Physical Modelling for Electronics Enclosures Using Rapid Prototyping

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Lecture - 09
Exercise in Product Sample 2

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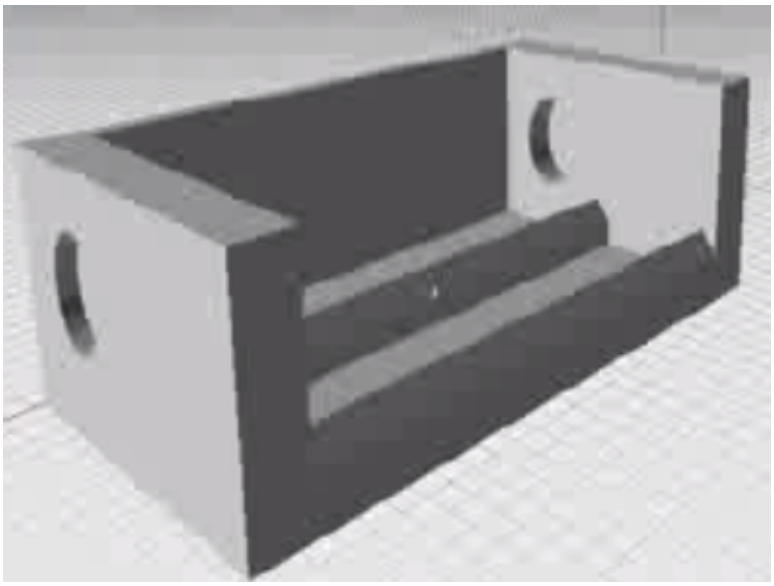

If I want to now create a cap for it, it is very easy for me. All I need to do is take this cut surface here it is possible for me trace all these lines and find out what is the thickness with which I can go inside and so on. Since, in the beginning itself I have made certain thing saying approximately, you see here this thickness, this thickness, some various what do you call design considerations I have done.

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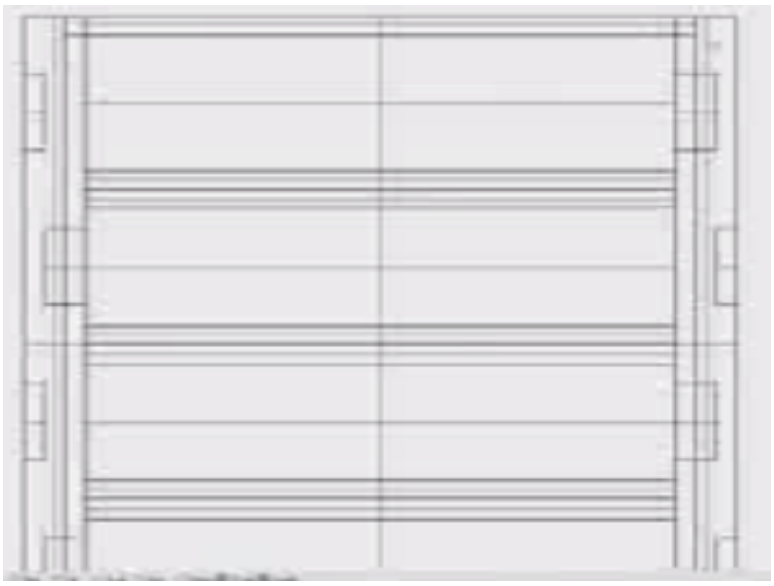

It is safe for me to right now to take may be about half the thickness.

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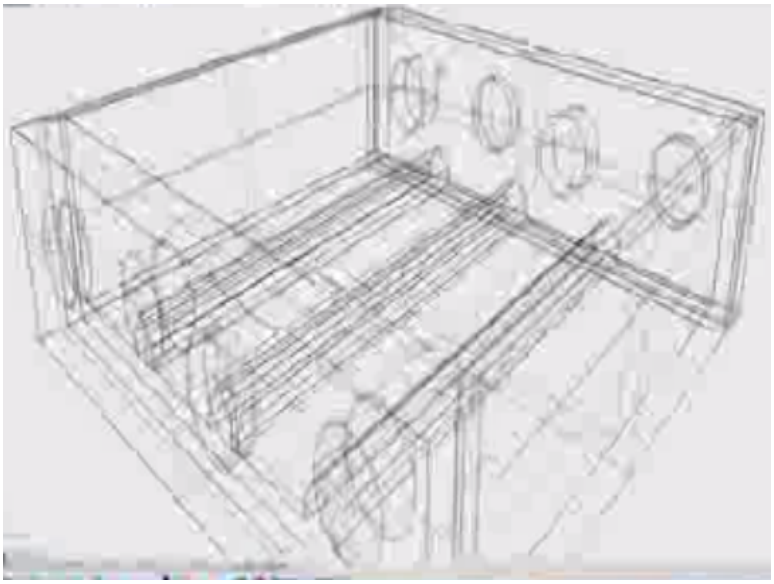

So, coming back to this point here, now I can try to make certain things to make sure that you know things will what do you call sit properly. So, I have a top surface by which you know this is one phase which is there, this is one phase. I will see what best I can what do you call surfaces from objects, this typically represents the corner to corner which I have and inside, I will hide it. Inside I have another surface. Some bug, I will do it instead the other way saying I will create a.

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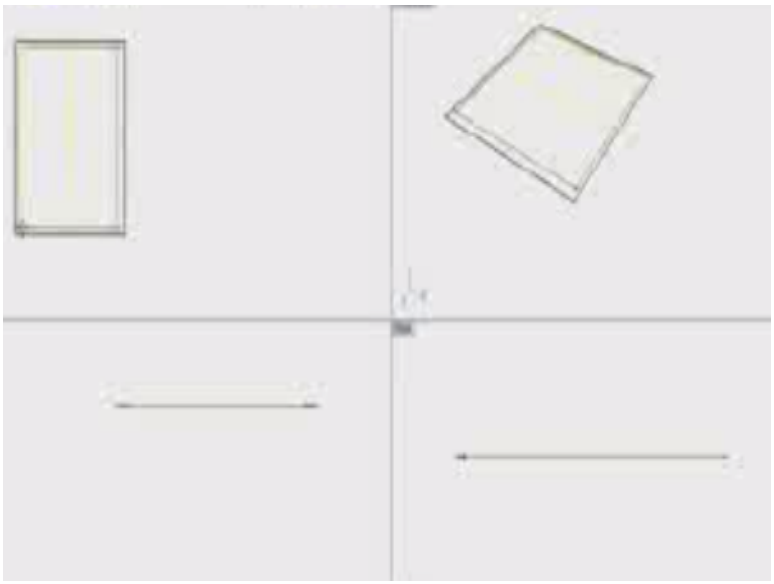

You see here, I have 2 planes, one of these planes I will extrude vertically up, the bottom one, inside one, this could very well make my cover.

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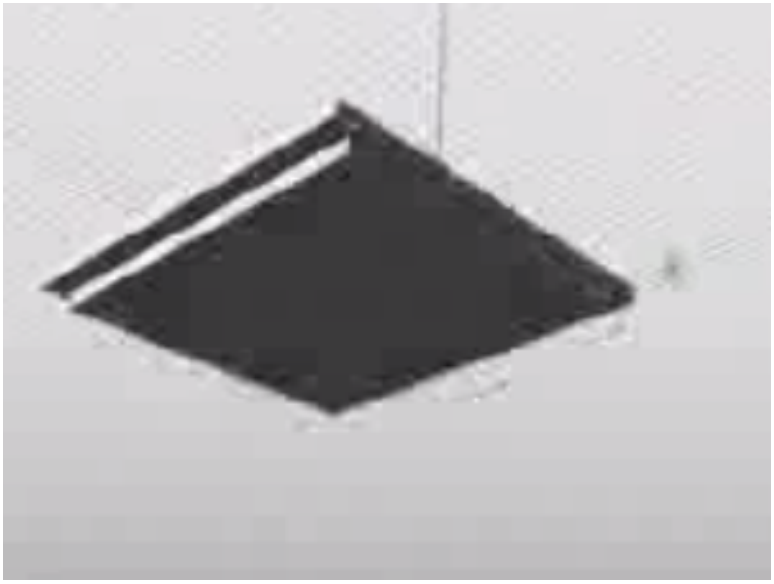

See here, I have a beautiful cover. Now, I need to do something to make sure that this cover will go and sit on the other things. This is where right now know, I will not optimize, there is a lot of unnecessary material here. Actually, I just wanted a small rib ball around, so it is possible for me, right now I will use it as it is. I will what do you call copy both of them, hide one set, then I will solid the thing, I am sorry what do you call union this whole thing, make as a single solid.

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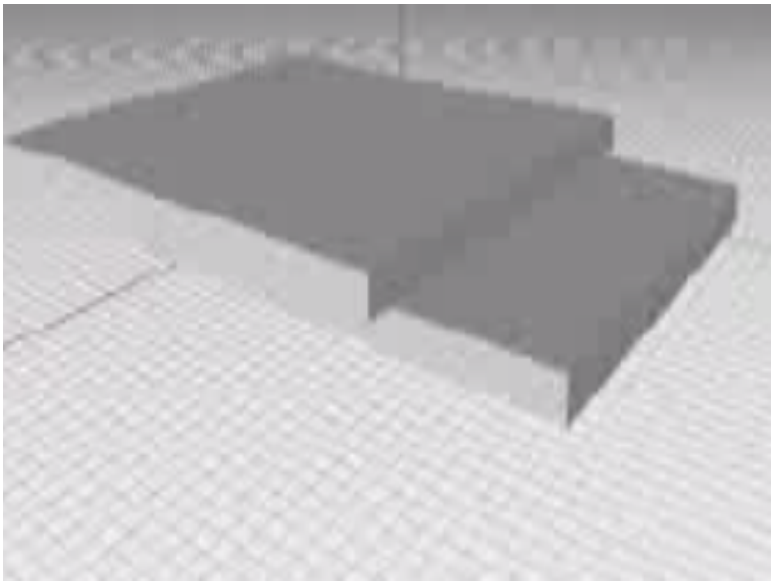

Ah what happened, yeah, yeah, some reason it is what do you call is a small 0 thickness issue so it is not what do you call easily joining together, I will just leave it as it is, instead I will what do you call group them together and now get back to this and try to. Hey what happened to all my parts.

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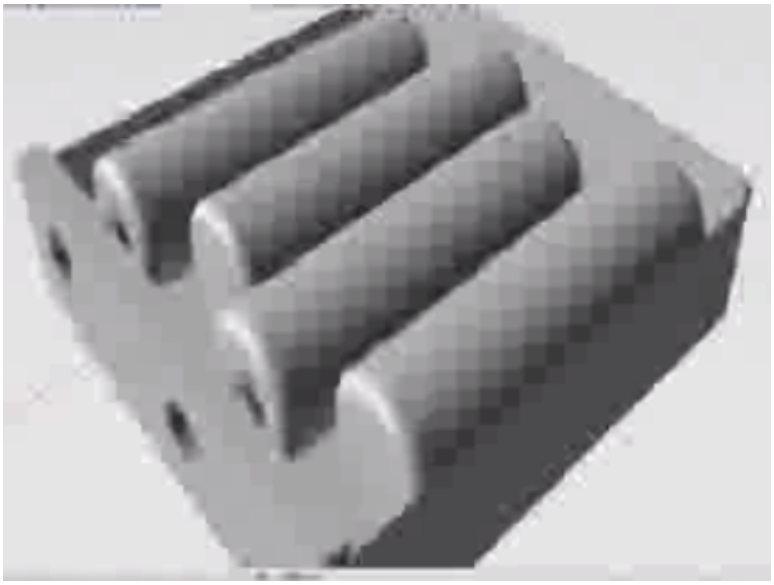

Yes, oh part of it got cut, anyway you can just still see what I wanted to do was saying, whether I can create a step here on the top. Right now probably it involves a restart, so I will avoid the restart, instead I will lift it a little and see where the problem could have been.

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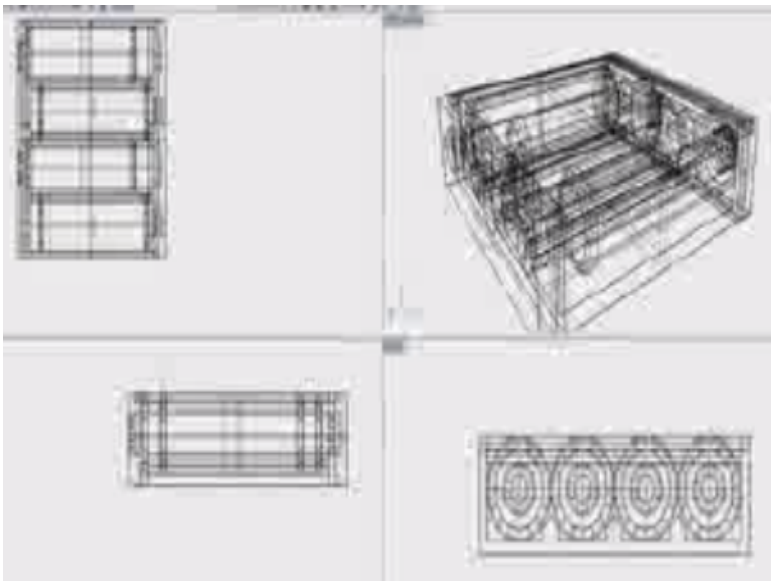

See, in principle there is no issue about it because this thickness is here, you see that thickness has been put into this and this I expected know it will, give me a little leeway. Oh, I need to restart it, may be I will get back and do it next time. Right now, well I just wanted to show you that I have a cover on top and the problem being this thickness on the left side, I have not dealt with it properly, so it is possible for me to make a cover, which is just a little smaller than this. It should not be the full width that is where the problem has started.

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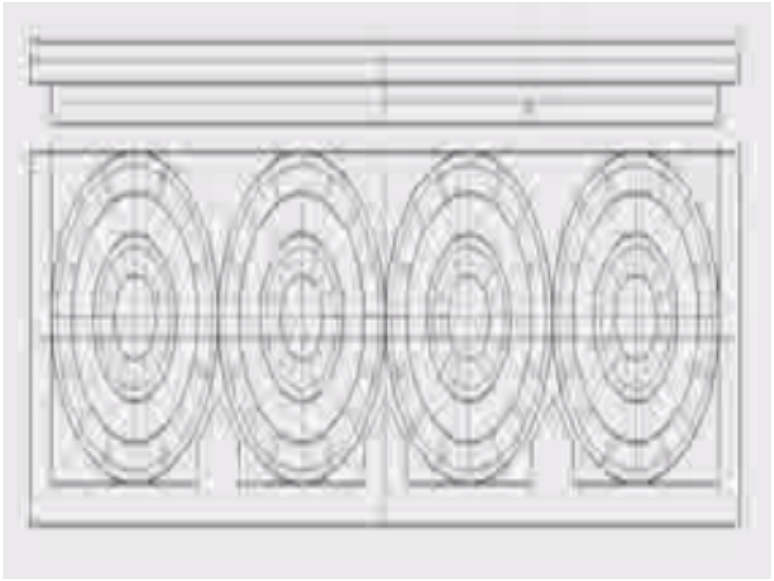

See here, this you know should have been a little what do you call smaller, I will see if I can I mean handle that thing in a different way. Yes, slowly, yeah it is a little you know narrower here, little narrower here, no I will see, so if I see here I notice that there is a small step and all these

sides is a little smaller than required. It is a question of my lowering it now and then try to remove the materials.

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Here as you are aware, I thought I will show you very interesting thing. You have these cylinders, you have seen that, the cylinders are almost coming to the total height of it. Now I need to play a lot to get the cylindrical shape there, which I thought you know intuitively I will do it, but it does not seem to work like that, so what I will do know, I will take all these 4 cylinders up, make them touch there, height the slot and do a.

With all my this what do you call tricks, you may just notice that I have managed to make small depressions in the top portion, which will be useful for me eventually. You have noticed it, now when I look at this cover, you see I managed to get the circular portions of it, which was part of the cells to be on the top side, which is it gives me a small advantage of when I place them if it was circular there is a little issue about it, but if it is in the other way know, the other features can be there. Finally, when I close it fully, that whole thing can be sealed inside.

I started with the top cover with a little this thing, I will now just see how well; see here, ah finally I got it. See here in the corner I have a small step here. All around, all around I manage to get the small step. Because of some what do you call that is only a surface modular it has not

come well, after I finish it I will sit at I mean outside, I will sit outside and see how well I can bring these things together.

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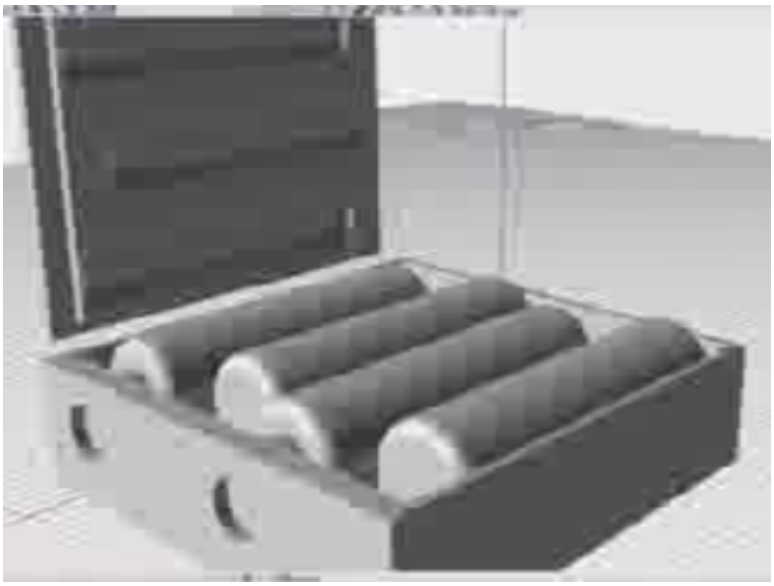

You see here, that was the concept. Intentionally, that cells have been raised and then you see here on the top cover, I have a small projection here, you have seen that, it has almost come to the edge because of some problem, this what do you call there is an extra plane here, which it got cut and it is not able to show up properly. So, eventually I will have a cover which will sit on this.

This is where little bit of what do you call our ingenuity is required or this thing saying do I know pack it with little bit of you know an elastomer material or in this case I can even put it with RTV compound, the same silicon sealant which you use for windows and all that, just a tap here and there. Once you close it and take it back, it will make sure that these things do not rattle and it will form follow whichever it is.

So, I think I have taken a bit of I think, I just wanted to show you how it is possible to build all these things. Now, I have 2 objects which need to be laid up and built.

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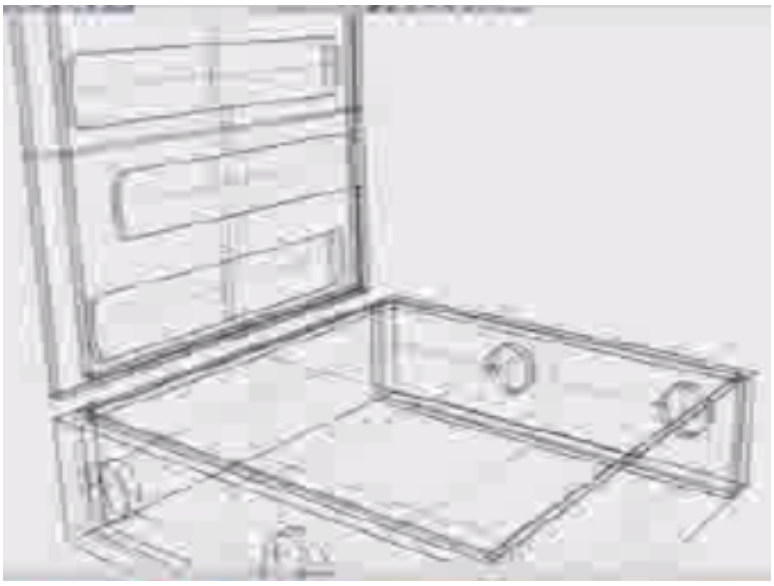

See, I have repaired it a little due to some error, it has boxed the whole thing, sorry. I will build it up afterwards later. So, I have one part there, one part here. Now it comes the you know our what do you call whole way of producing it. If you just want one piece, it is possible for me to lay, build it up by keeping this flat and start the machine and have this built up. Now, we will notice it, if you want to make this in a mode like this, we still end up, we may end up with the way things built up and all that.

So, it is more common practice that you make may be 2 or 3 of them in one file separately. Make 2 or 3 of these things in another file separately and start the building up, so that you will know how things are and may be you can do a modification.

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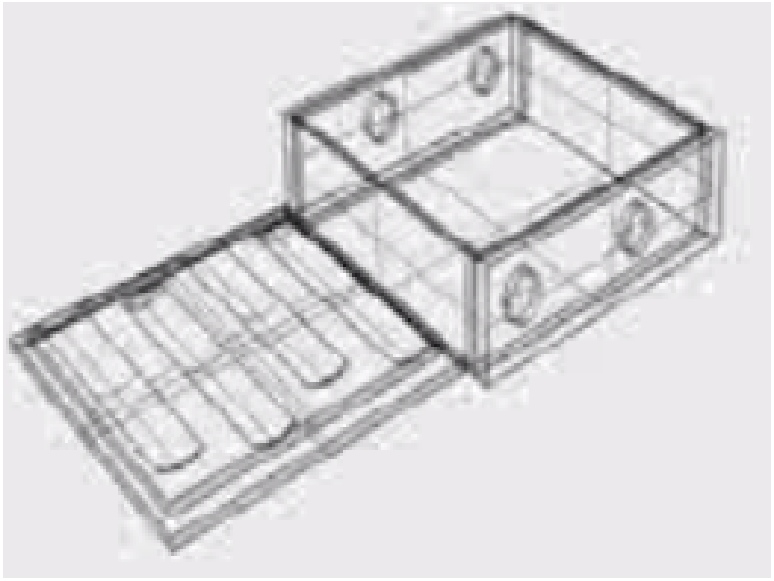

I will just briefly, I will show you now saying I will export this object, this is what we have created in the assembly, is a fatally completed object and it is easy for me to start building here.

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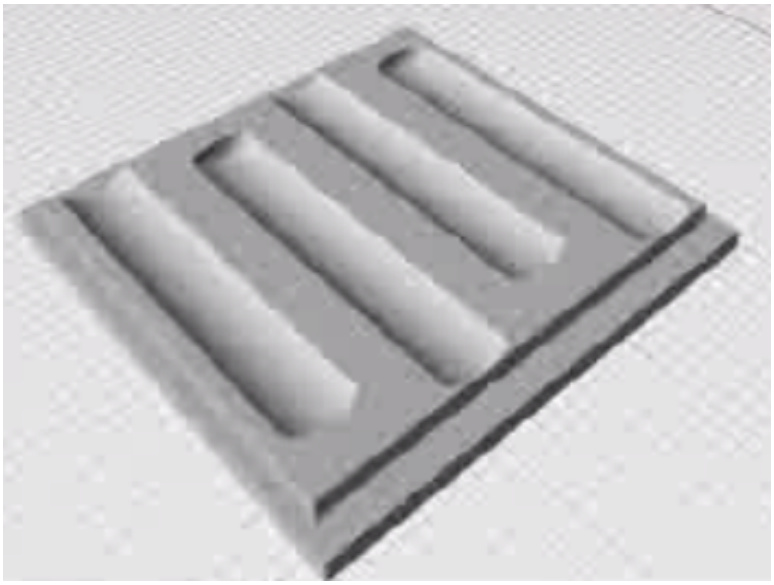

Now, if I see here there may be some problem in one case, in this case know it has cut and it has come out like this. Is this preferred or would I prefer this. So, these things you know out of practice we need to what do you call see which one of, there is no one universal rule for it. But, I still prefer in some cases this being open like this. In some cases, we need to make it a box structure and then since that has a, in case that has an actual movement, probably we need this side also to be open.

The issue is not so much as now; we need to send this. I will repeat it again and again. I need to now send this as STL file. This has been created now into a stereolithography file. The advantage of the lithography file is that it is a collection of lot of measures. So, I have a lot of control on this. In another program, and if I now close this and see where the STL file is there, I hope it opens well. I have not checked it. I am lucky if it does, you have seen here, oh it is lucky. Our creator is with me.

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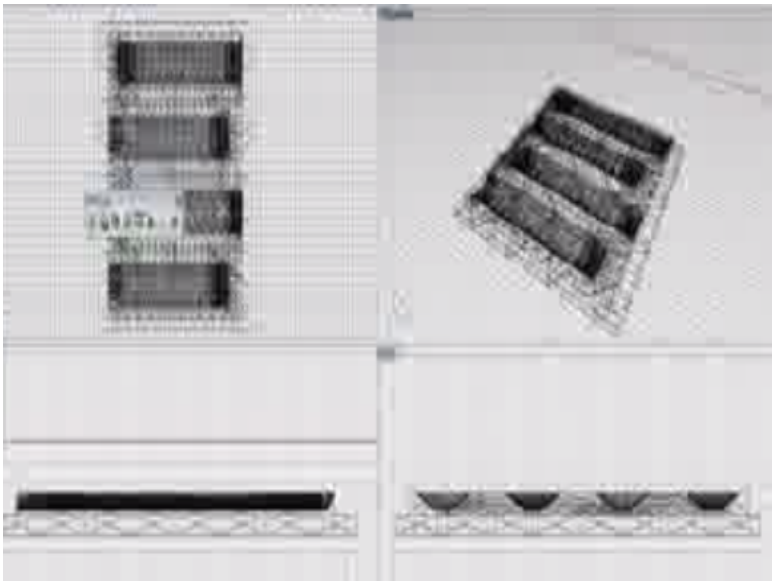

You have seen, I have noticed something about it here. What looked like a simple common thing is it is a, it is a collection of lot of triangles and first time all that surfaces what we have shown so far and partly which has become solids has got become converted into this mesh of triangles. This mesh of triangles is now used by a patch program by the other build up what do you call machines and for practical purposes, it does look like this. But, depending on the resolution and all that know, it builds the model.

So if I now, this thing, can you see, how many every radius has ended up with so many, so many triangles here. We have an advantage, we have a disadvantage and then if you see while creating it, we have to be a little careful about it. While creating a solid model, it appears little intuitive and easy, that lay up machines are the what do you call (()) (22:57) machines, use this for generating the other things.

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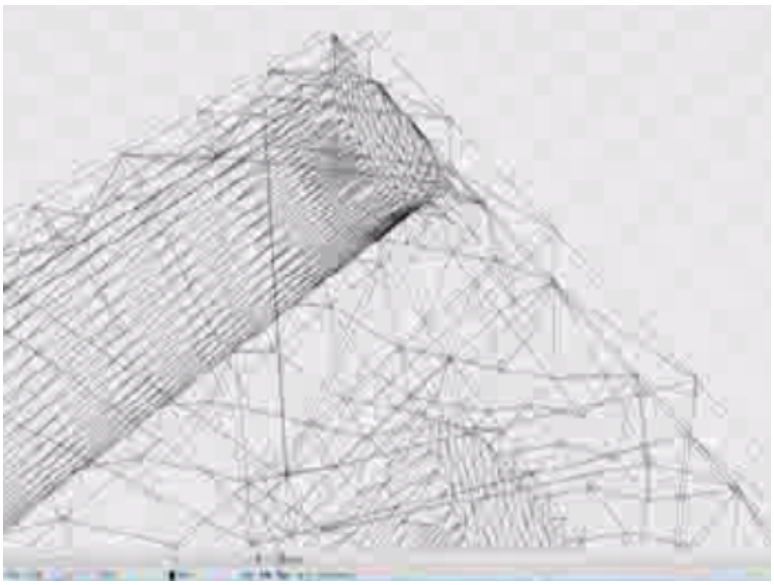

So, little bit I will just what do you call probably stop it here. Sir, can you focus me on my this thing, the surface, can I see my monitor? If you take any plane, if this were to be a plane, any 3 points you can pass a plane through that. So, that is the starting point of all the cad. So, if I, I will just close it at this point and what I wanted to show you also was the file lens. You see this file. This file typically is only 221 KB and you will see this file this is slightly bigger 287 KB.

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As more and more radiuses and more and more features come into place, these files become bigger and bigger, so I will come back to this. So there is a commercial thing here. Imaging this is single plane. In space, you can have one single plane through any 3 points okay. The moment there are 4 points is possible that you will have something flexed like this here. You understand

and if you want a smooth radius, you have to build all of them using more and more triangles. So, I am sure some of you remember building a globe.

If you have our globe, simplest way of building is make arcs, so many arcs offset the arcs and then when you put it like an orange peel, the top closes and the bottom closes, so that the center equatorial region does not what do you call fall apart. If you just make them you know I mean 90 degree out of phase, we can expand the whole thing into one space. The other option is to use the geodesic type of dome in which you will see a typically I do not know which ball, may be a football or something know, it has hexagons and pentagons.

So, around every pentagon, you have 6, 5 hexagons, so you see here with that know, it has to be, if it is all are hexagons, they will continue to be flat. When one of them is removed, then the flexing will start, you build the whole dome around it. If it is a single dome is a single thing, it will only be made of hexagons and pentagons, maybe we should look it up on the internet and then I used to give it to the students here saying why do not you build a small thing depending on resolution of those things.

Minimum, there is some minimum number, which is where the, I mean all of these things are developed. I will stop here at the moment. So, what I have shown you so far is where to start with, a cell and then how to make a box around it, which I have shown you already. Morning I showed you about it saying is it possible for me to make a box see here okay, and then how do I extract them, do I extract them, squat like this and then how to create the small details.

There is a lip here and then in this case, I have not covered yet, how to make a hinge, how to close it and so on and then some very elementary things relating to how to build a prototype, which can be used. It is a solid model, which can be used for printing every time. So, I will stop here, thank you. We will continue with the more practical model next time.