Engineering Drawing and Computer Graphics
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Lecture – 43
Projections of Solids - II

Hello everyone, welcome to our NPTEL online certification courses on Engineering Drawing and Computer Graphics. We are at lecture number 42 learning about Projection of Solids.

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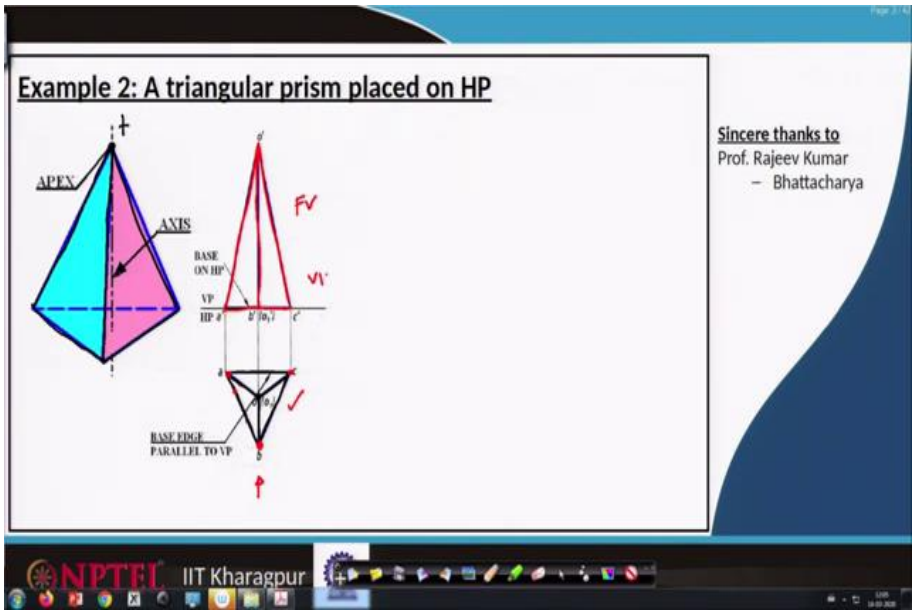

Let us take an example. A triangular prism placed on the horizontal plane. If that is the case of how these views look like on the vertical plane and horizontal plane? For example, this is the triangular prism having apex and axis.

Now, if one of the bases edges for example, maybe this one or this one or the other one, one of the base edges parallel to; when we are looking from top view this entire point shrunk to this single point apex and we will be in the position to see these edges also those three edges. So, that is the reason we have these continuous lines.

Now, if we are looking from the top view, it looks like a triangle and if we are looking from a front view because one of the edges is parallel. So, if we are looking from this side this supposed to be visible this one also and these lines intersect at this point because this is a parallel one.

This entire line this line the edge line all the time maps. So, this one always is mapped through that line. So, what we will see is the frontal one a continuous line, this entire line goes all the way to the apex and this entire surface maps as this surface.

So, we will see a triangle is a surface. Similarly, this the entire surface maps to this entire surface and we will see another one. Naming always be in the top view we will have uh without's a b c kind of things. In the front view, we always have a' b' c' and so on.

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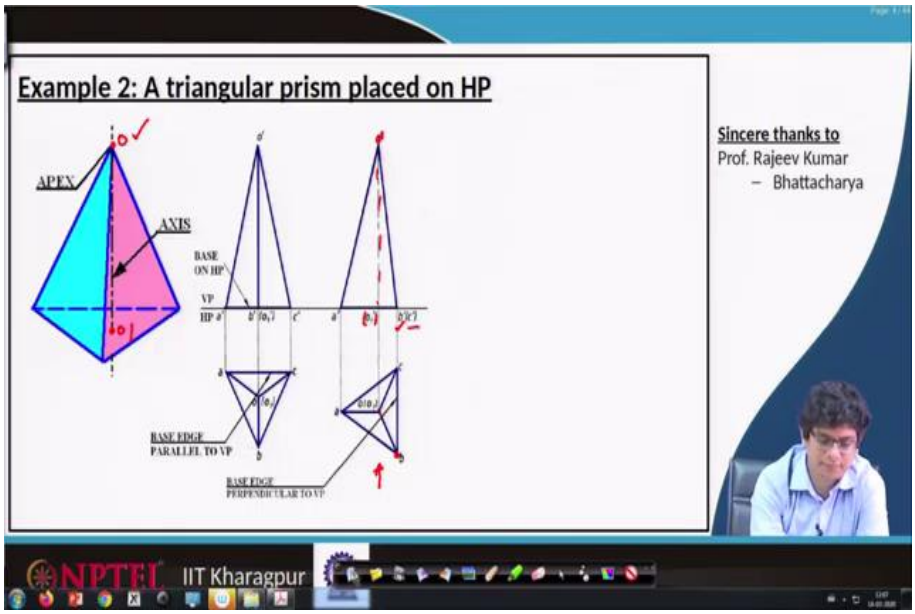

Let us rotate this one of the base edges. So, instead of having this one let us have an inclined prism. In that case from the top view, this point maps there; b and c coincide that is the reason b' c', o will be visible and there is a line which goes and joins that point. So, all the way from there we connect it by that.

There are multiple if multiple points are there one of the points we will show outside, invisible point or map point which is at backside we will show it within the parenthesis. So, here if we are looking from this side b point will be visible that is the reason in the front view it is b', but c point will be at the backside of that invisible. So, within the parenthesis, we will show.

Similarly, o point and o' in the top view o one is invisible because it goes all the way down of that prism somewhere here o one. In the top view, this is the o. So, when we are looking at this in the top view, o will be visible o one will be invisible. Similarly, when we are looking from front view o point goes to o' in the front view always be having's and o one' which is that one invisible. So, we show it in parenthesis and this axis one all the time map to dash-dot lines.

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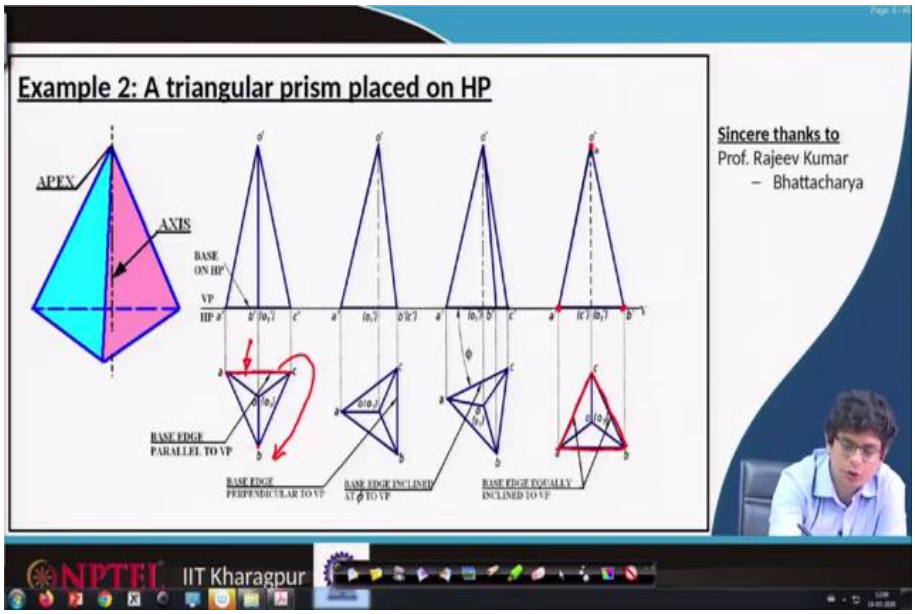

Now, instead of having this b point and c point coinciding with slightly making an offset. So, the slightly rotate this in this direction. If we do that b will be visible it goes and from b there is a line which goes and joins the top apex that one will be this one. In this case c, bc surface also visible.

So, we will have this surface. Similarly, in the front view, this ab o surface will be visible. So, a' o' and b' surface. This o, o 1, o', o one'; o 1' is invisible, o' is visible that is a reason we show it by dash-dot line because it is slightly inclined. So, naturally, this line whatever it is going to join that will also be inclined.

Now, instead of asking this base edge parallel to vertical plane and near to vertical plane what we will ask is if this base edge is parallel to the vertical plane, but far away from the horizontal plane where this one will be near to that. If that is a situation, we will have a, b and c will be in that way. Same thing if we are projecting the lines it goes to a', this one goes to b' and o goes to o'.

This entire surface will be visible. So, this entire surface will be visible. This backside lines we cannot see that is the reason we show it by the dashed line. If you note it carefully here the o o 1 supposed to be dashed dot lines, but the object dimensions are more important than that axis in this case. So, that c from o to c whatever invisible line we show it by that dash lights. So, we do not show that axis and give preference more for this invisible dimension than for the axis.

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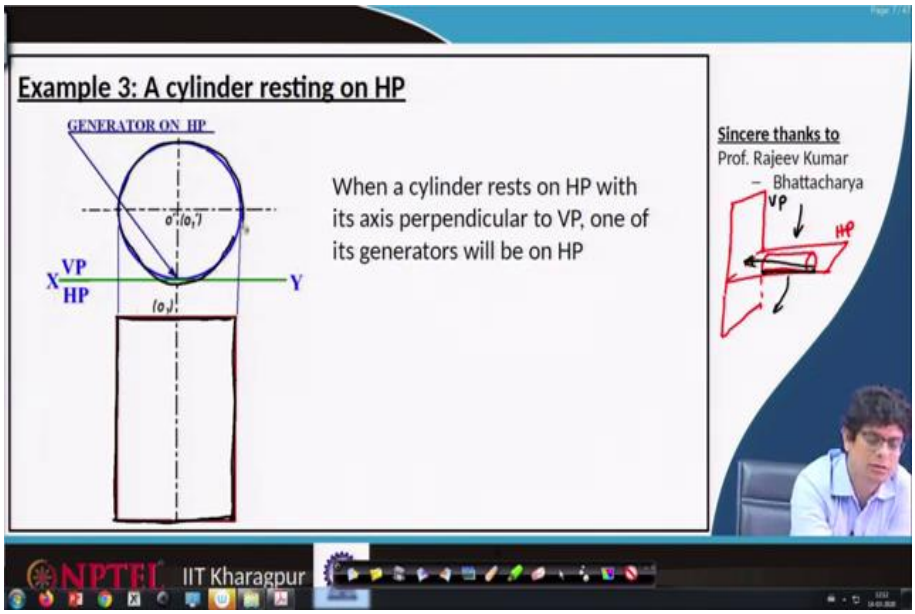

Now, let us begin with one more example a cylinder resting on the horizontal plane, but maybe its generator is resting on the horizontal plane. Instead of having the first example like resting means, vertical cylinder what we will see is a lay down the horizontal cylinder.

For example, here we have this vertical plane and this is the horizontal plane and our cylinder perhaps resting in that way. This is the horizontal plane and this is the vertical plane. When we are looking at that it just touches at these points.

The line whatever it is joining there only it touches the remaining points will not touch the generator. So, when we are looking in that direction horizontal plane rotate it we will see it like it rectangle and this one maps to a circle in that way.

And it touches only at one point, a point contact you will have. So, along that line, if you are looking in the front view it will be a point and axis always be dashed dot line and you will have o point and o 1 point o o 1 point. So, those will be o' and o 1' here.

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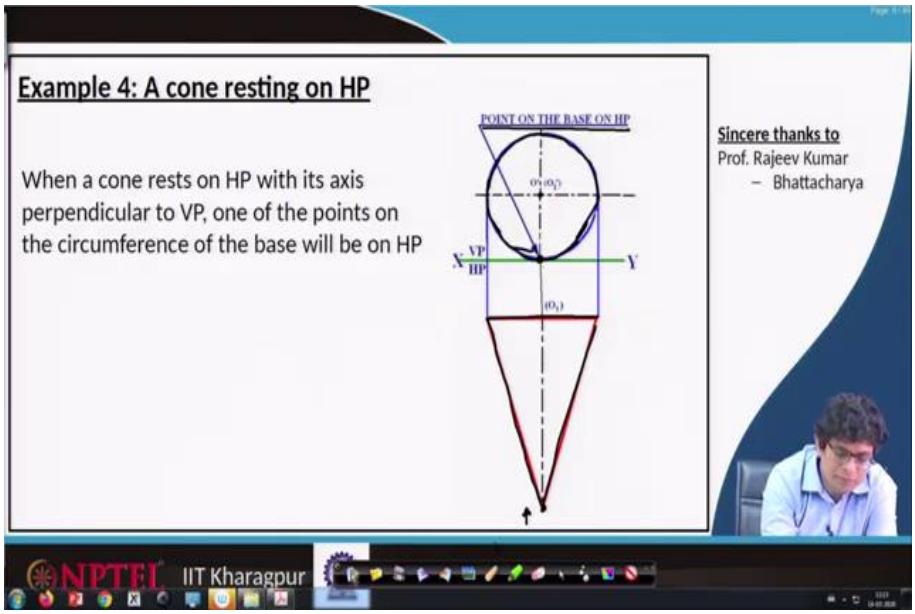

Now, if a cone is resting on a horizontal plane. It is not resting on the base but its generators. Then anyway in the top view, if we are looking at it, it will be a triangle because it is a cone which is resting on the horizontal plane. This apex point always touches the ground and that one is this.

When you are looking from this direction though it is a cone which is inclined, because of this projection we always see everything mapped to this circle. It is the right circular cone that is also one of the reasons we will see the only circle. This point is on the base on a horizontal plane; that means, that entire line generator lines which are inclined in the vertical direction that when we are flipping it in that direction that entirely coincide to that point.

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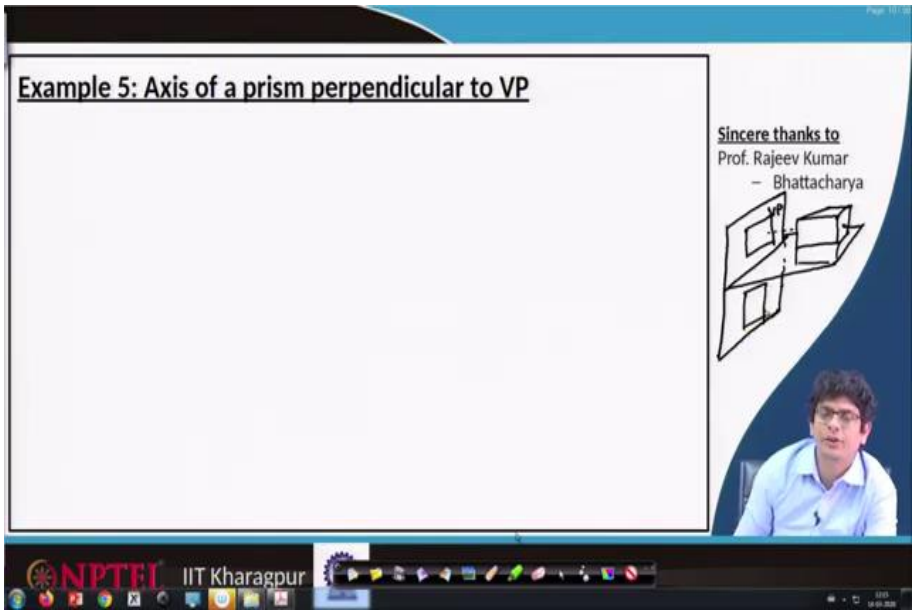

Similarly, if we are looking at a prism perpendicular to the vertical plane, so, the axis of the prism is perpendicular to the vertical plane. For example, if we are picking something like a prism may be a box in that way.

If we are looking at this kind of prism then everything the axis is perpendicular to vertical plane what we will see is a rectangle here and here it also maps to the rectangle. So, what we will see is a rectangle in that way; different prisms different kind of projections.

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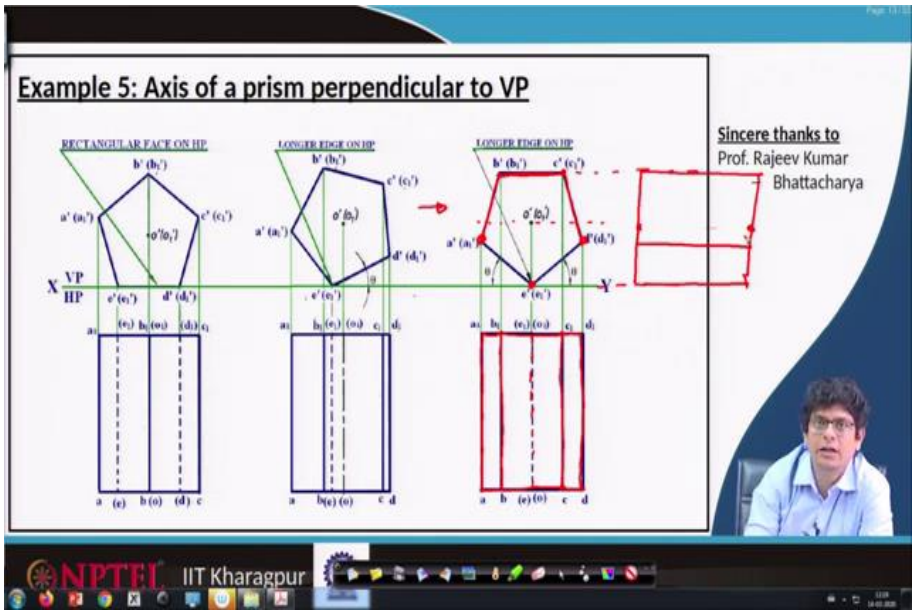

For example, let us consider pentagonal prism. So, the axis is perpendicular to the vertical plane that means, when we are looking at the view the pentagon will be visible only on the vertical plane. And this is one possibility, where axis perpendicular to the vertical plane. When we are looking from top view these points map to lines like edges and we will see that and this line entirely from the top view again a continuous line.

This one will be visible maps there, but these points are those edges will not be visible. So, we show it by dashed lines. In case same axis perpendicular to the vertical plane, but edges it is not just resting on the horizontal plane. Something like this part if we are looking this is resting on the horizontal plane, but if it is slightly inclined maybe rotate it in that direction only this line contact or point contact, we have it.

Then when we are looking from top view this one we will be in a position to sense as an edge, this one also we will see as an edge and this one also we will see because this entire plane surface we will

see again as an edge. And these lines we will see as continuous lines. This one this edge is invisible. So, we show it by dashed lines. And this one will be visible. So, we show it by a continuous line.

Similarly, if the prism axis is perpendicular to the vertical plane and resting on one of the edges and when we are looking at that this entire face is parallel to the horizontal plane. In that case, these lines will be visible this one also visible and this one is an invisible line. So, the invisible line is dashed line and this entire surface we will see it as this object. So, it is a filled surface, similarly this entire surface we will see as another filled object on this one as a filled object; so, a continuous line. This is the way a prism we will have projections.

If I would like to draw a side view of that prism for example, in this direction I would like to visualize. Then these lines map there. This one goes to a rectangle. This one we start seeing something like that perhaps this entire thing in that way we will see. These lines maps; so, that is this one.

Because it is precisely located at midway if something like midline is that one below that we will see that line. So, this line will be more like an axis and where we will see is here, we will see that line. This is the way our left direction side looks.

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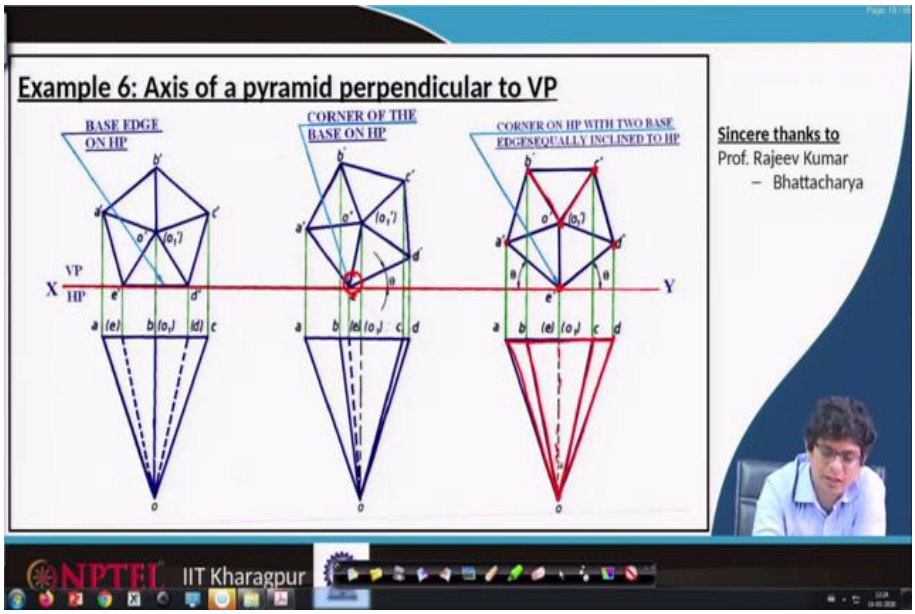

Now, let us take a pyramid and its axis is perpendicular to the vertical plane. So, a pyramid is a pentagonal pyramid. So, having apex all these points are going to connect there and the axis perpendicular to the vertical plane and one of the bases is resting.

So, first of all, construct that pentagon in the front view and we are looking this is the front view. So, the entire apex cone 1 mapped to that point. All these slant edges maps to this point. Now, we want

to look at from the top view. When we are looking from top view these edges under surface, we will see it in that way.

Now, this surface is visible and this line is also visible, the surface whatever it is connecting; so, this one whereas, these lines are invisible. These lines are invisible things; that means, that entire inclined surface whatever it is coming in that direction.

So, those points will show it by dashed lines. Similarly, if it is if the base is inclined at different directions, we will have a view in this way. This is the entire base we want to rotate it by an angle and axis is always be perpendicular to the vertical plane.

So, point always be there. When we rotate this line will be visible. So, that visible line is this. Anyway, edges we always see that edge goes coincides with that and c edge also whatever c to o edge we will be in a position to visualize it there. Similarly, b to o edge we will see that and a to o we will be in a position to see it from the top view.

So, that one goes in that way and all these things on the other side map to this point. If we are looking carefully a' a d' to d c' to c b' to b and the e' which is at bottom of that which is not visible. So, that is the reason we show it in parenthesis.

Similarly, if this edge one of the things this e' point. If it is resting on the horizontal plane then we will see a, b, c, d points straight away in that top view and o point they will be connected by lines, this b o line and c o line always be visible. So, we will have continuous lines. What is not visible is this o to e' for that prism does the reason we show it by dashed lines.

So, thank you very much and in the next class, we will learn more about this projection of solids.