Physical Models for Electronics Enclosures Using Rapid Prototyping
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Lecture - 24
Building a Model 2

So I can have 500*100 milliamps maybe 0.5 watt. So if I have 0.5 watt that is enough to keep the edge very much warm and further if I want if I want to heat it and all that I need to work more on it but this is the starting point.

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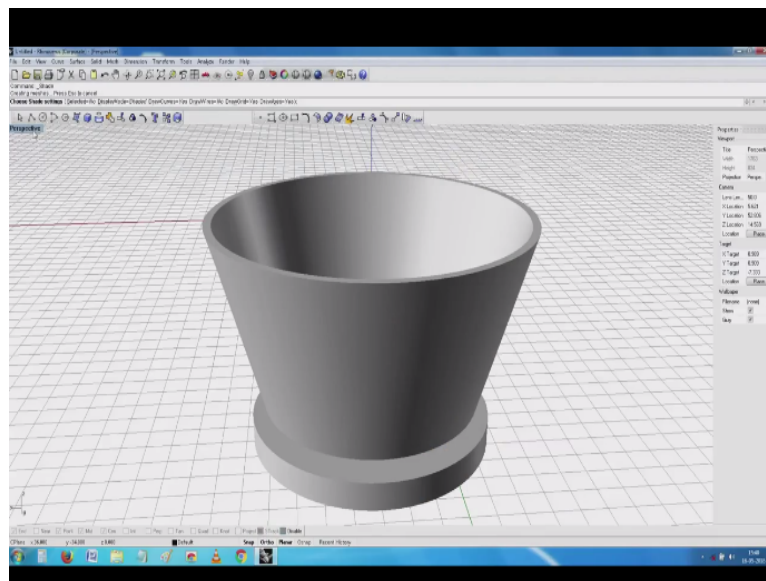
Now having this, now we come to the other equally important thing saying if you see my this 18650 cells, typically 18650 cell has you know 65 mm height and then diameter is probably around 18 mm. So I need to make a cell and see how well I can keep the cell here. So I will try, I will have what you call go at the cells here to see how good I am still at making this. I do not have the internet.

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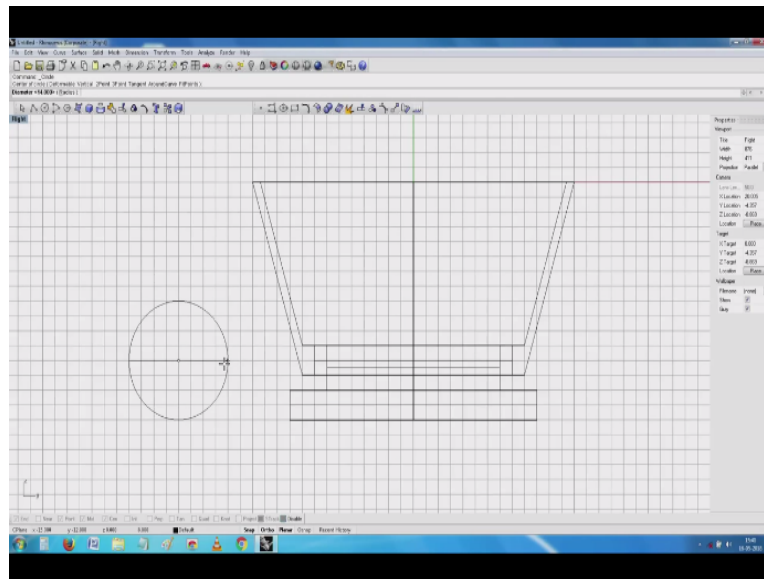
So this is 12 mm, this is 16 mm. Oh let me take something arbitrarily, so I have oh it is looking ridiculously big. Let me show since I have not taken you know too much and then I will try to now extrude it and see what best of what you call extrude a planar curve.

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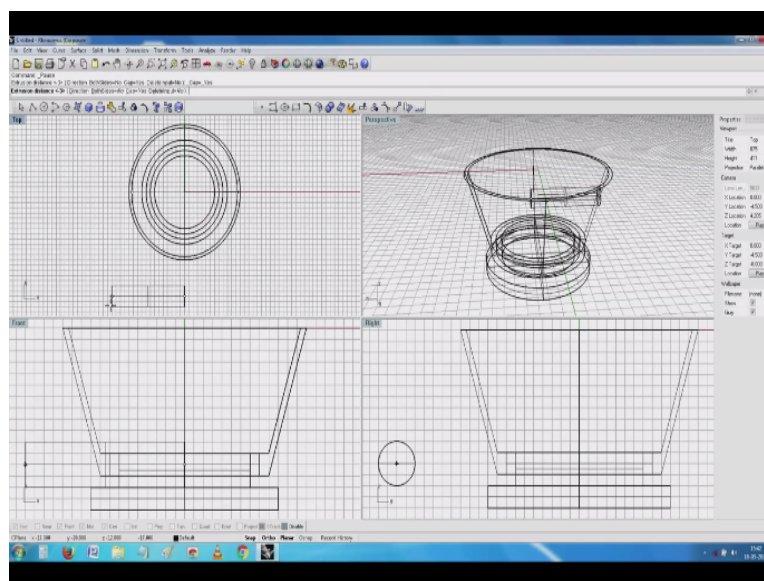
See this could be one of my cells. Now I try my best to play around and you know arrange it and then just for little embellishing and which I require to identify this thing also I need a small cap here. This cap makes this at least look like a full-fledged cell.
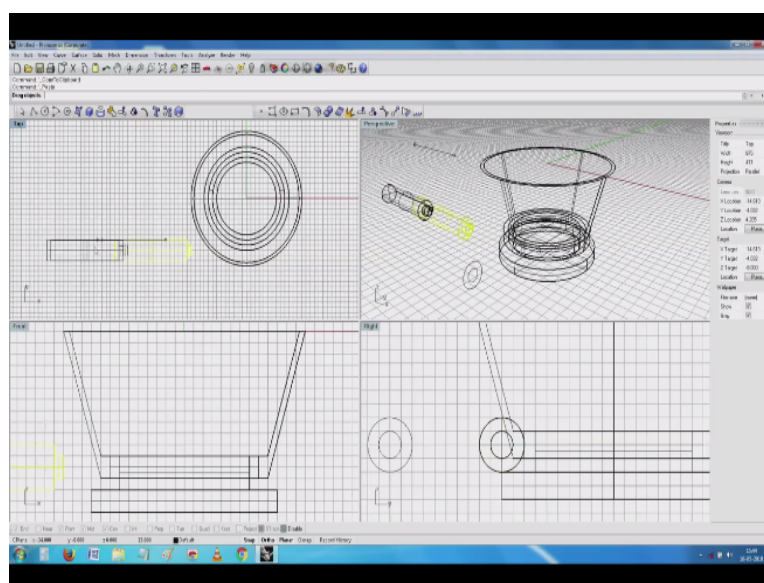
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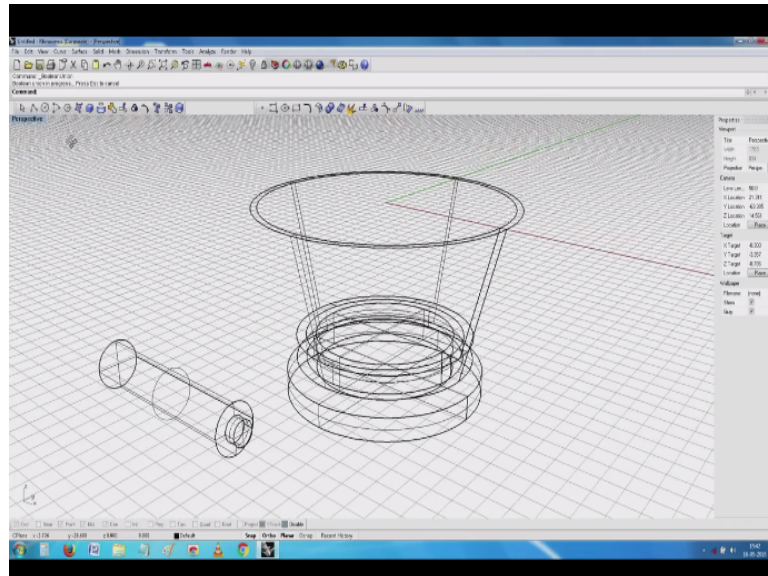
See there I have a cell there. Now it is for me to what you call play around as much as I would like, have as many cells I want to. I make them stand or I make them what you call flat and what is the critical thing here? In this case, the student sort of you know took it saying the form is equally important and what that grew is I am not able to right now know, I am not able to judge.

I expect it is storage for the wire and maybe he has given away by which you know you can probably push something or keep a packet of sugar and tea bags. So we have a place there for storing you know sugar and tea bags and we have also a USB thing outside that is actually an optional thing. So he has made it in two rows, so I can in fact take this here.

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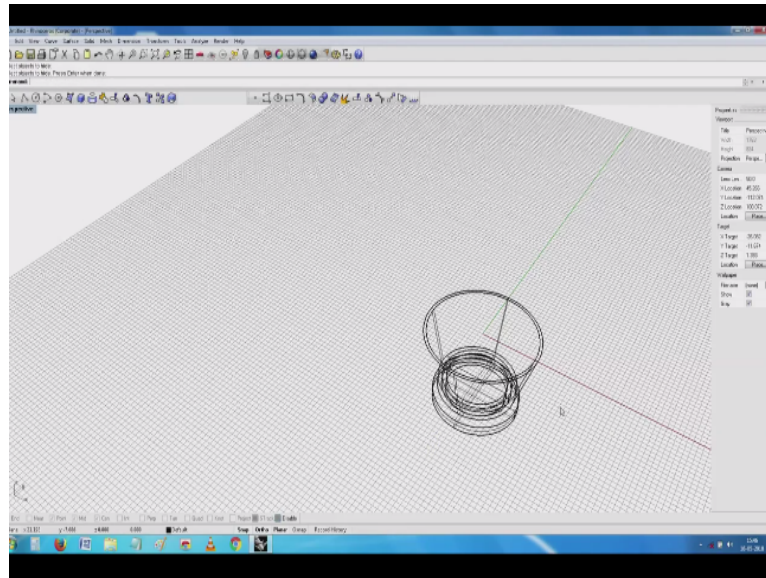

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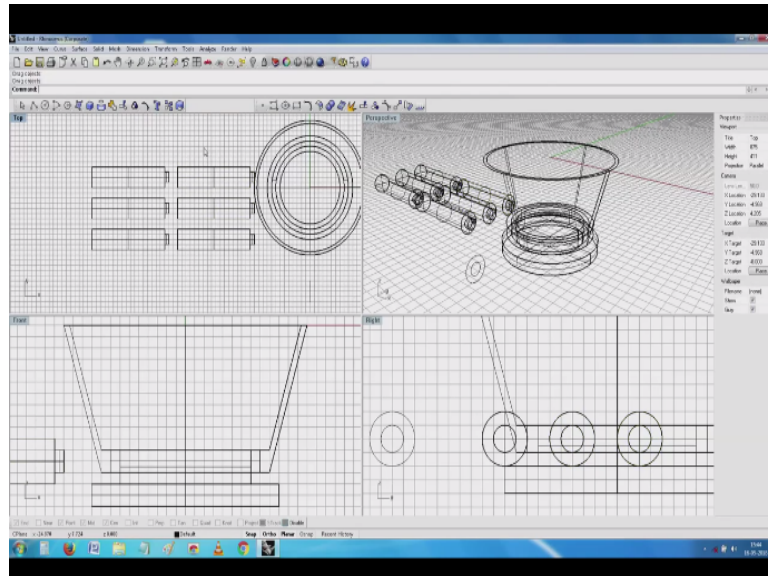
I have 3 on one side and probably there was a printer circuit board or something and I now move all these things up to the other side and move this here flush. So I have enough place here for power supply and to make it symmetrical. I do not know what actually know prompted that boy to make it like this. There maybe I am not able to at the minute tell you what it is, so we have the starting point for our design here.

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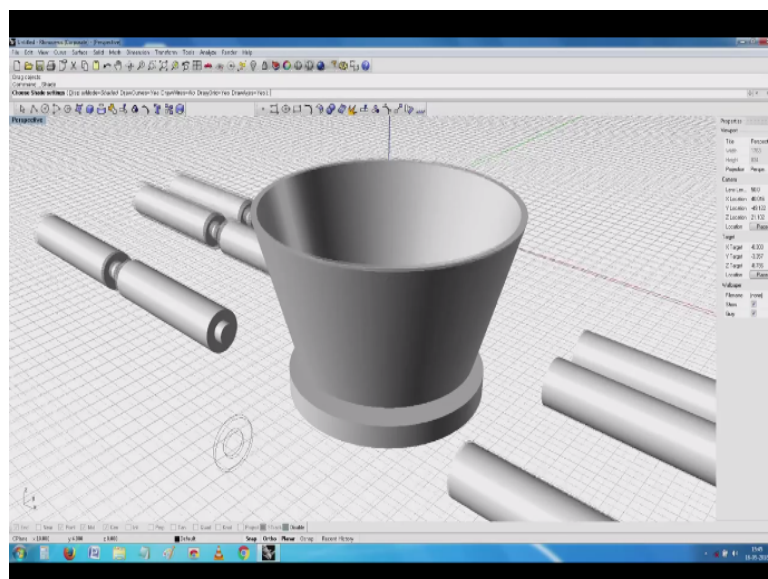
Can you see? I have all the cells in place. Now I need to build the remaining project, make a box all around it and right now to go a little faster, I will remove the cells completely, meaning I will hide it, will get back to it in due course when the time comes.

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We have come back to our cup. Now I will try to go a little faster as I can. Now from here onwards know this is the side view. If I see the side view, it is easy for me to make a solid, it is actually a box.

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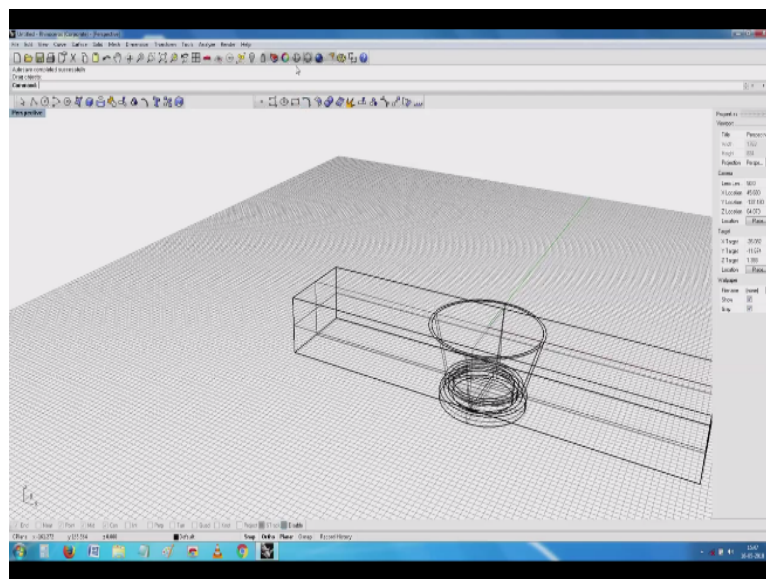
The form is emerging slowly. If you see here now, it is for you to decide how you are going to deal with the situation. So he has done a very convenient way saying obviously you know all this is looking ugly why cannot I, I am sorry why cannot I just stick to this basic form? Okay, that is the basic form which seems to have made sense to him.

Right now, I will delete this and then make something which is actually very aesthetic that one looks way more aesthetic than what I can imagine. So I make a solid here which is again a box. See I am getting that what he could do, easy for me.
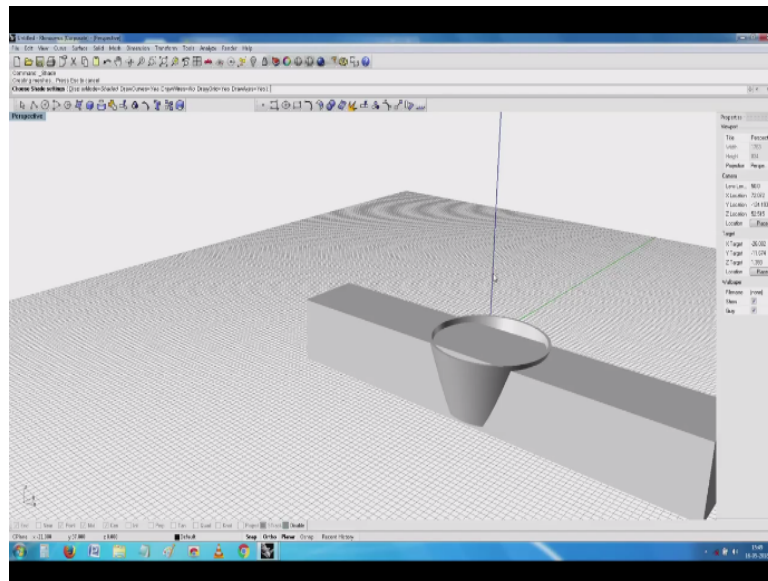
Easiest thing is I tried to cut it and you know removed the inside surface and all that. So this is the basic and then removing and on this box lot of what you call trouble has been taken and you know he has sliced the box, he has made it open into two parts, there is a top portion and bottom portion and then the taper itself is a challenge and how do you build this and the beauty is it was built and demonstrated.

So this is actually the part of what you call the product as well as this thing. Please show them this thing sir this monitor. You see the monitor; I can explain these things. Please show them this PC laptop. So I will see what best I can do here. See here so not impossible to make that nice thing here. Right now to make things a little more simple, I will just do a simple what you call Boolean difference and cut it off later.

One piece is hidden, the other piece is used for, see there I have what I think now is extremely clever you know object.
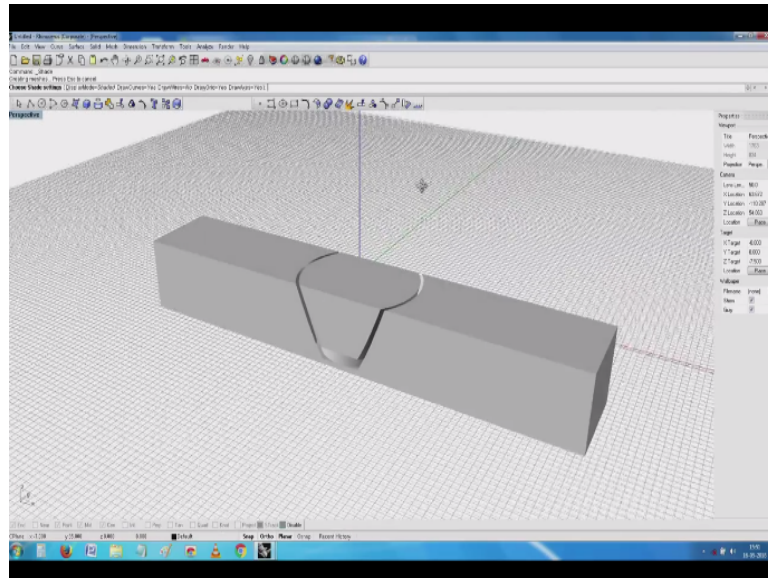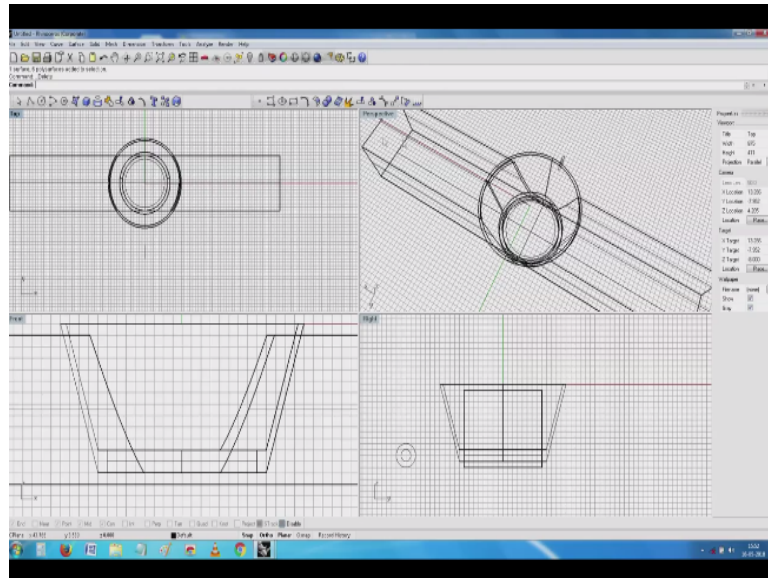
I have something there which is cut and you know something there which is there and all that. If I want to it is easy for me, all I need to do is make some arrangement by which know there inside surface I can probably explode it and one after other so I will remove these surfaces.
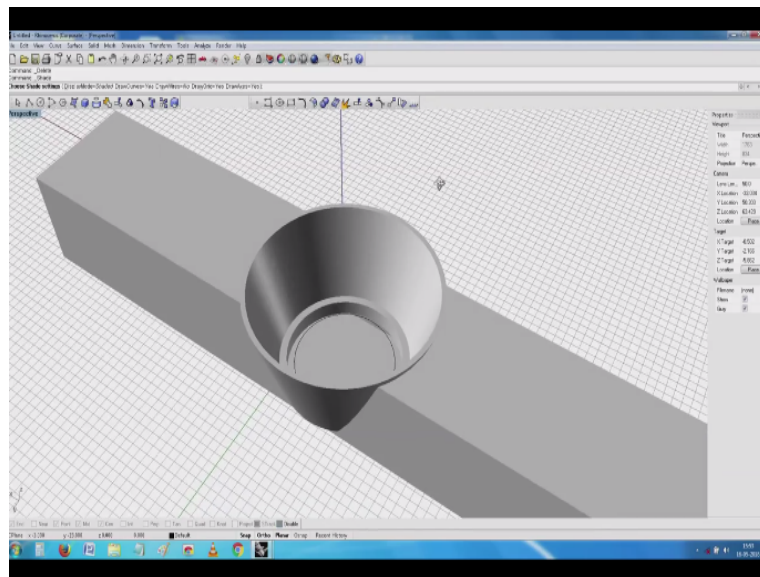
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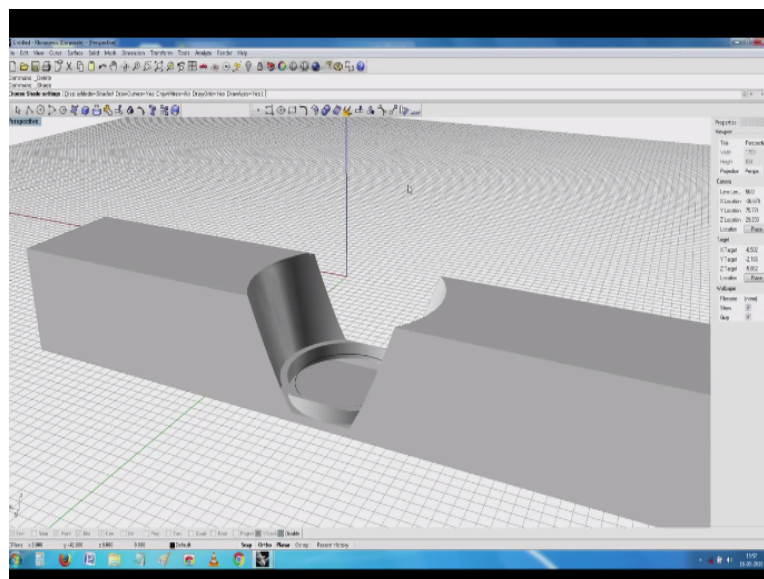
This is part of it which I could manage by making the Boolean operation. Now when I unhide what has been hidden and remove all these cells, my project is almost ready.

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See I have a nice formation of a cup like this and you can say little bit of the detail also at the bottom it is there when I have a box. Next is I need to decide how to print it? Luckily, in the case of 3D printing unlike our other thing, you just need to either print it straightaway without the base or invert it. If you invert it, we end up with that peculiar over hang like this, so in this case this helps in building it straightaway.

Printing it like this in the same form is about the easiest thing to do. Now inside the whole thing is a solid. Now I go around and try to see how best I can make. I will make use of all that surfaces which I have used earlier how best to hollow it all the material inside, I can make something which you know sits comfortably and if I turn it over okay you have seen this here.

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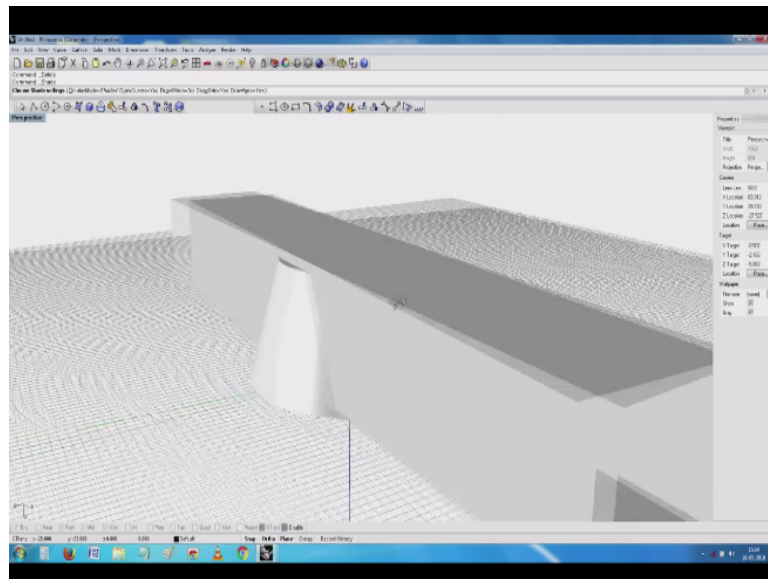
It is possible for me to make it into a solid. I take all this and join all these surfaces and make it into a solid. I joined them, see this whole thing has been joined and I try to also use the solid command to create a cap or planar hole. I have what looks at least at the first level a beautiful object like this here.

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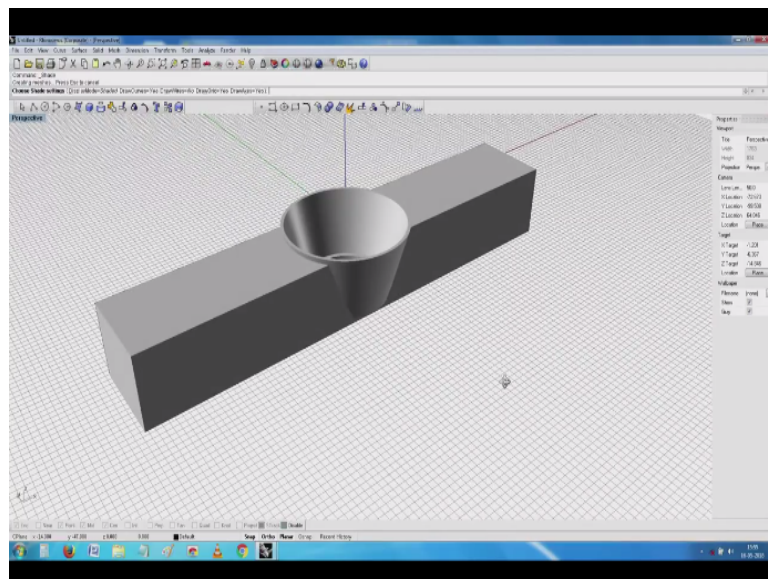
Now it is relatively easy for me to use this bottom what you call I have this bottom surface and try to cut through that material and try to remove as much of material as possible in this but what makes a little problem for me is this cup like structure here. Now I need to find out a way how to create that hollow surface in a possible way. This is where building at model becomes a little what you call little tricky as well as I mean that is how it is.

Just to show you what can be done is I will just try to now once again as I have done before, I will try to remove the bottom surface.

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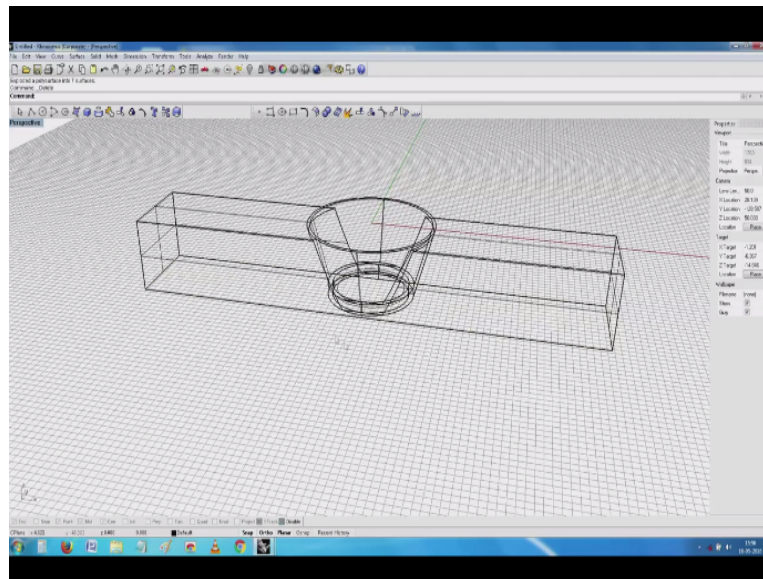
You see here this is the object, see it has come so far. Now I need to do something to make sure that these surfaces know I convert these things into surfaces and attach them and join them. The movement I join them I have something which can be printed easily and chances are now there would not be any what you call surprises and problems and you see here it looks reasonably good.
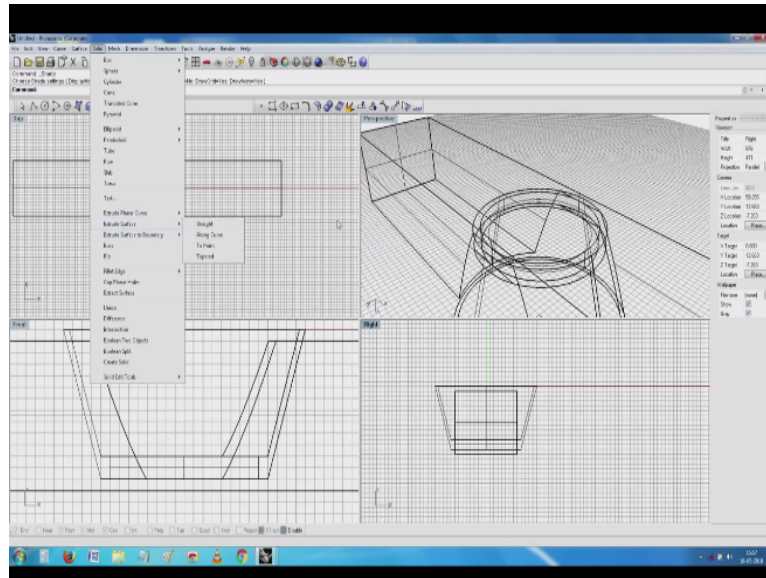
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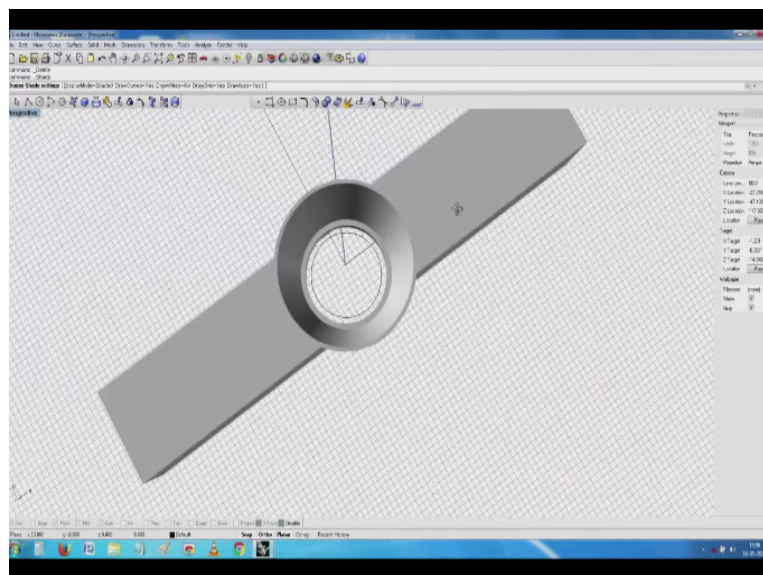
Only thing is now I need to worry about thickness here. You see here, this thickness has come here into this corner. Now if I go off there, it will what you call it will intrude into the surface and create a problem for me. So it is you know I use all my ingenuity to see what best I can

do to prevent it to see if there is a thickness, if there is enough material what to do. So I will now have a go out of it and just be you know patient with me.
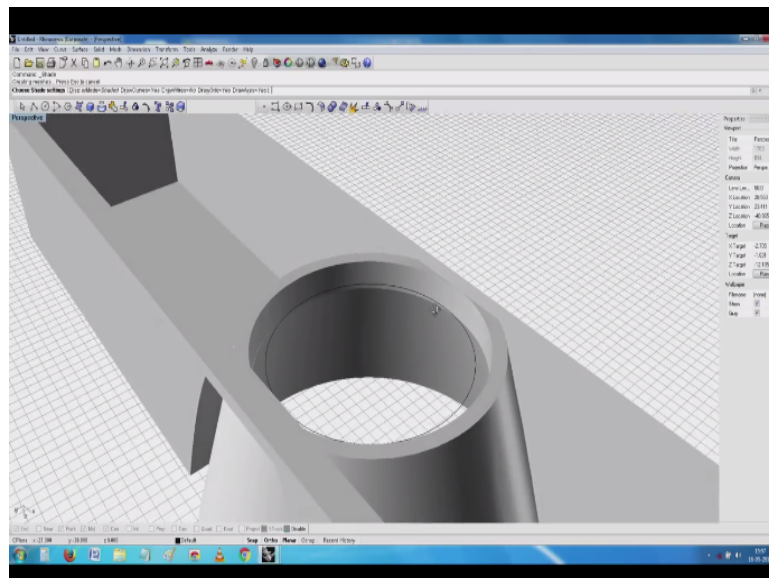
I make a solid out of this surface what I have here.

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Anything else happened? See something else has happened. This is probably not what I wanted.

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See in this know, it is nice, it is gone off onto the other direction and it has you know extruded here, which I still have the old surface, which is there. Now I will try to go inside on the other direction. Am I better of maybe, maybe, maybe not? See here, not so much of a

damage. It is not bad enough at least know I have come this far. It is easy for me to remove that material.

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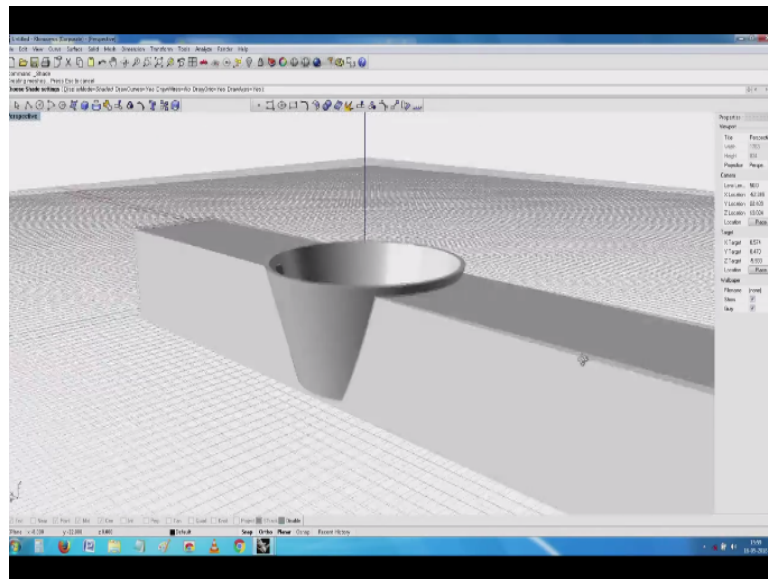
Can you see here; I have something here which has extruded that is easy for me. I can take this cone again, make another cone and you know easily remove that material but in principle, the outside sits flush, it is not as good as what my student managed but I have got something here which is not bad. I will say know not bad is all I can say. Now I will try the same thing for all the other surfaces, see how well I am doing.

And then get back to whole thing and then try to again. Now solid; I extrude this surface straight. This is slightly better.
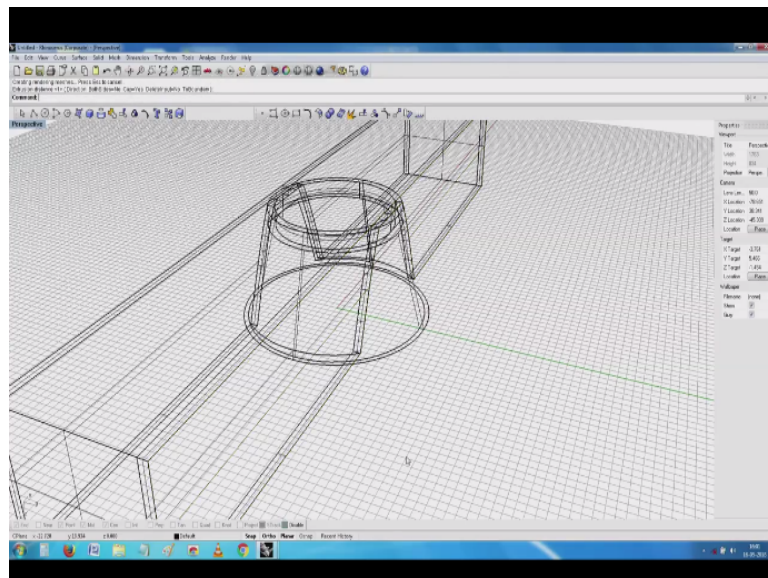
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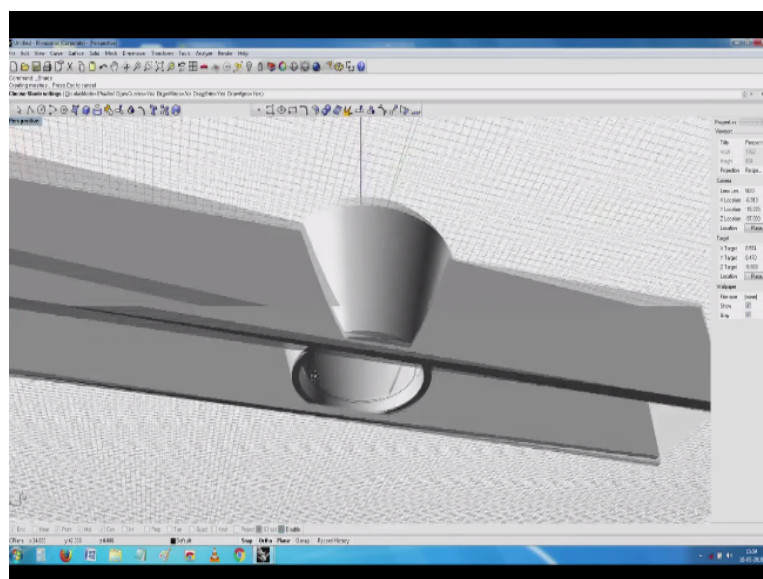
The thickness did create a problem. Here the thickness is not so much of a problem. So maybe I should do it there also. You understand know, maybe I should do it there and incidentally you have seen one more thing which I have managed to prevent that thing from getting jammed I may have small flutes all around.

These flutes have an advantage to make sure that you know they do not you know jam the other thing. Disadvantage being it will prevent contact. So not a very good idea to have these flutes. So I need to now do something and trim them off. It is very easy to trim them off. I will show you later and however to me know this seems to have much better option than this. So I will remove this polysurface. Use this surface again for.
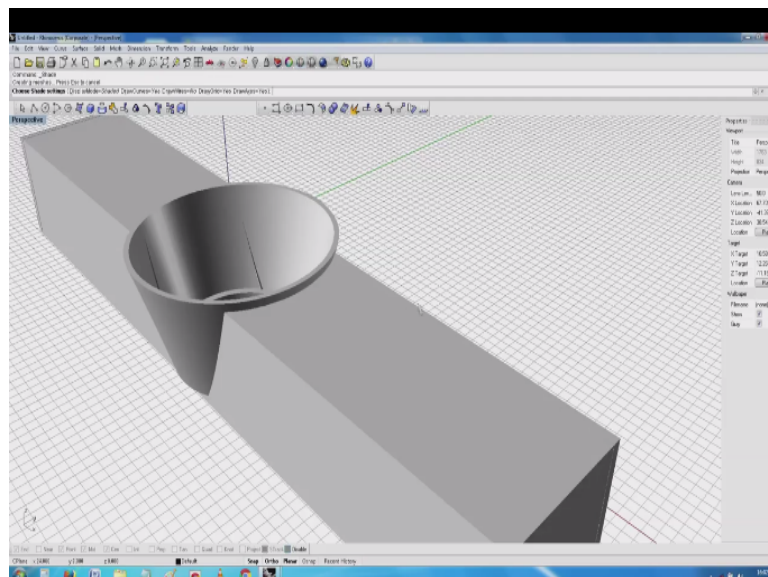
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See here this is slightly better. Same thing I will do with this surface also and with this surface, last surface which needs this plane and I have got these two bottom surfaces which I have left earlier.

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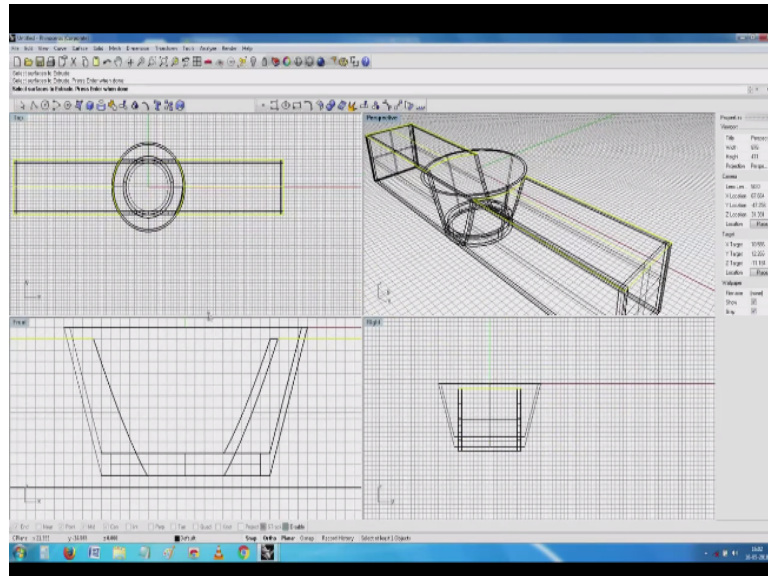
My project is almost ready now.
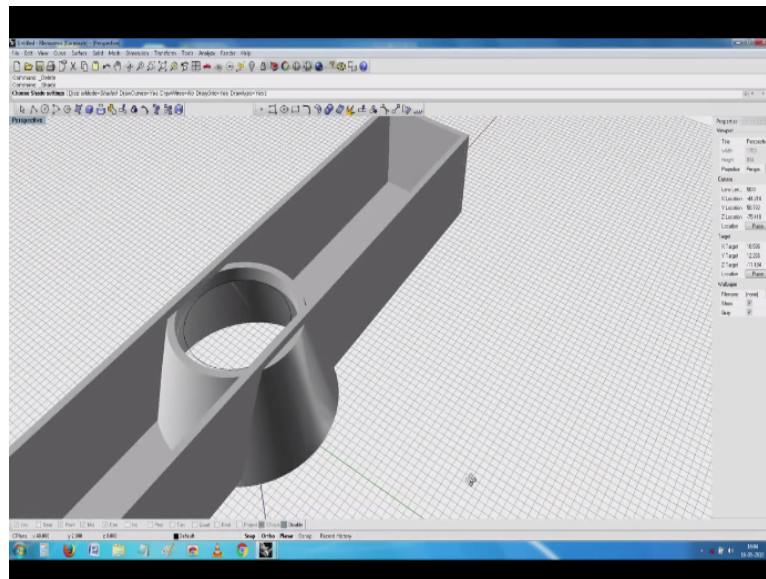
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See I have a cup and it is hollow and I have place now to maybe put a printed circuit on the other side and printing this is relatively easy. Now comes the important thing saying what sir we have a little problem what do we do about this thing. Now if we have to print like this while we have solved a problem here, here know large amount of support material is required. So you need to make a tradeoff saying would you like to print it this way or would you like to print it upside down this way.

If you print it this way, support material ends up in the cup but this prints easily. Now if you print the other way that also a print. So is there any other way out? Obviously, there is a very simple way out. There is no particular reason why this top surface should be know built and it
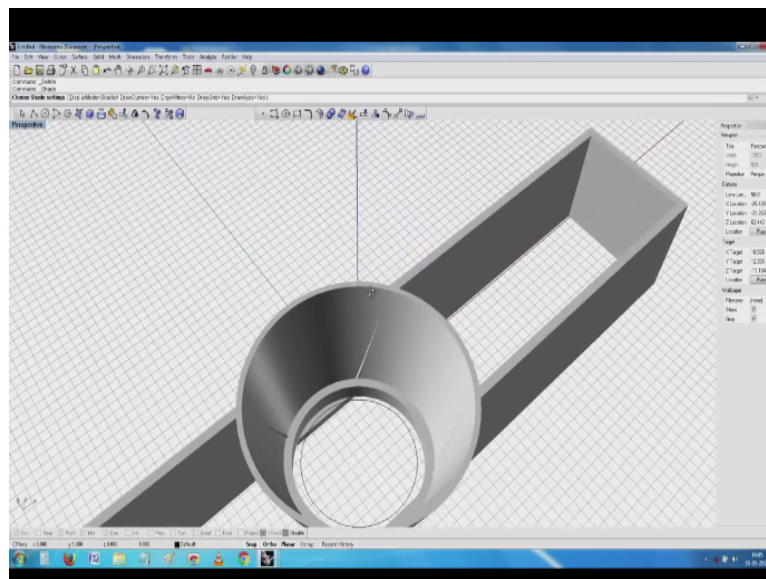
should look like this? Is it not? So instead I will remove the top surface and try to build it from the other side.

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See how?

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See this here, I build from the bottom surface instead and this angle I mean being not too much of a problem, it is very easy for us to build from this surface, no problem at all. You understand know or I can build it from here. So either way the total amount of material that is required and how it is I need to play around with it a little. So generally this particular decision you can take once you load this onto the machine there saying building it this way will it make sense or building it upside down will it make sense.

This being an inclined plane know so where does this support material come? So in my experience, it is probably easier if you build it upside down like this.

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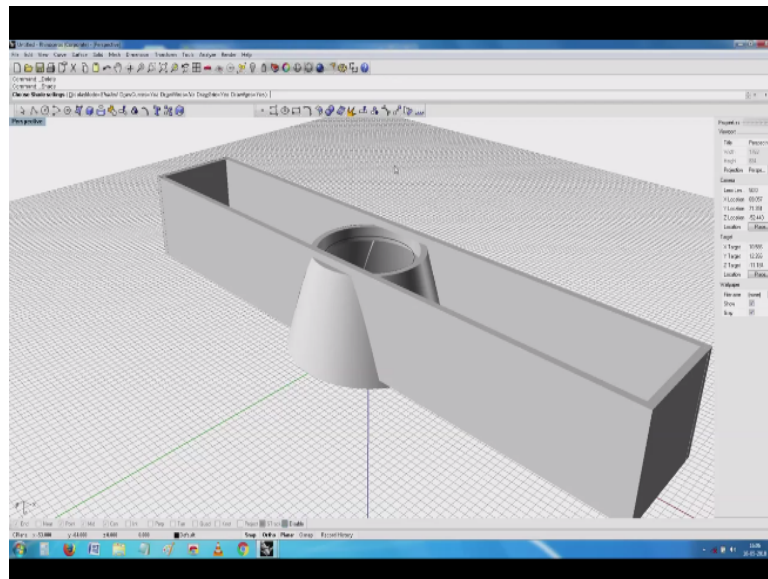
You understand know. So the thing starts building and one after the other enough support material which makes to build here. Alternatively, it is more convenient for the machine to build things like this we can build even this way. So both the things are perfectly valid and purely from what you call matter of convenience and aesthetics and all that know this is probably much easier if we allow it to build like this because that angle is not less than 45 degrees.

There is still a little slope, this is straight 90 or 0 degrees, this is full 45, this is only about comes to maybe around 30 degrees off from the normal. So if you go around and check most likely it is easy to build without too much of a problem and afterwards like we have done before we need to provide the various bosses and all that and in this case he had made a place for a tea and milk sachet and probably a spoon.

Now can we build the spoon also into this? Yes, and no, depending on the type of plastic you use probably no. It is much better to take a wooden or what you call any throw away spoon and then use it for stirring or in the case of purist, they just put a tea bag, stir, may be you know shake it with that, throw it away and take your cup out and start drinking with it So this is a story of my what you call that USB what you call?

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THE FINAL PRODUCT
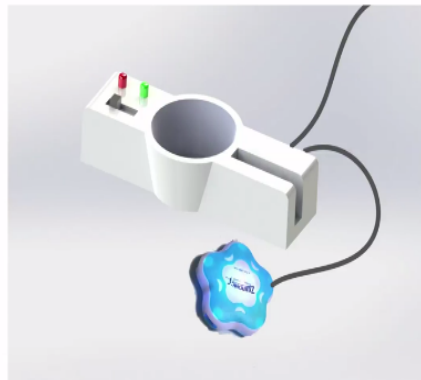
I will call it you know tea cup or whatever it is, so that various slides, various control is possible, how it sits and then how do you attach and then how do you build this product, what is the angle and if it is not very deep, mine looked unnecessarily deep, it is very much possible for us to build this product. So thank you, next session I will probably show you something else which is this.

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If you see this, if you remember I started with the light, so next session talks about relatively easy thing to build. In this case, it is built out of two shells, one shell on one side, one shell on one side but the real life what we build know it does have a texture. This texture problem here can you see. This texture does give a problem here. This is the CAD model. This is the 3D printed model.

So it is not impossible to finish it. What can always be done is you can coat it with any of your paint primers or there is plastic primers are there and you know use good old manual skill to make it smooth. The reality is this, this product is real. The one on the right side is real. The one on the left side is what you call our students have made a CAD model.

So automatically know you will not get this model here though now it is readily available what you call surface finish is still a problem but colored materials and smoother materials are possible and here more important what the students have managed is they have managed a LED bar graph. So I will explain to you the product better. So I will stop here and maybe in the next session when I show you another sample and may be will try to build it. So thank you.