Engineering Drawing and Computer Graphics
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Module - 05
Lecture – 47
Sections and Sectional Views (Contd.)

Hello everyone, welcome to our online certification courses on Engineering Drawing and Computer Graphics; we are at lecture number 47, learning about Sections and Sectional Views.

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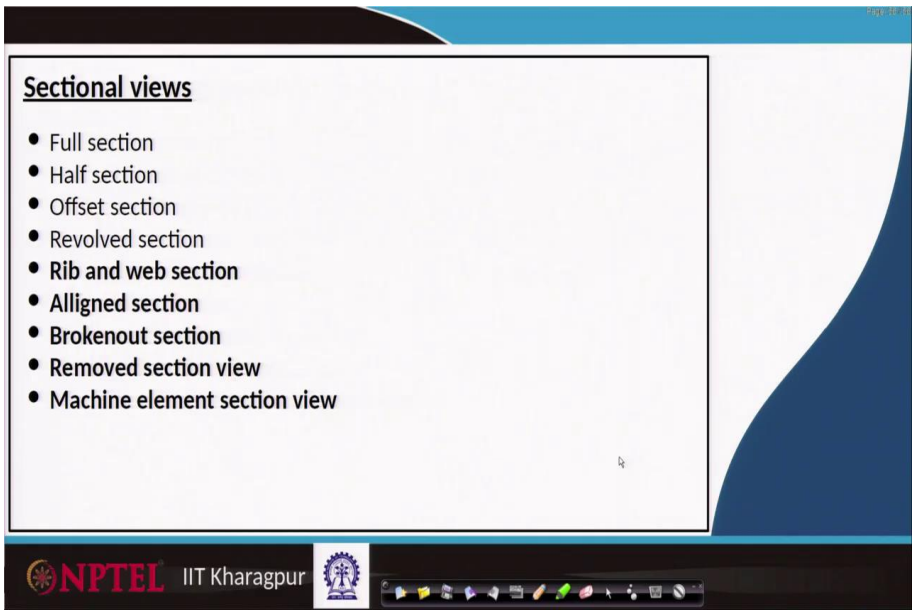

In the last class, we have covered full section, half-section and offset section and also revolved sections. In today's class, we will learn about how to represent rib and web sections; if there are aligned sections, if there is a small material is removed by broken-out sections and how typical machine elements in this sectional view be represented.

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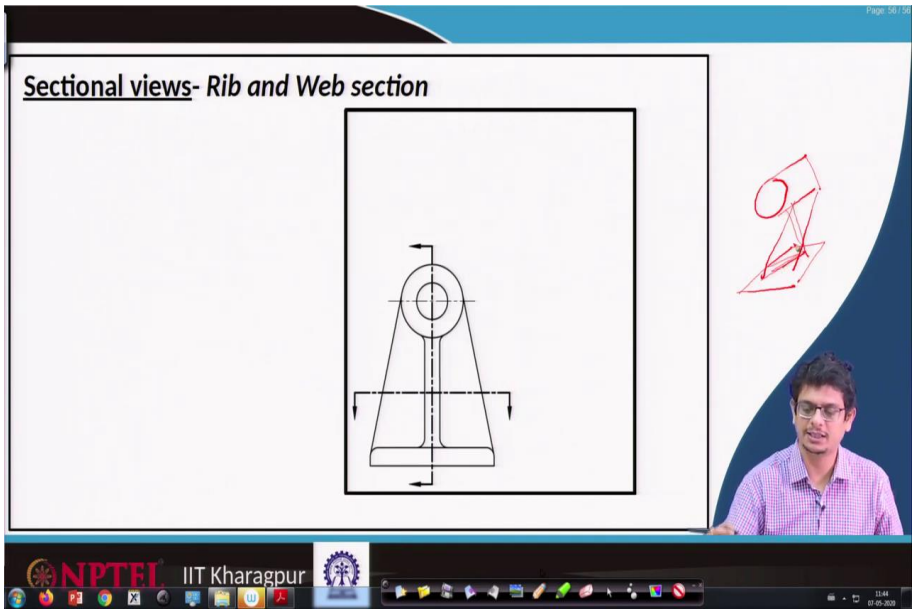

So, the first thing, let us look at rib and web sections. Typically these ribs, web, flanges this kind of sections are crucial materials to support; for example like if you have a railway track, there is a track is having one specialized section like eye sections. These kinds of sections usually support loads.

So, ribs webs these are the additional machine elements, which we use it to support loads. Something like cantilever kind of suppose we would like to do that; perhaps off centre kind of lows we would like to represent, usually, these ribs and webs are a quite helpful kind of machine elements. So, let us look at one such kind of machine element. So, we have a three-dimensional object here.

So, this basically, there is something like a part and that part is supported by a base and this is connected by a flange kind of thing, this is the way that element looks like. And we would like to have cut sectional view of this element, how it looks like?

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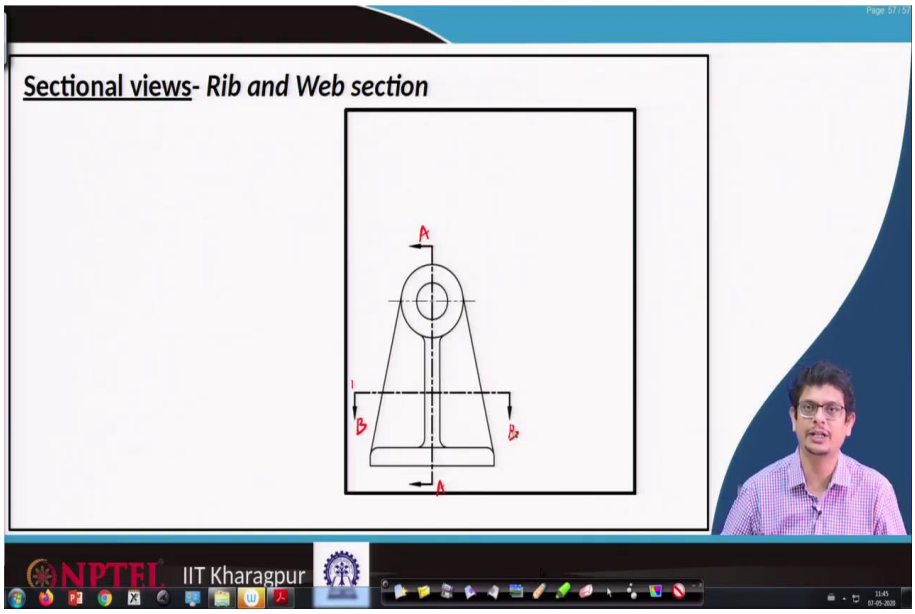

So, we would like to consider two sections; one section A A and other section B B; in the direction of the arrow we would like to retain that part.

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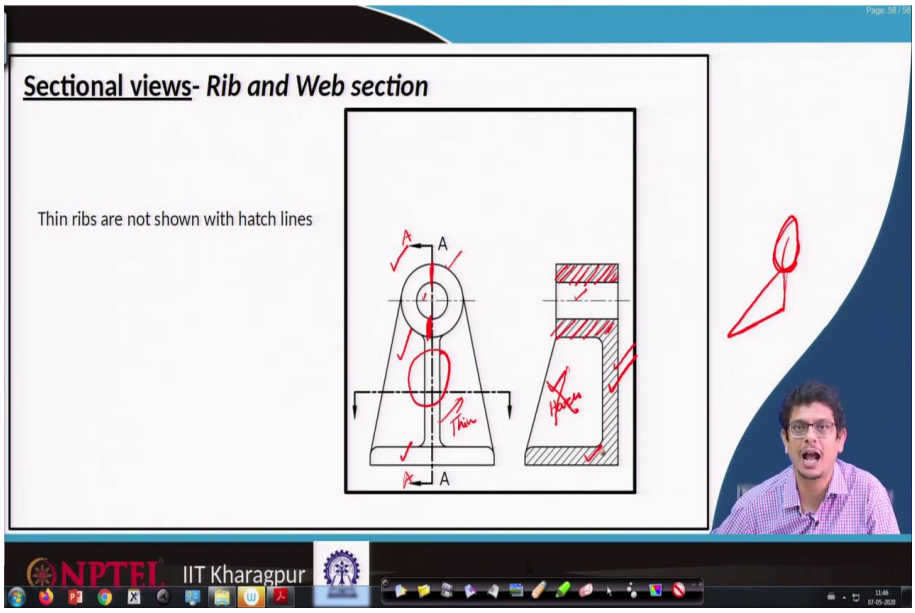

So, let us look at the first section A A. So when we have that cut section; we would like to retain this part, remove this part. So, from there to there, there should be hashed lines; we did not remove any material there. So, it is a blank one. Again we have removed material there; so we will be having this hatched lines.

Now, this part is protruded part from that circular one. So, if you are seeing that circular one; this is more like a supported one, a very thin element. So, when we are removing that part, the thin elements we never show it by hatched lines; compared to the object size, any thin supports like plates, flanges and so on things, we do not show it by any hatched lines, this is the first convention

Only thick elements we represent it by this hatching thing. So, when we remove that, at the backside, there is a material that one we are going to remove it. Similarly, at basement it is very thick, so that also we represented by hatched lines.

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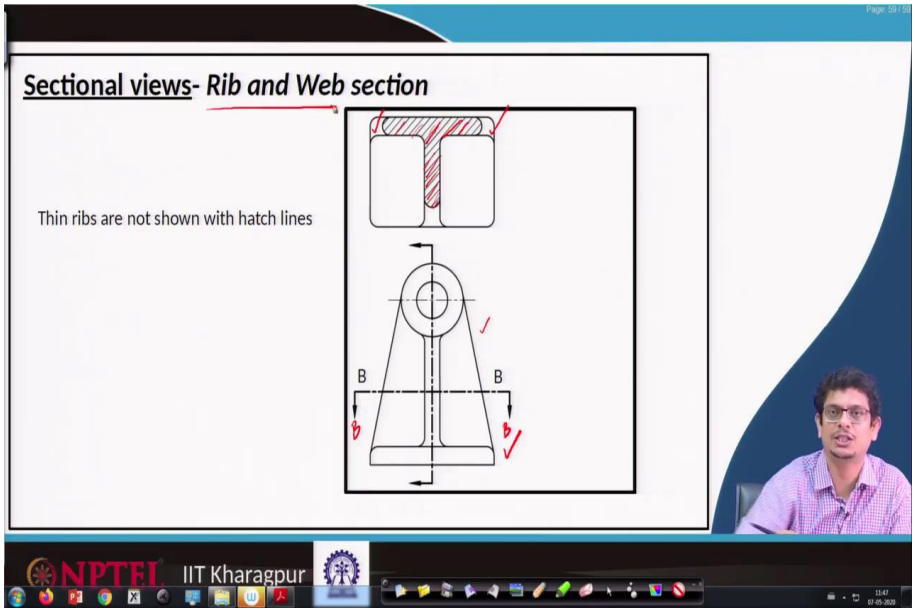

Now, let us look at section B B representation. So, retain this, remove this top portion; when we slice it passing through this B, normal to this computer plane, so from top view if we are visualizing how it looks like.

Because it is a tapered one; so we have removed that material up to that portion, the bottom is visible, only the tapper middle one we have removed. So, finally, the section looks like that; if we are showing such kind of things, we call rib and web sectional representations.

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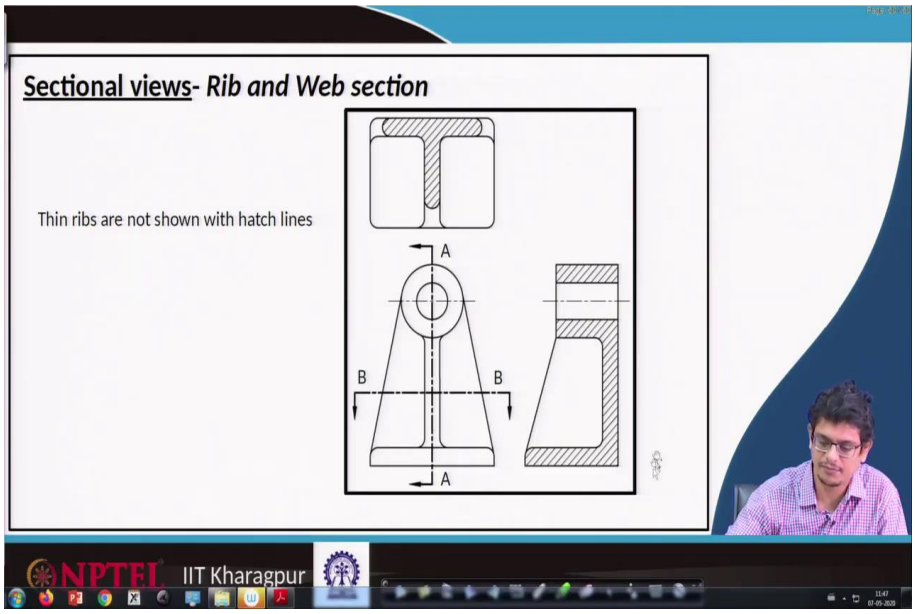

So, based on both the views only, we will be in a position to understand how the three-dimensional projection of this object.

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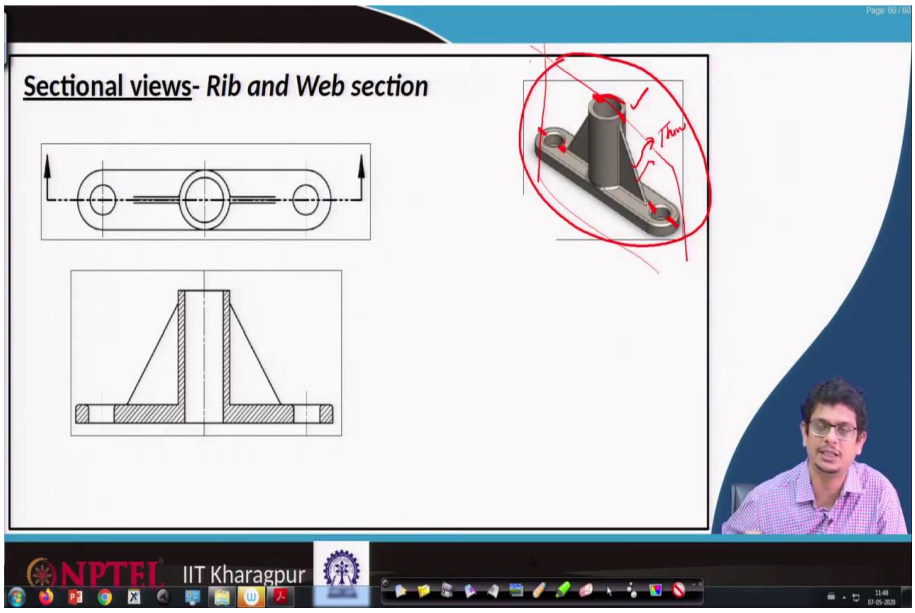

Now, let us look at another rib and web section. For example, this is the object we would like to represent. This part is very thin, it is more like a supporting element for this cylinder. And when we are taking any cut sectional representation; even if we are taking full sectional view of that object, this thin portion should not be hatched.

It just represents a very thin portion, but the material has to be shown by hatched within that zone, this part and that part. Similarly, when we are representing; this material has to be shown as a representation.

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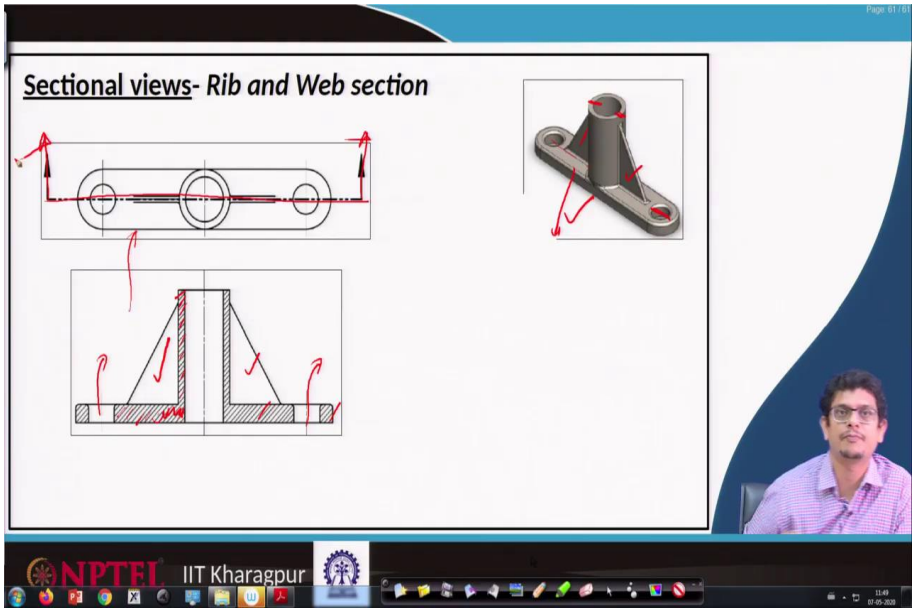

So, let us look at that view. So, this part has to be hatched. So, we have those hatches and material goes all the way there, so we have that; because bottom materially, the hatched portion what we have shown here is for that bottom portion.

The flange portion, though it is slicing, this standard convention is we do not represent it by any hatched lines; that is the reason we have that free space. Similarly, this free space we show it; the remaining portions are hatched. And we did not remove any material there; so there is no material removed. If we show such kind of representation, we call rib and web section. So, look at the top thing, our section pass through this plane.

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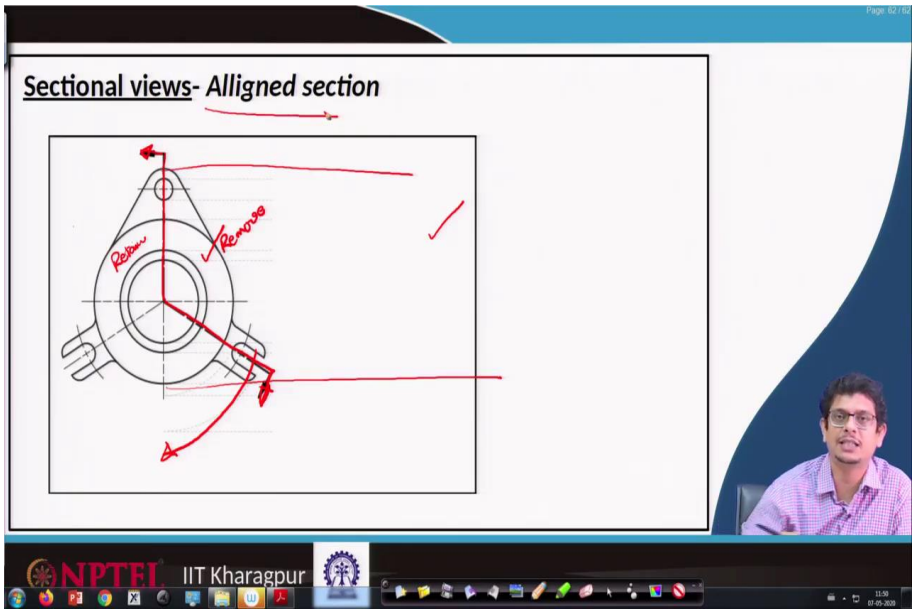

Now, we will look at a new thing named aligned section. So, for example, we have this machine element; you can think of this one as a top cover of a motor. So, the typical electrical motors, there will be shaft and there will be the rotor and so on; there will be a plate bearing kind of supported kind of plate which you go ahead and insert it and bolt in it, tighten it, such kind of machine element what we are trying to look at here.

Now, we would like to see the internal portion of that machine element. So, remove this and retain that. This aligned section says we can represent this removal and representation by two ways; one straight away sees that in the projectional view, how it looks like, the other way is to rotate this object down how that represented, that kind of use if we are showing, that we call aligned sections.

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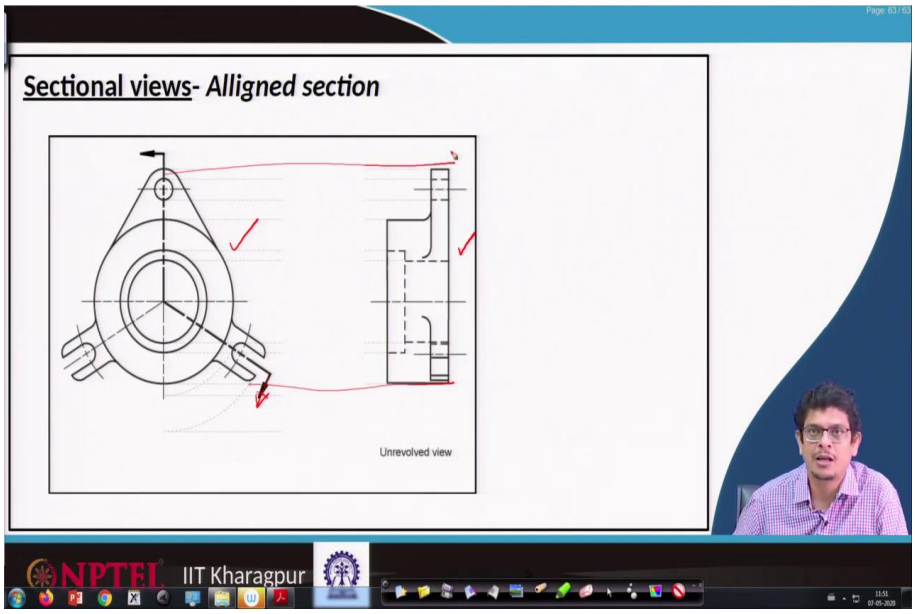

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So, for example, if we are not revolving this entire after cut section thing; if we are not revolving it, how it looks like? These lines will be projected straight away; but if we are revolving it, how it looks like?

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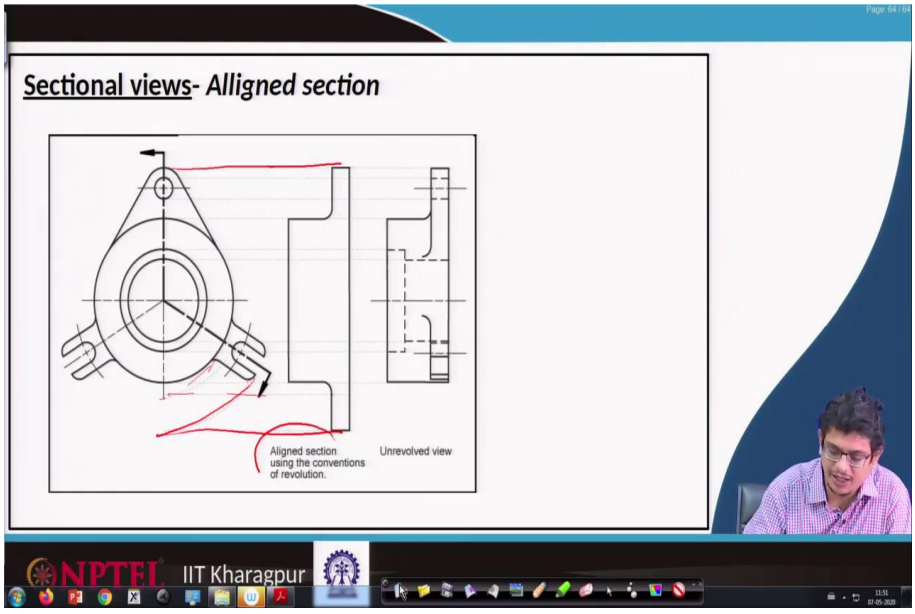

So, when we have revolved this part projects there; this one we have to bring it down project there. Similarly, each point we have to rotate and represent it; that kind of thing what we call aligned section using conventions of revolution.

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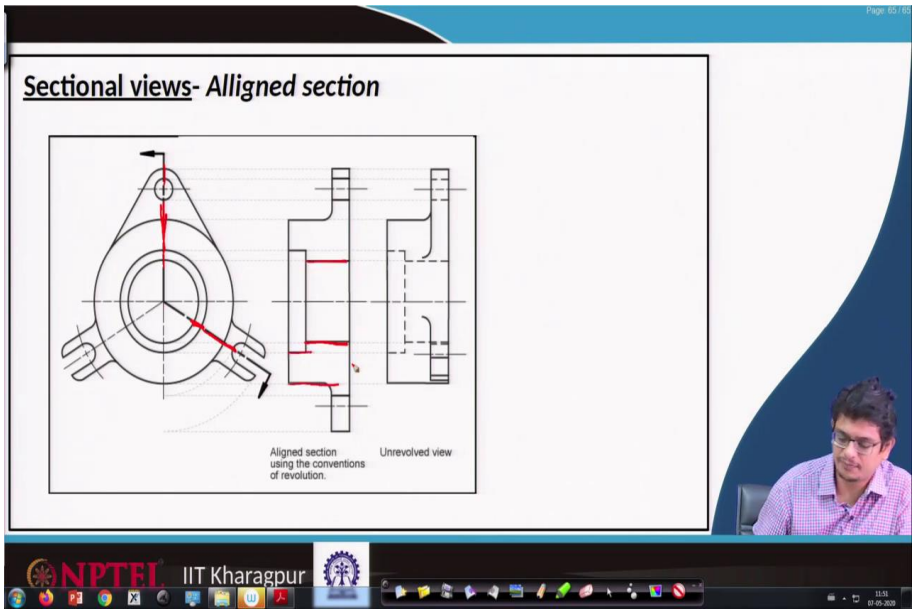

So, if that is happening. So, these are the portions what we are going to cut and similarly, we are going to cut this part, cut that part, the material is going to get removed. So, those become continuous lines.

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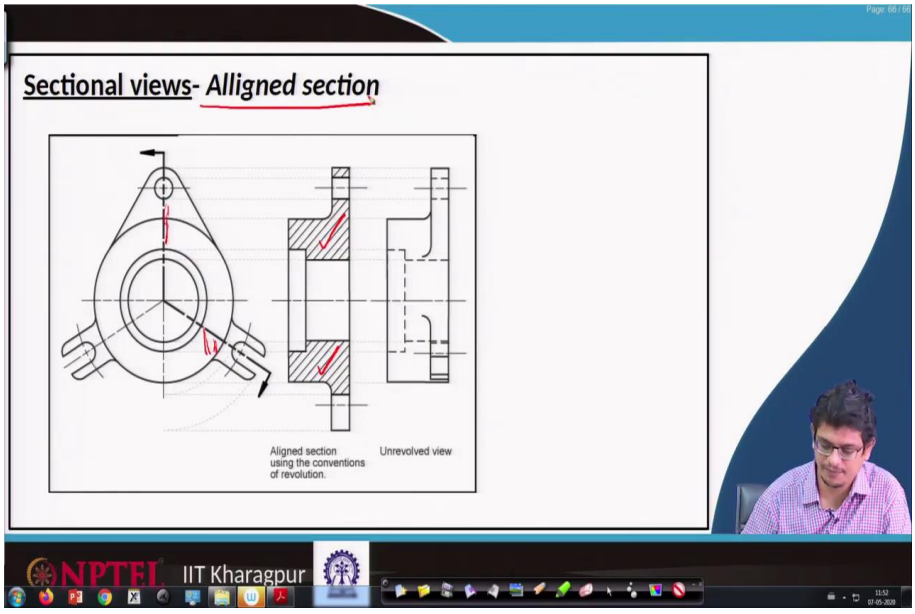

The sectional view, so whatever the material we have removed this part and that part, we would like to show. So, that part and that part we will see; such kind of representation we call aligned section views.

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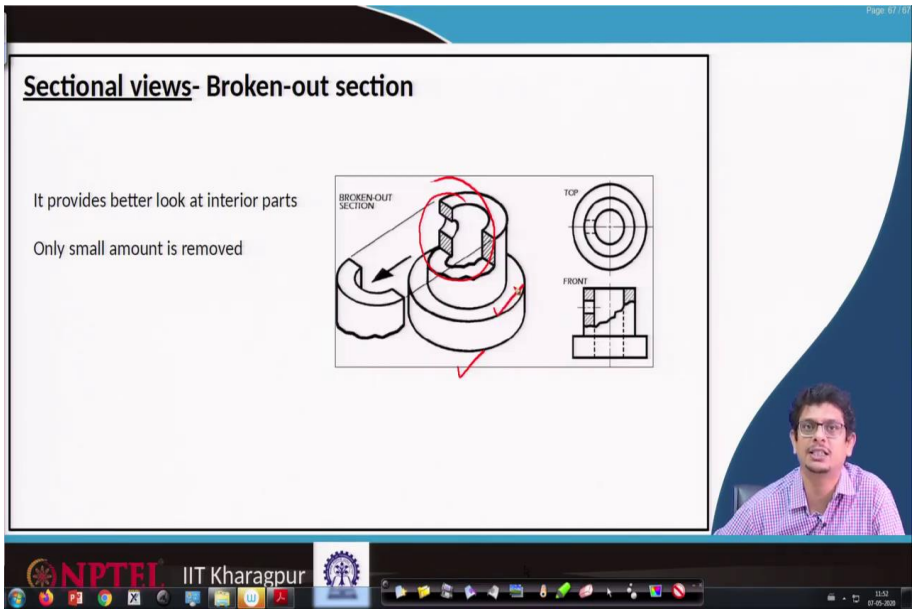

Now, let us look at broken out sections. We do not want to make a complete slice to represent some object. For example, here we have such kind of machine element; it is a symmetric one and we do not want to represent every detail of that entire object.

So, only part of that object we would like to show; we are not interested in showing any cut sectional view at the bottom portion.

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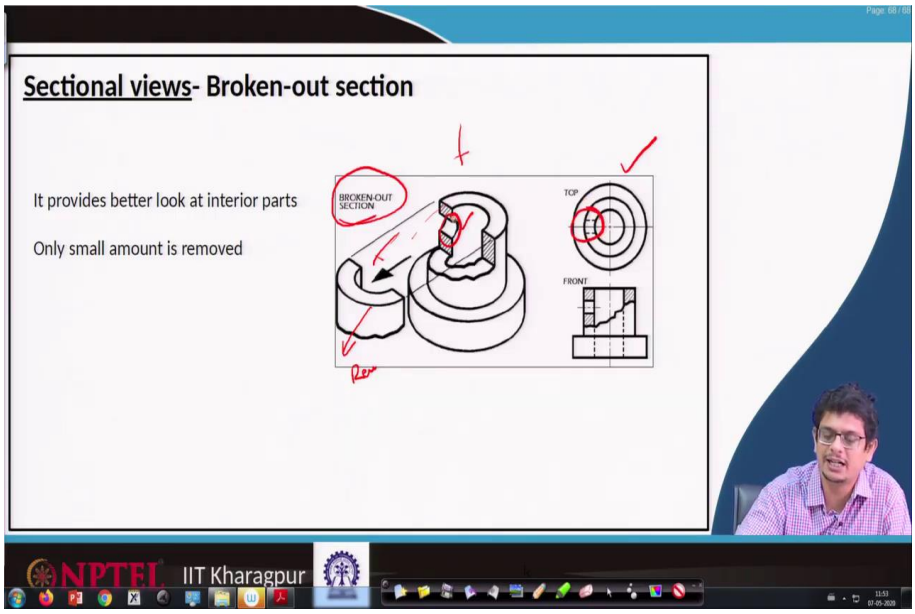

Only a certain part if you are showing, we call broken out sections.

So, here that part we are representing; this part we want to remove and retain that part. So, here if we are looking at the top view, object symmetric and we have a hole only on one side, not everywhere and we would like to show such kind of cut sectional view.

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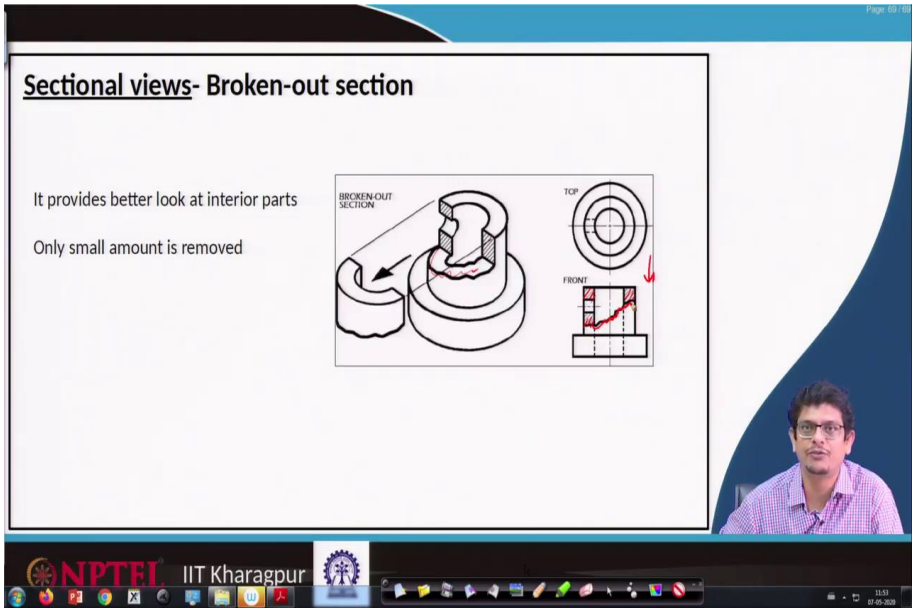

So, in the front view after removing that part; the way how it looks like is near that hole we will be having material and again here, and there is a cut section happen through broken kind of part.

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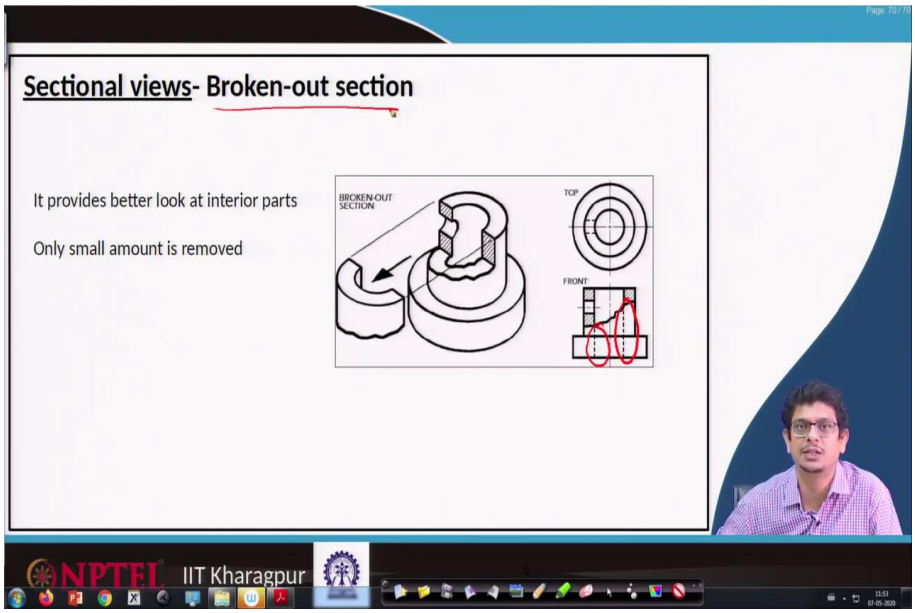

So, we show it by a kind of wavy kind of line. And dashed lines still present; because we did not remove that material. Typically in sectional views, we do not show, except for this broken out sections; in broken our sections, it is allowed to have such kind of hidden information.

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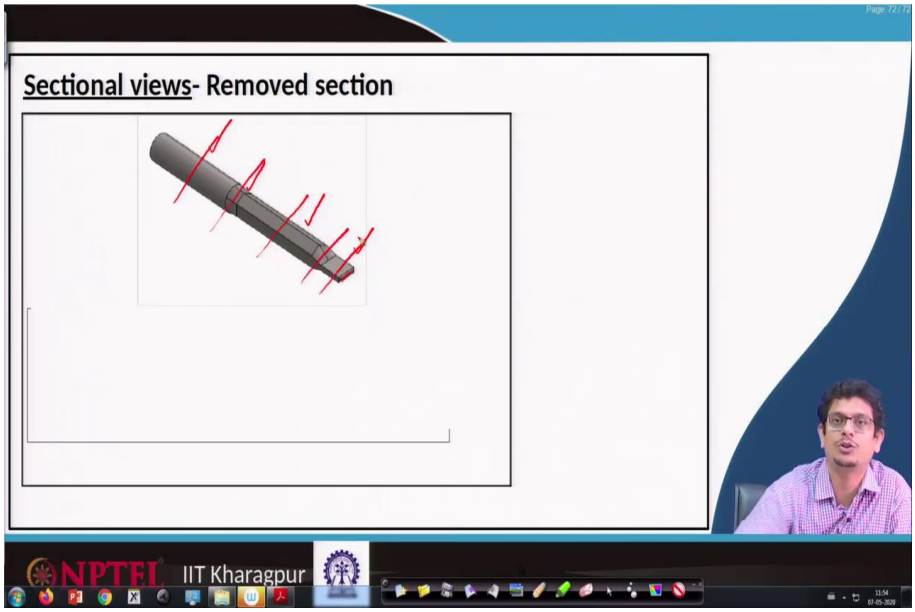

Now, let us look at the removed sections. For example, we have such kind of machine element, more like our screwdriver type, where this is the handle portion and there is some kind of tapered hexagonal kind of pattern.

And again another pattern and we have that twister kind of portion, such kind of machine element we would like to represent. What about the section here, what about the section there, what about the section there, what about the section there and what about the section there? Now, we have a variety of sections in the same material at different planes. So, just showing and this is a symmetric object.

So, just taking something like offset section does not serve the purpose; so there should be another way of representing that, that kind of sections what we call removed sections.

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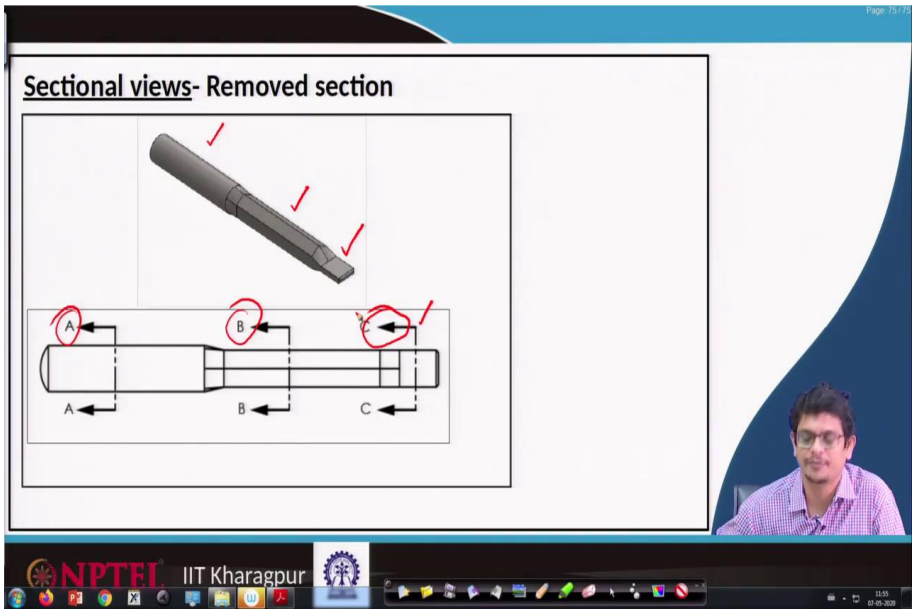

For example, here the material element is different, the sectional area is different; the sectional area is different, the sectional area is different. All these A, B, C I would like to represent only on one picture; instead of showing it three different pictures, we would like to have three on one thing.

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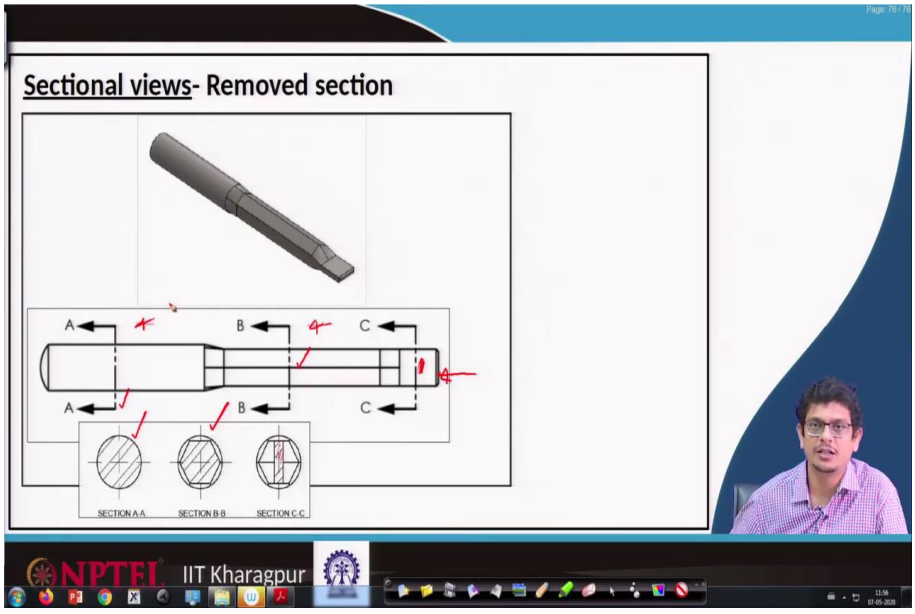

So, if I am having those sectional views, perhaps this A part section might be circular, the B part is something like your hexagon, and here the section is completely square kind of thing, along with the directional preference we have to show.

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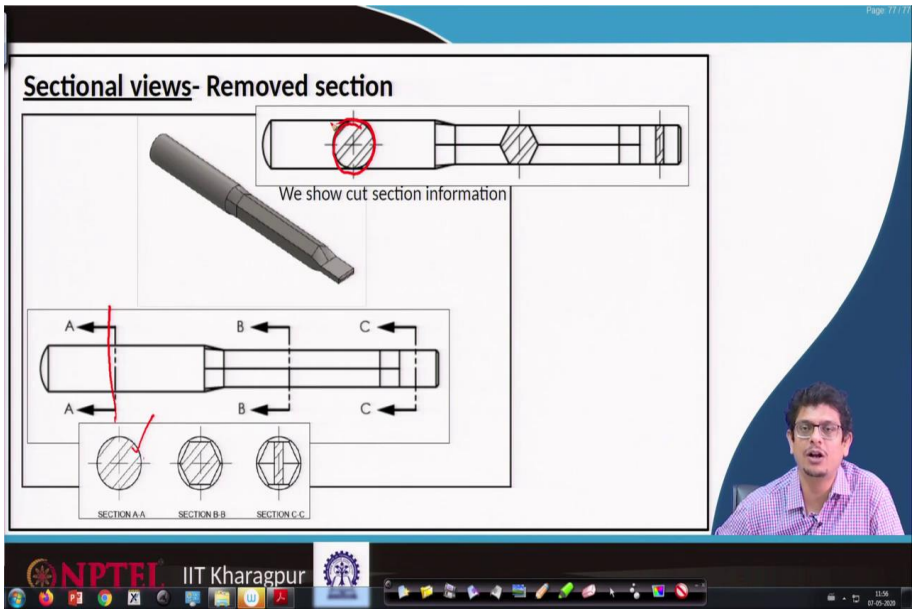

So, to represent that, the easiest way is representing the sectional view. So, we are having a slice in that direction, it looks like a circle.

Now, flip that circle into 90 degrees on the same section show it. So, such kind of representation what we call removed sections; it is not that we have a slice of a circle there. We have a slice in the perpendicular 90 degrees plane and that we are flipping and projecting it on the machine element. Similarly, we will be having a section which looks like a hexagon in this view.

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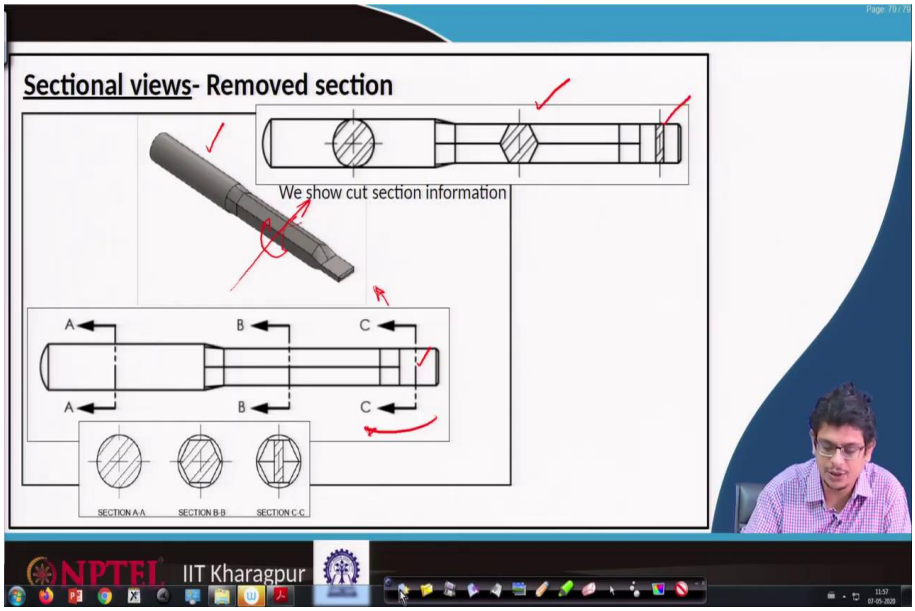

But at the same time, we want to represent the entire element; we do not want to have only sectional representation, but the entire element also I would like to see. Then, in that case, that sectional view of hexagon I will flip it by 90 degrees, on the material I will show it. Similarly, here we have a sectional view, rotate it by 90 degrees in that way and represent it on that object.

So, the advantage of this removed section is, on one side we will be in a position to see the complete machine element and also respective cut sectional views we can see.

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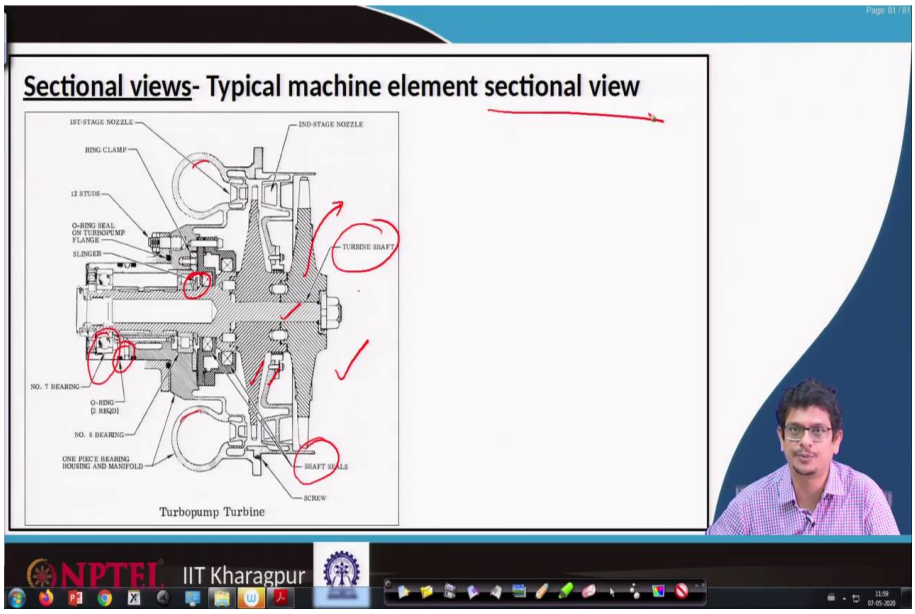

So, using all these sectional representations; if there is a drawing of a typical machine element, how it looks like? One example we are going to see. So, here we have a turbo pump-turbine.

If I am taking that entire turbo pump-turbine, taking a full sectional representation; the complicated details will come out in this way. There is something like turbine shaft, that material is different from this part. So, if you are seeing these lines are different, the interior details of the machine element one can see; this part is different, this part is different from the stress nozzles.

Similarly, oil rings are different, perhaps lingers are different; if there is any ore ring kind of thing to prevent leakage how it looks like, the bearing portion is different. If there are any shaft seals, how they look like; based on these hatched lines, based on the material elements, we will represent these complete full sectional details of that machine element.

So, each one based on the spacing, the thickness of this lines, how much darken we use, what kind of portions we use; based on that people will understand what kind of material it is. So, when we are sharing these drawing sheets to the production line; the local representative should be in a position to

read, what kind of material one has to use. So, such kind of representation for that we required these sectional views.

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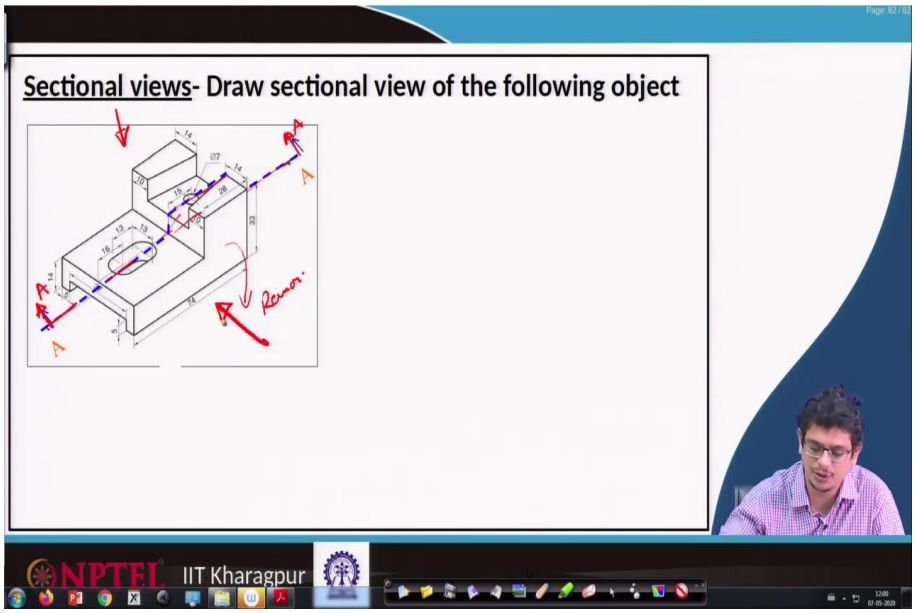

Now, can we guess sectional views of this object? For example, this is the blocks, block what I have; I would like to have a full sectional view passing through that, and this part I would like to retain and remove this part. If I do that; how it looks like in front view and top view?

In the top view, we will be in a position to appreciate the plane, the cut plane where exactly it is passing. So, in top view, we will show complete details of that information, including the plane before removal. After removing how it looks like in that side view or front view, based on the direction. So, any hatched details after removing, we will show it; the complete details with the plane information we show it in other views.

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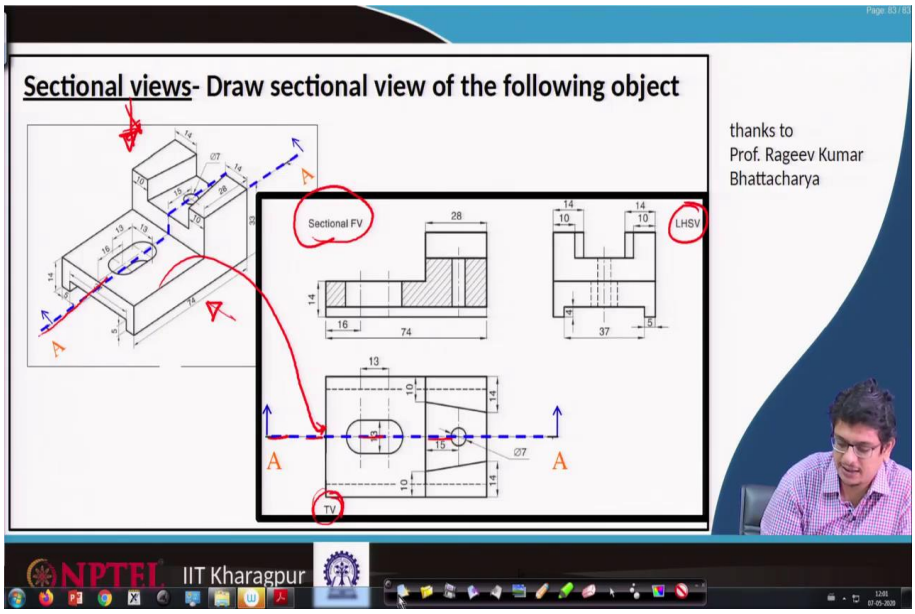

So, let us look at the solution. So, here we are showing all these different views; something like the top view, something like a sectional front view, something like the left-hand sectional view. So, how it looks like? So, this is the front view direction, this is the top view direction in this way. In the top view, if we are representing the object, the complete details we can see. On that we have a cut plane, so we show it by dashed lines.

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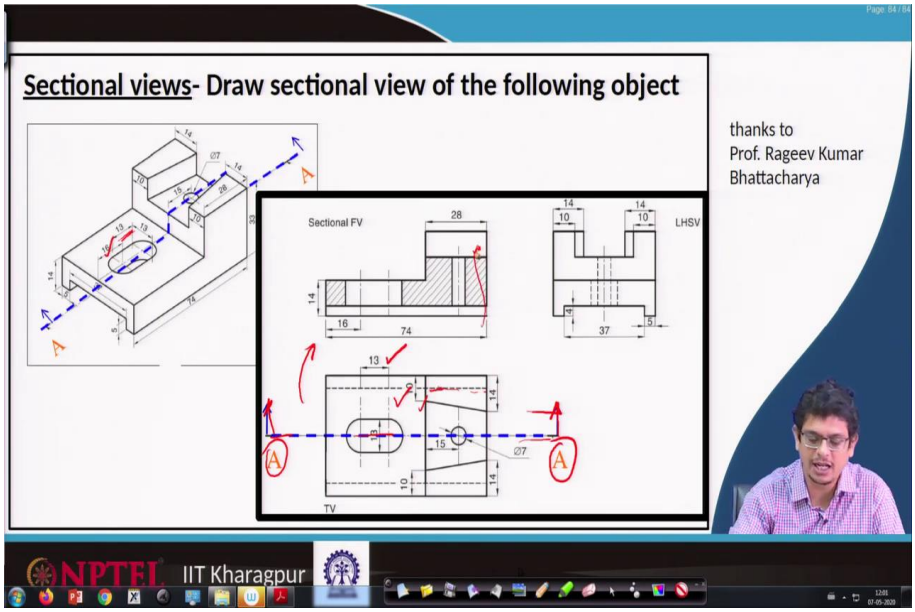

The dimensions clearly we will show, the hidden lines are visible; because in the top view as of now we did not remove the section. But on this section, once we implement that; the front view, the

sectional front view we should not show any dashed lines internally, these dashed lines we do not represent. It comes out like a continuous line.

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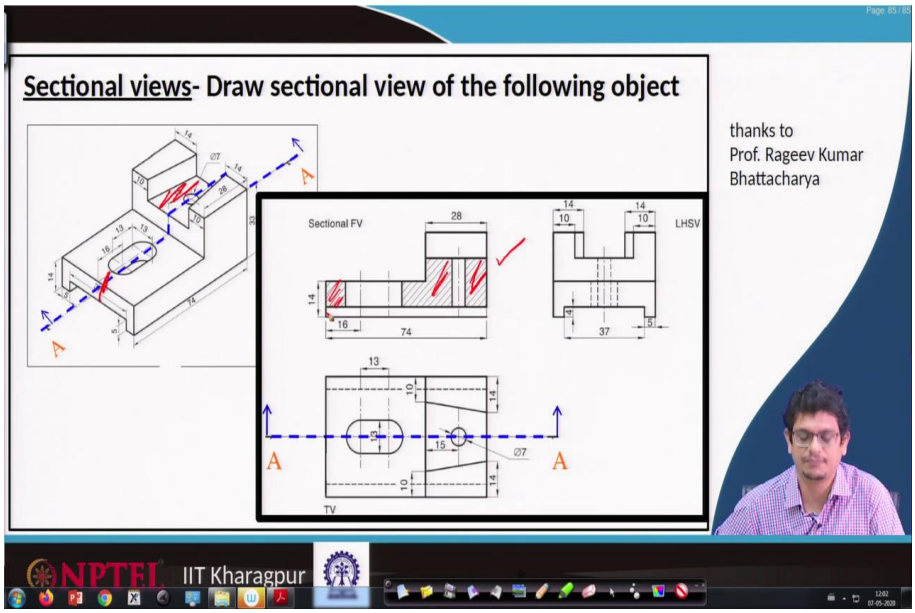

And the material is removed within that portion, so we have those hatched lines; the material is removed within that portion, we have this portion. Now, this is the sectional front view and this is the left-hand side view. There again we have a plane which is passing through that. So, before removal, how it looks like? This is the way we represent the material.

So, thank you very much.