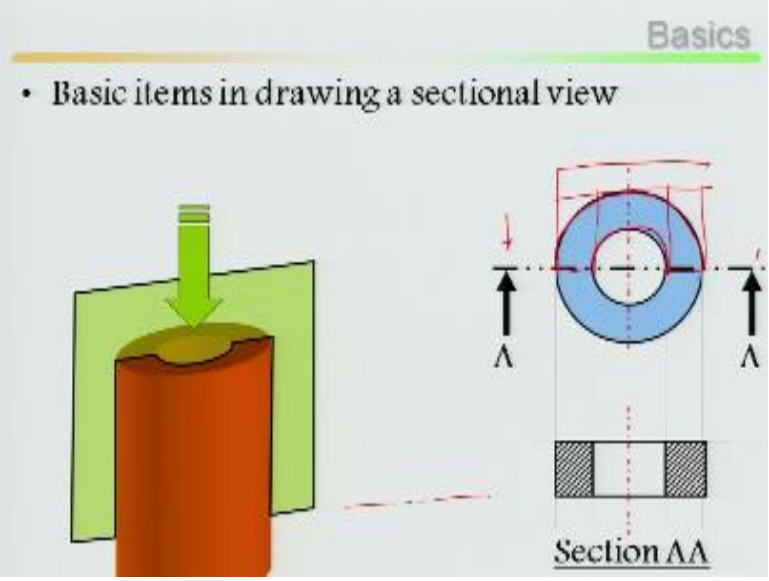

Basic items in drawing a sectional view, what does it mean? I cut it longitudinally then want to show what is the basic material, how the material has been made. This material is throughout solid or hollow or some part is hollow again throughout the solid. Unless if you are not cutting it and looking it inside you cannot define it. Sectional view at AA, in this case what happened, longitudinally it had been cut from the top view.

This is your top view and longitudinally you cut it, then what happen once you cut it this part you have taken. If you look that here, the arrow mark again it has been shown, one dash, small dash again small dash other dash. This shows your sectioning, this line shows sectioning. Arrow A at AA that means this part after sectioning I will take it out. I cut it in longitudinally then once the sectioning is done I will take out where I am looking at.

If I am looking at from this side, this side I will take out that part. So, because the arrow shown at AA and this is your sectional plane, so you cut it and take out the front face, then you look that. Once you are going to look that you are going to look this surface here, here, here and here. This part you have taken out, then once you look that how it looks, you are looking from this side front, then what will happen this will all merge.

This is what this point to this point, this point to this point, this point merge and there is a gap. This is your hollow sections that means it is throughout, because you cut it longitudinally. Then you can show that what is this material, this material is made up of wooden, steel, concrete there are different construction shapes, you have to mark it, so that very easily somebody can say, oh! This material after looking at this arrows this material is made up of this.

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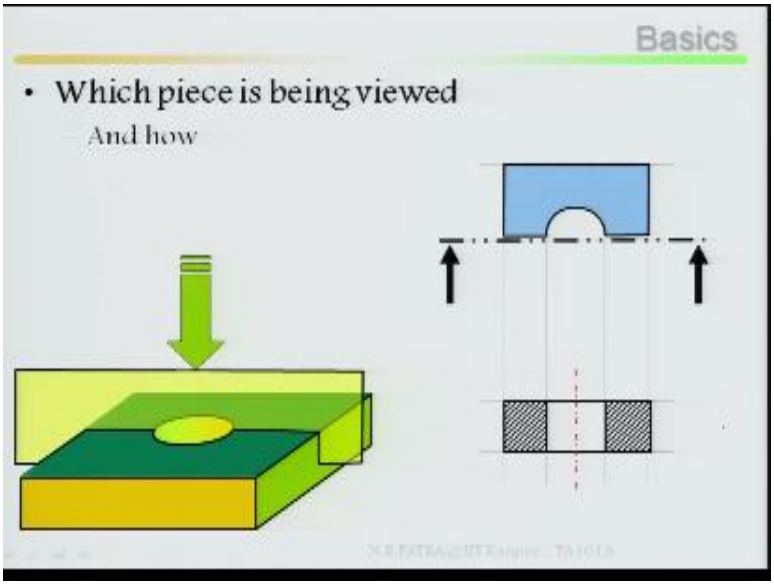

Which piece is being viewed, that is again important. Looked at this which piece is being viewed I have explained last slide and how. Sectioning has been done longitudinally look at this, it has been cut it then you take out, you take out this part then look that from this side, then how it looks.

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Types of sections, there are different norms as I said, there are different principles, different norms, how to do sectioning full section.

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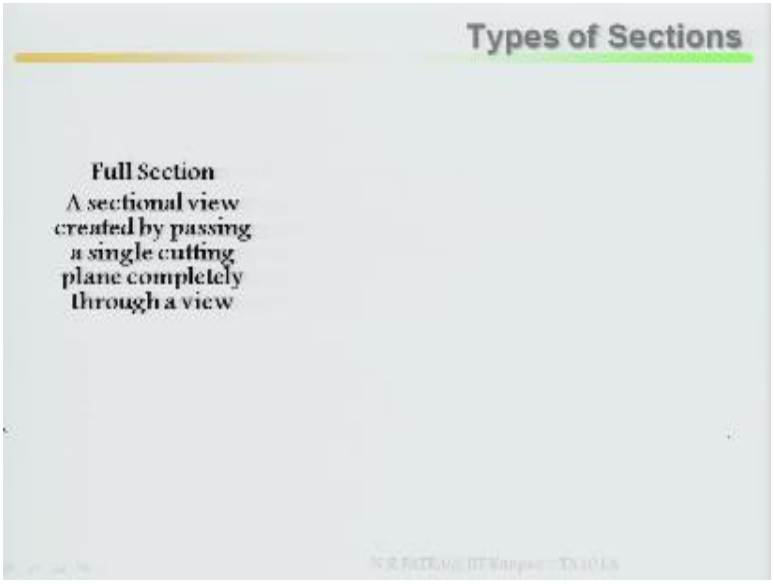

In full section a sectional view created by passing a single cutting plane, a sectional view created by passing a single cutting plane throughout or completely through a view, any of the view single cutting plane in top view or cutting plane passes entirely across the object that is called your full section.

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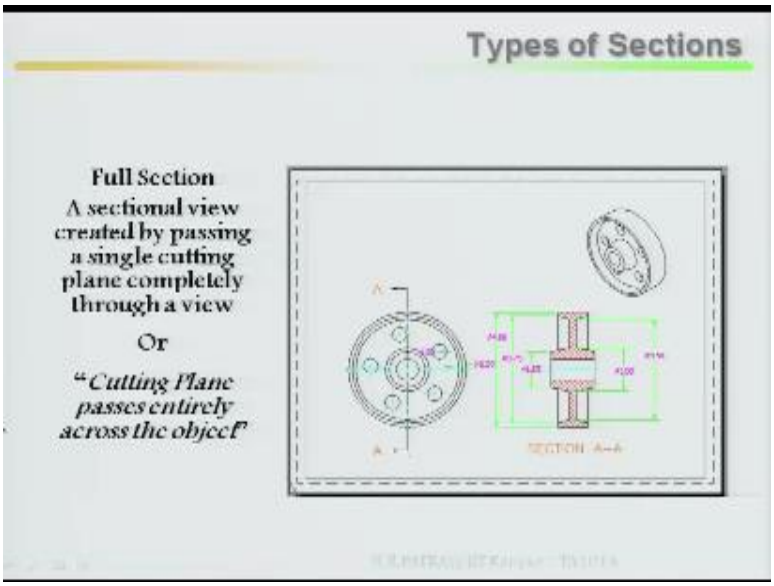

Look that here, in this case cutting plane passes through the entire object. Entire object so I can see what is inside this entire object.

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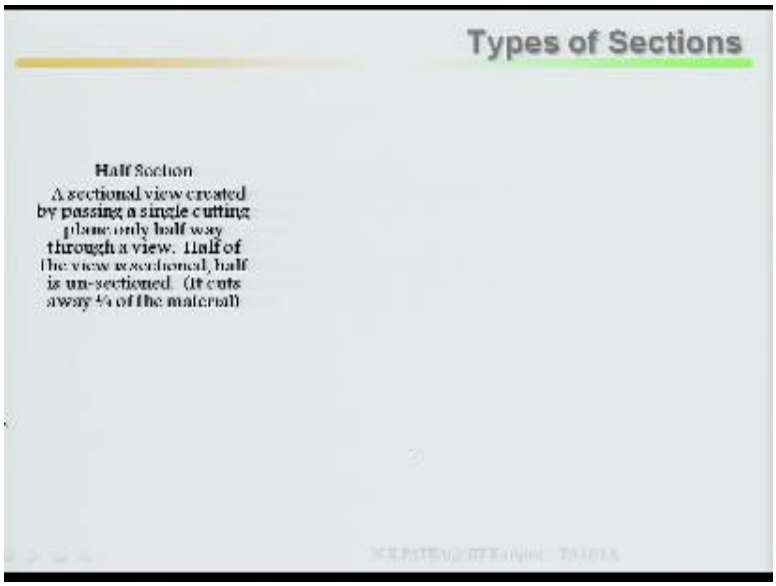

Half section, first one is your full section you can show, second one is your half section. A sectional view created by passing a single cutting plane only half width review, only half width review or cutting plane is imagined to extend half way across then forward.

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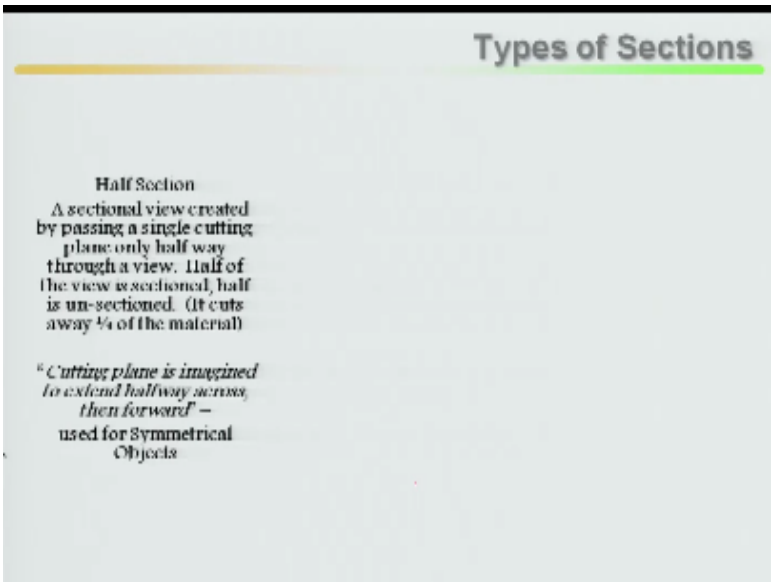

Use for symmetrical objects, particularly why half of the section if you do, one half whatever the material is there, second half or the other half same material will be there, if it symmetry not necessarily so the entire sectioning rather used half of the sectioning.

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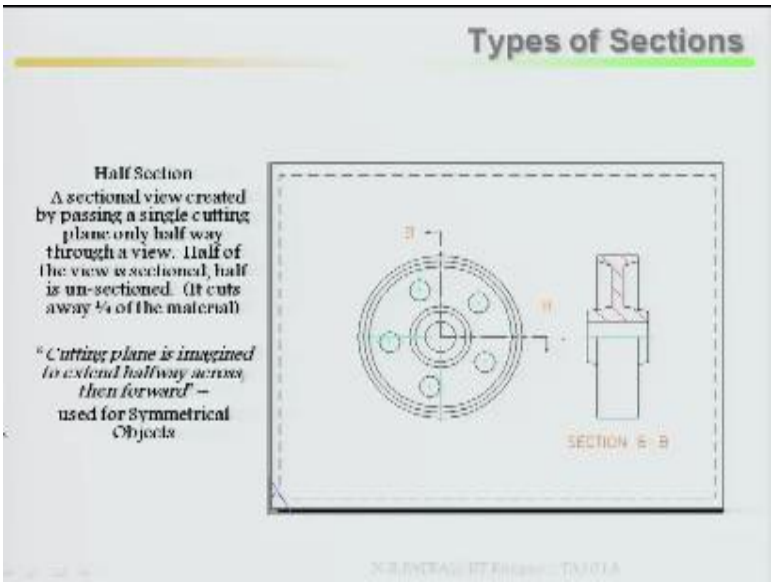

Earlier I have shown full, in this way it is full now I am making it half.

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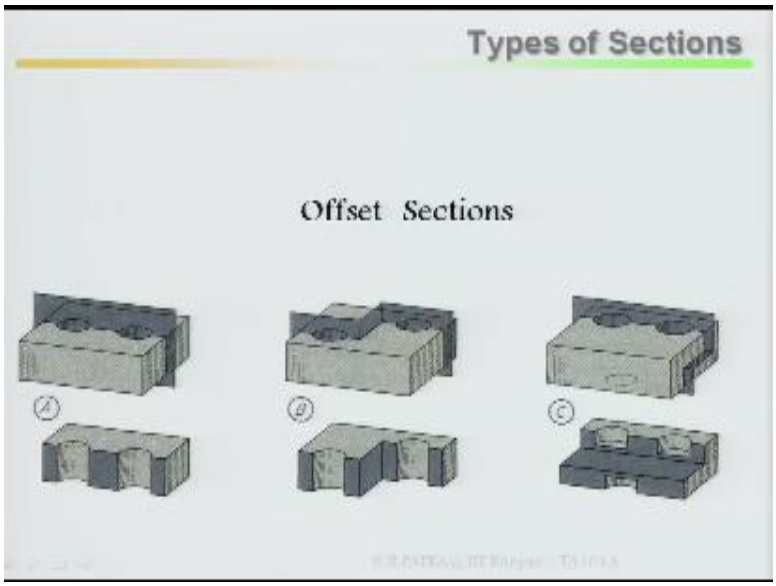

Offset sections, full sectioning, half sectioning then offset sections. What do you mean by offset sections look at the object AB just C just visualize A, B and C if you look at the object A in this case the holes are equal distance and aligned in the same line or simply plane particularly case A so if I take a plane in such a way that it makes the object half and the plane passes through this holes at the middle then I can see what is inside the hole the hole is throughout our half of the whole or anything case two if you come to the case two there is a hole here slightly towards another hole is there slightly towards the rear side one is at the front side other is at the rear side.

The offset sectioning is required in this case first the plane first in the hole at the center of the hole then take perpendicular to this so that sectioning in continuing second part of the hole how it looks the section B at point B here, here, here, then example 3 are object C there is a hole there is a hole at the rear end there are two holes rear end and front end there is a hole which is not throughout, which is not throughout, which is not throughout from the bottom it is up to here but top you are not seeing so that is why this a dotted line so you start a section plane like this got top mark then again take it back and got it if you looked at here I can see rear side as well front hidden holes this is called offset section so that all the hidden part can be taken care inside furthers can be taken care.

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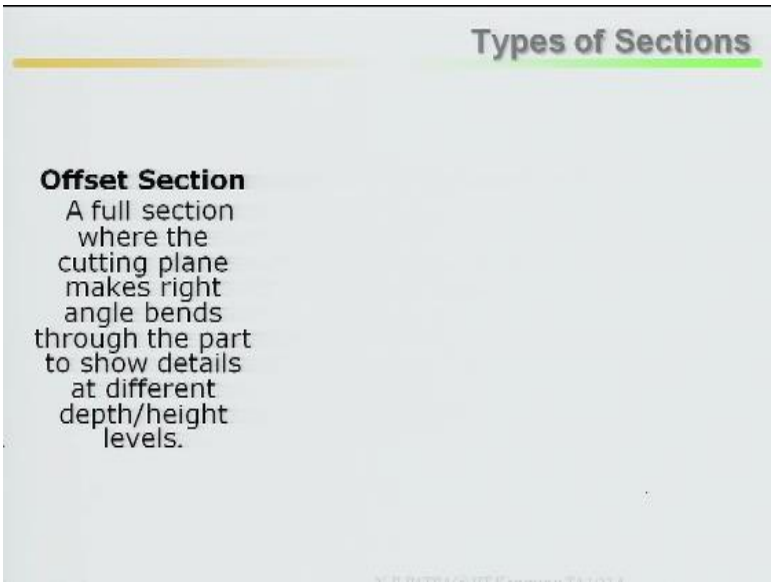

Offset section a full section where the cutting plane makes the right angle bend through part to show details at different depths height level remembered this one to show

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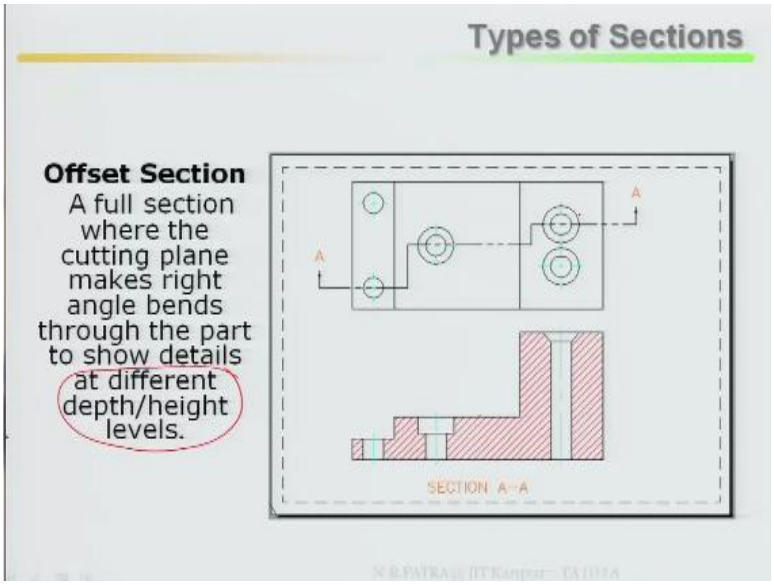

Details at different depth or height level different depth different depth or different height level if I put in this directions x, y and z this is my width this is height this is depth so offset sections advantage is you can show the parts different depth as well as different height levels looked at here top view of the object how the section plane of the section has been chosen top view means this is your top view means depth and width no height depth and width got it perpendicular so all inside furthers we got in looked at it how it looks.

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Rotated or removed sections be careful this has been used particularly mechanical or mechanizes rotate or remove sections take one examples

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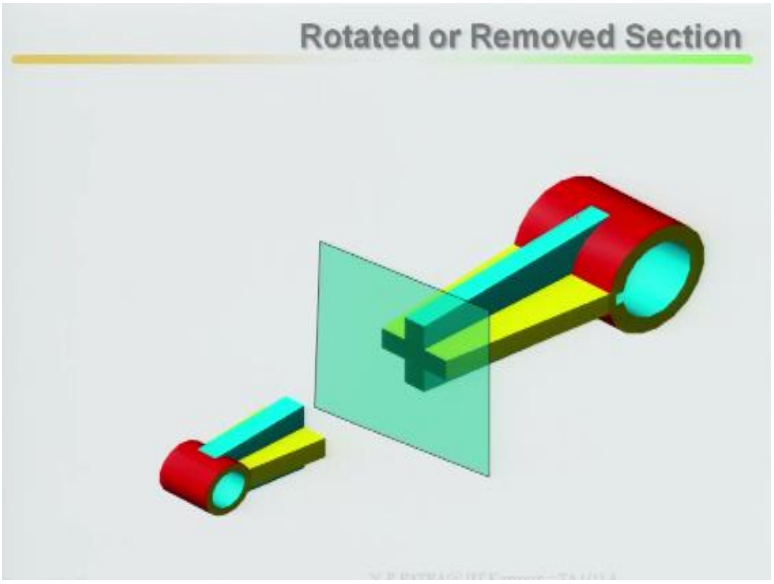

Take one example I cut at the middle I cut any of the middle how it looks there is square shape there is a t shape both the ends it looks like

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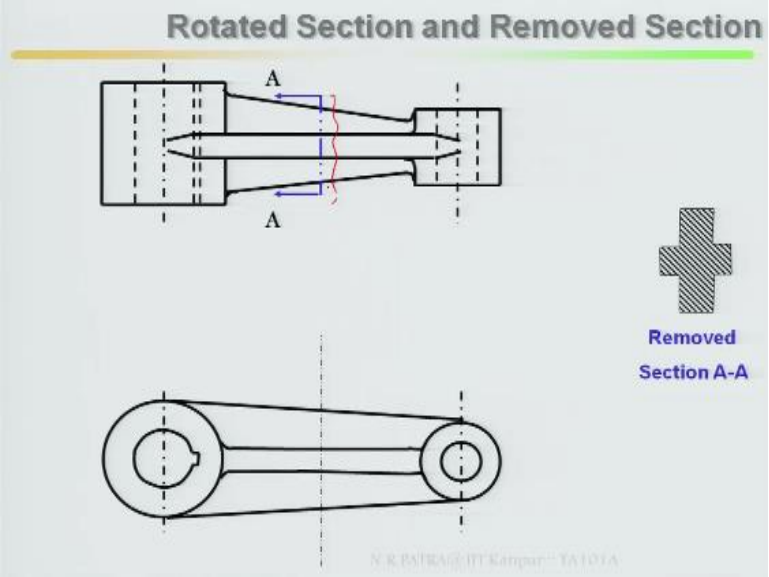

Now how you are going to provide it this is your top you then you mark the arrow where you are doing the success this is your section then mark the arrow that means what does it mean you will take it out and looked at then this is the front part front view then take it out take it out separate it out both the part at the middle you are seeing at the section you are seeing both sides this is view take part by part of part then how it looks it looks like this then at this particularly at this sections how the object looks it has been rotated not like animation I have shown but rotated means you can see both front and as well as rear whether it is same or something different.

right rear front real rotated sections then take this external view out removed sections then this is your sectional view at A,A then draw it somewhere else what is it mean this is rotated removed sections at A,A showed separately so this is required particularly machines and mechanical engineering one by one part planes wave connected and what is their inside this is varying sections varying eye beams varying eye sections varying t sections this is.

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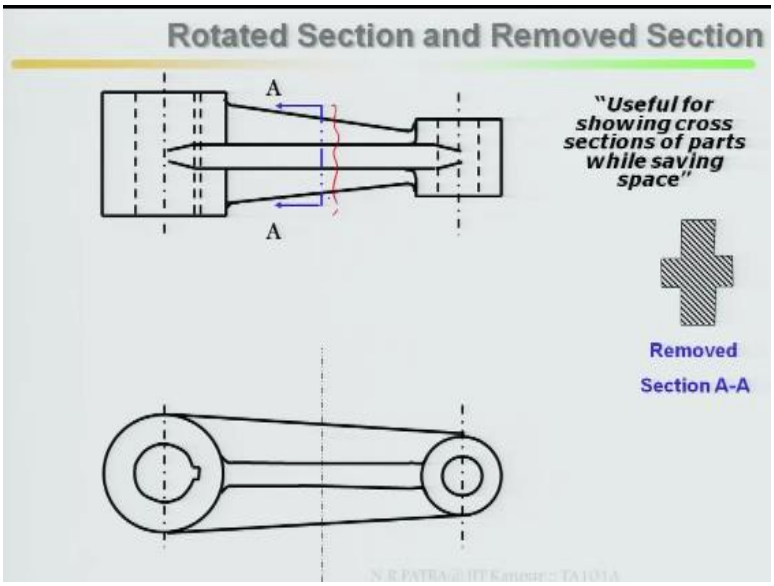

This is almost aerospace mechanical civil engineering also this rotated sections and remove sections are very much useful for showing cross section of parts while saving space while saving space.

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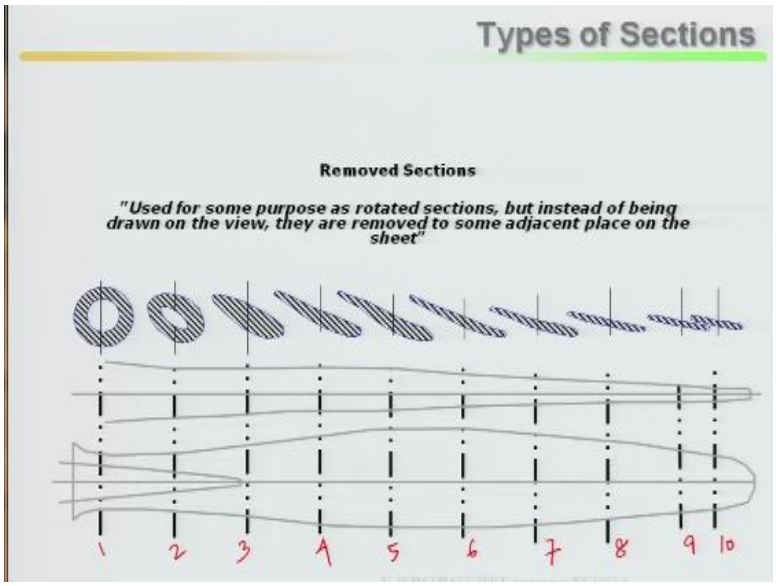

Type of sections removed sections used for some purposes as rotated sections but instead of being drawn on the view they are removed to some adjacent place on the sheet looked at the remote section that was your rotated sections 11 let us say this point 11 let us say this site 22 how the section is varying if I write it 1, 2, 3 then 4, 5, 6, 7, 8, 9, 10 an object how this varying inside 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 it is consistently are continuously varying from 1 to 10, so I cut it and remove the section and showed it outside at 11you can say at 11 at 22 at 33 at 44 at 55 at 66 at 77 at 88 at 99 and at 1010

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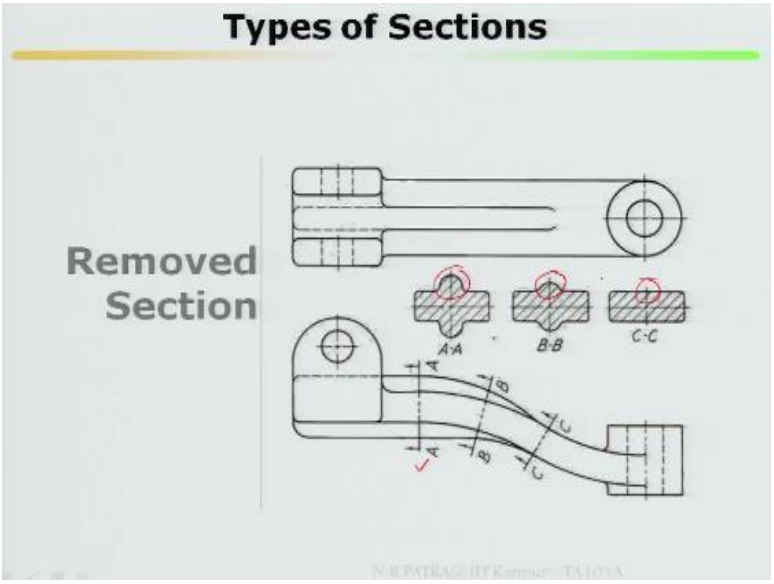

one more example removed sections look at this object top and front view and it has been made at A-A, B-B, and C-C how section it look like at A-A this sectioning as been done they can and sectioning sectional view has been drawn here B-B sectional view has been drawn C-C sectional view has been drawn looked at it how it is varying from section A-A, B-B and C-C in C-C while reaching from A-A to C-C this part is slowly, slowly managed.

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Another one is your aligned sections I am going one by one types of the section first one is your full section half section then offset section then rotated or removed section then your aligned sections a sectional view where the cutting plane changes directions.

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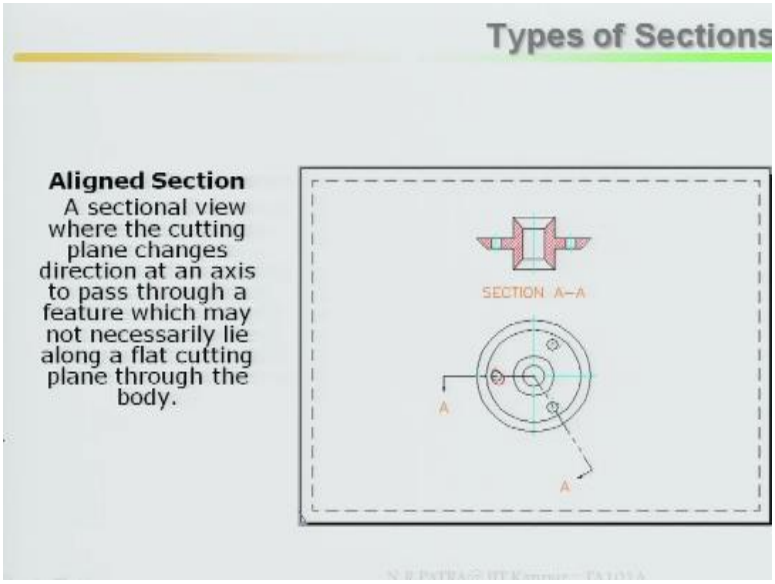

Our direction at an axes to pass through it picture which may not necessarily lie along a flat cutting plane through the body aligned sections you see what happens if you looked at here if am putting is sectional plane here this part lying in this body but if you looked at her if I am cutting this part is missing this part is missing so I take it and align where the other part is there.

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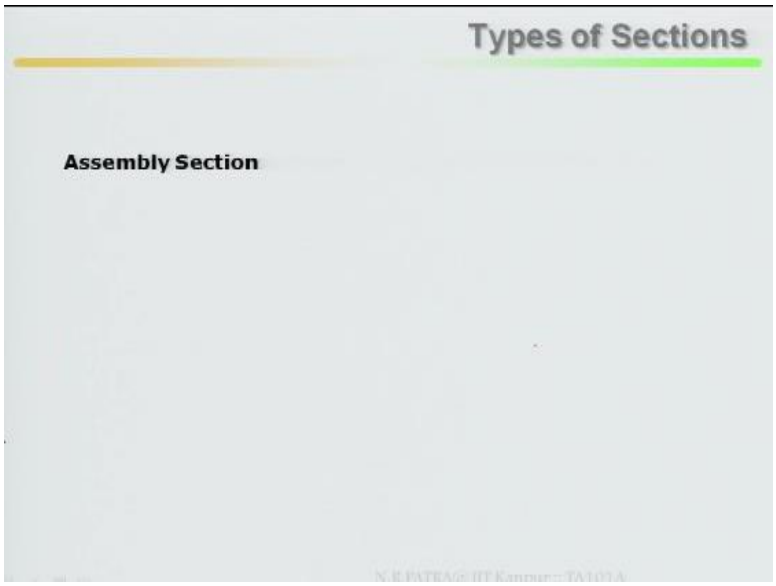

Another one assembly section assembly section basically this is primarily per automobiles mechanicals aerospace off course civil engineering so assembly section means there are different types of objects in different materials so this material has to be first assemble circle cube different shapes assembles and prepare only one object so first you assemble it then take the section, section vise then so the sectional view looked at the example.

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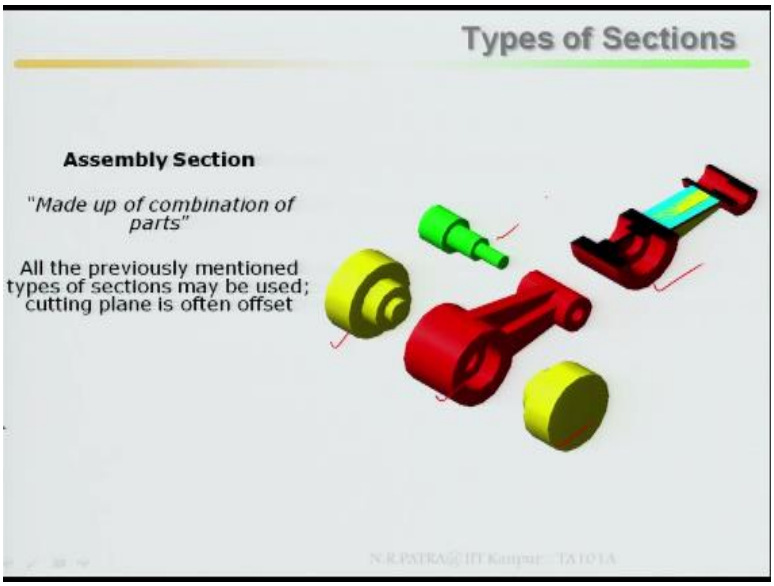

Made up of a combination of parts different parts all the previously mentioned types of section and may be used most important part there are two points one is made of combination of parts different parts all the previously mentioned types of sections may be used cutting plane may be used that means full half offset rotated it all this extents whatever as been discussed may be used looked at here different parts, part 1, part 2, part 3, part 4, part 5 so it can be connected it can be joined first so this would look like one object then you can you can go for section so how many types of this sectioning now.

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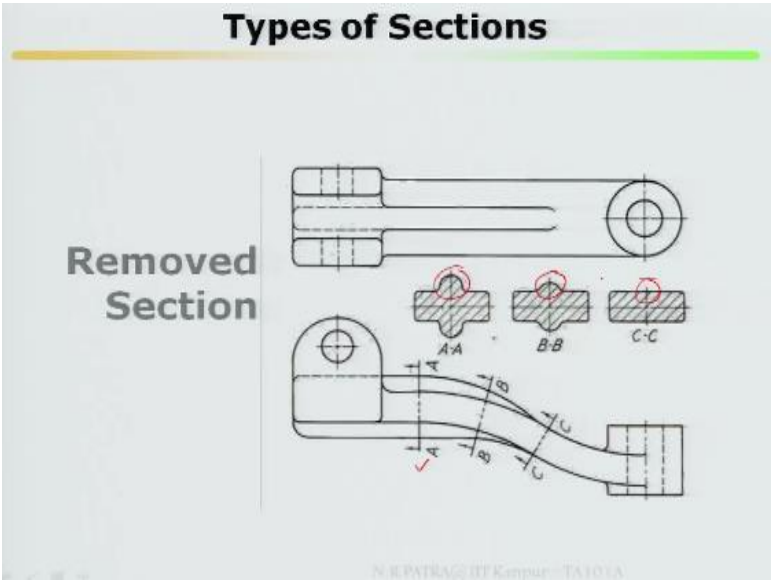

First one is your full section second is your half section.

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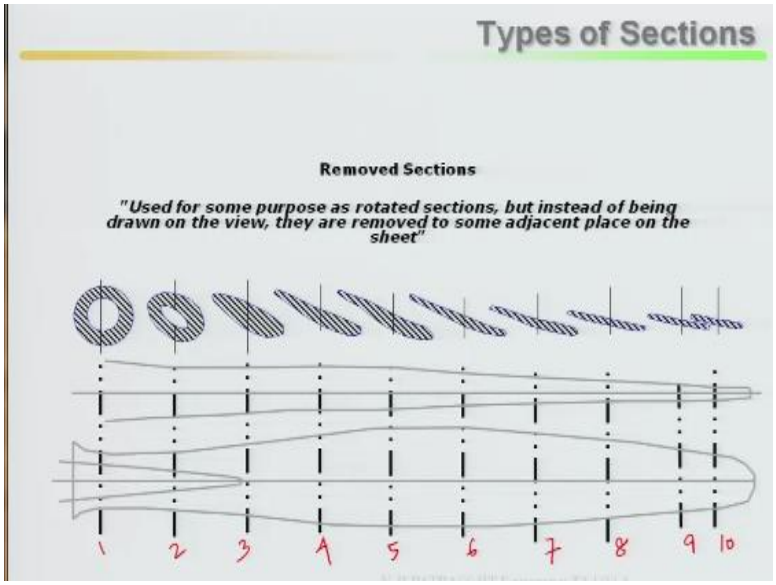

Let me go through this then.

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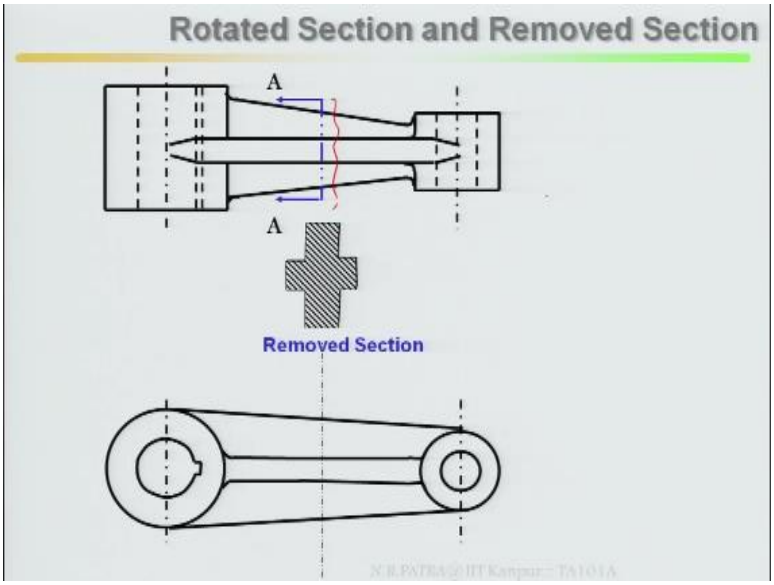

Offsets first one is your full then half then is your offset section then rotated or removed sections then rotated and removed rotated is different removed is different than aligned sections then assembly sections.

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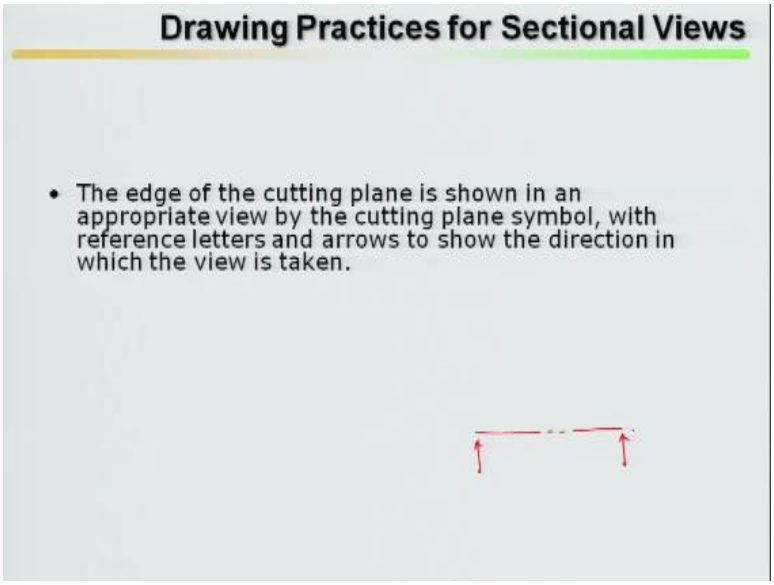
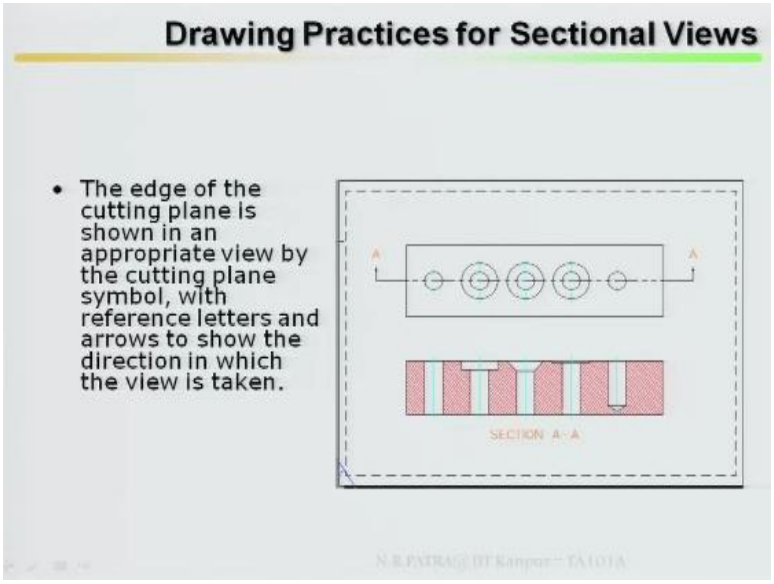


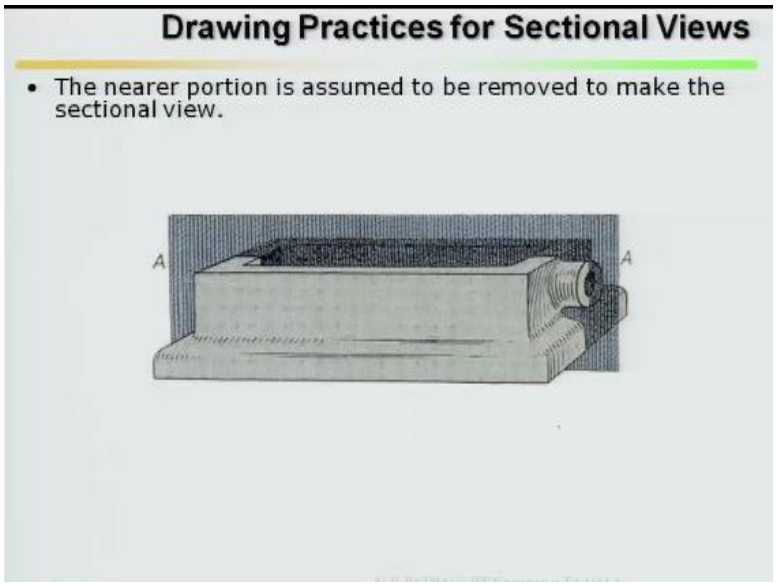
Drawing practice for sectional views the edge of the cutting plane is shown in an appropriate view by the cutting plane symbol with reference letters and arrows top show the direction in which the view is taken I have shown in the beginning the direction particularly if we are showing this section like this, this line so that this is section then if I'm showing this arrow that means this is my directions particularly view I'm doing this extending and taken out this and viewing the object in this directions.

(Refer Slide Time: 29:32)



How it looks the edge of the cutting plane is shown in an appropriate view by the cutting plane symbol with references letters and arrows to show the direction in which the view is same thing as I said.

(Refer Slide Time: 29:53)



The nearer person is assumed to be removed to make this sectional view. If I am cutting this nearer personal assumed to be removed I am cutting this plane and this part as been removed.

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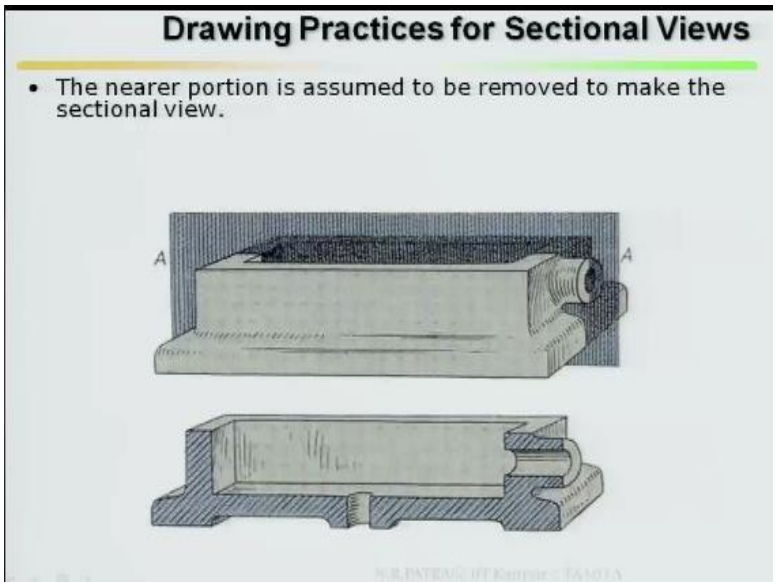

How it looks after removed.

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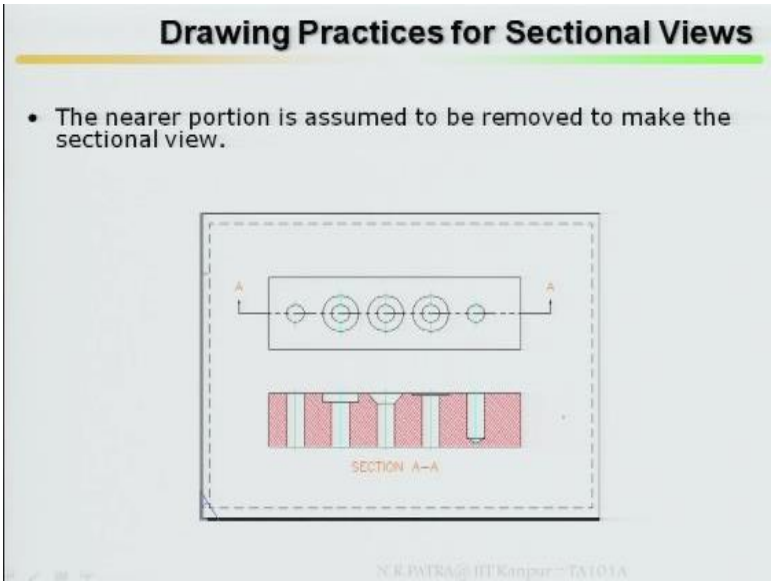

Then same thing.

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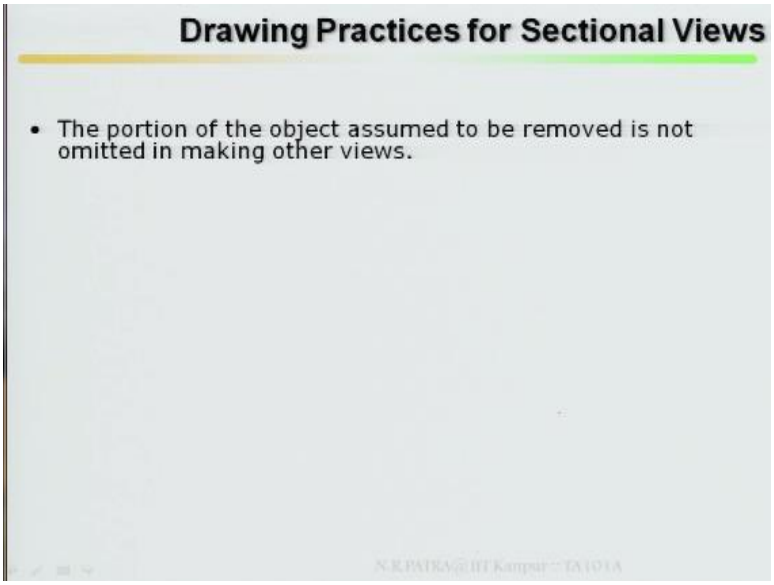
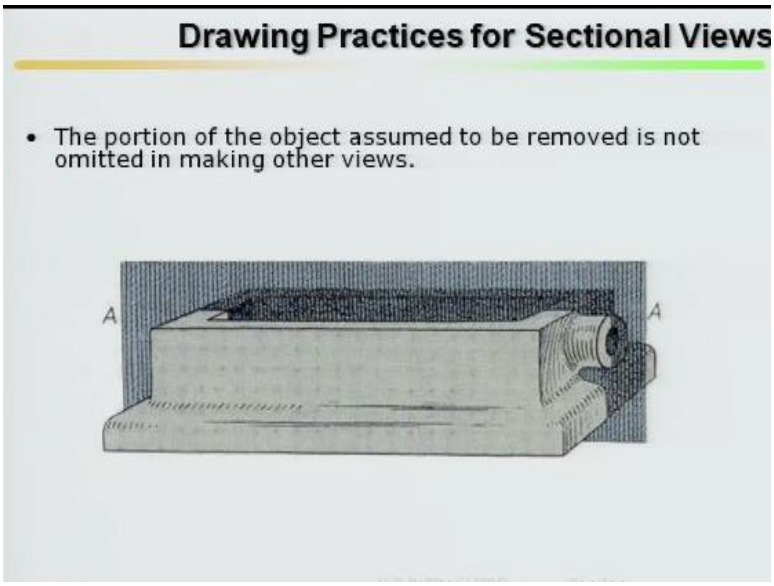


The person of the object assumed to be removed is not omitted in making the other views it as been assumed as been removed in the drawing not necessarily that you will removed and show it that it has been removed then you have been viewed this is an imaginations that much the way the direction has been shown in that direction you are viewing.

(Refer Slide Time: 30:42)



Where you are viewing the nearer person in imagination has been removed you see object is there I am showing a plane where this cutting plane is there but that does not mean that I am showing and removing this again showing this sectional view.

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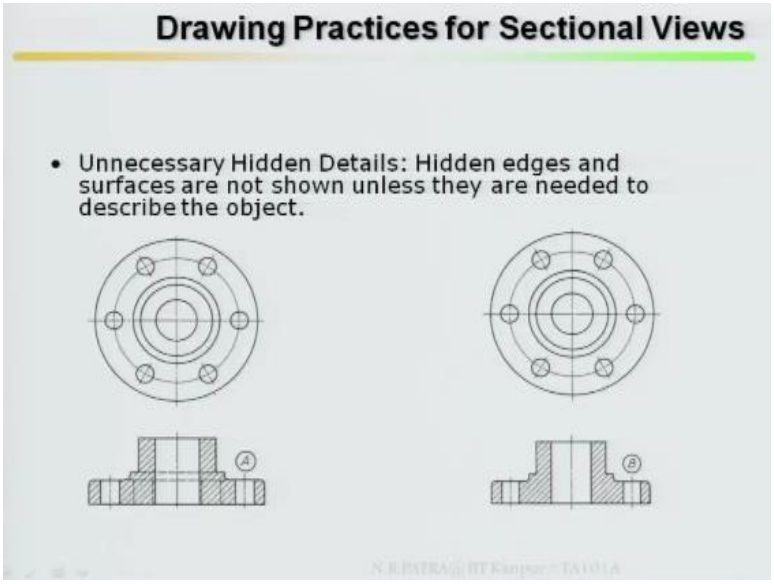
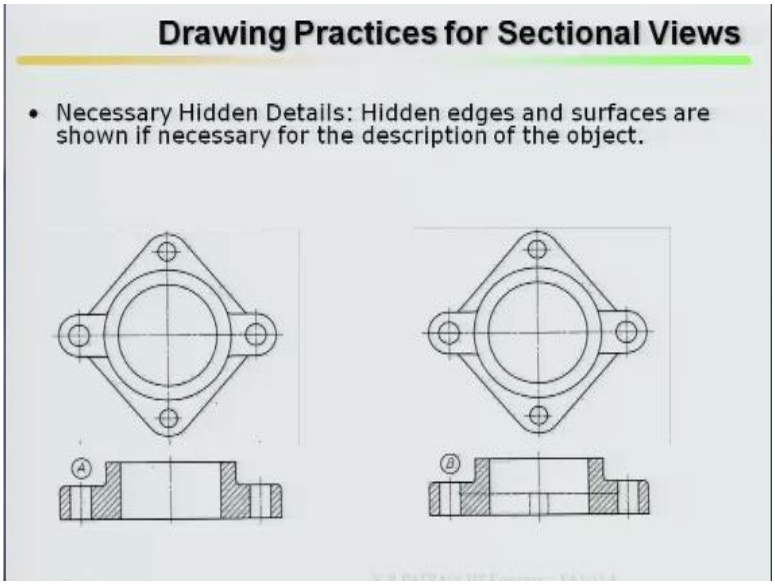


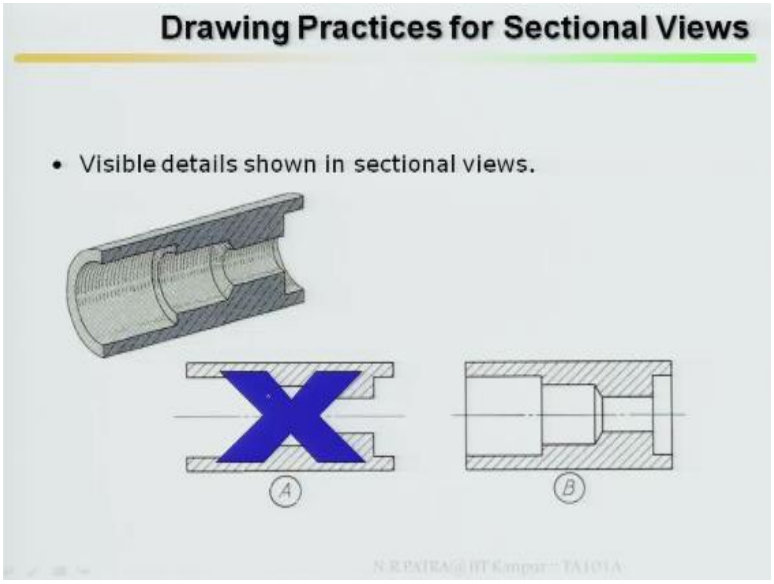
same thing unnecessary hidden details hidden edges surfaces are not shown unless they are needed to describe the object unless it is not necessary it is not required to shown the hidden objects are hidden surfaces looked at here not necessarily so the hidden surfaces here, here, here, if it is unless otherwise if it is not required A and B in A I am doing a sectioning here. here so what happened this hole half this hole half this is there, this is there this is there, then circular inside hole then these are aligning hidden by hidden I am showing it is required in this case because how many number of holes are there so that not can we not in bold systems can be made but here it is not necessary that is why it is not shown.

(Refer Slide Time: 32:17)



Necessary hidden details hidden edges and surfaces are shown if necessary for the description of the object as I said now same thing.

(Refer Slide Time: 32:30)



Visible details shown in sectional view visible details if your are cutting it looking at this what are the things inside it is visible curved surface visible her it is visible this part is visible is part is visible once it is visible you have to show it in this case I have awarded this is visible details but here there are visible details so then this is not correct I will stop it here our next class I will start few examples whatever the principles I have discussed few examples of your sectional views, thank you.

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