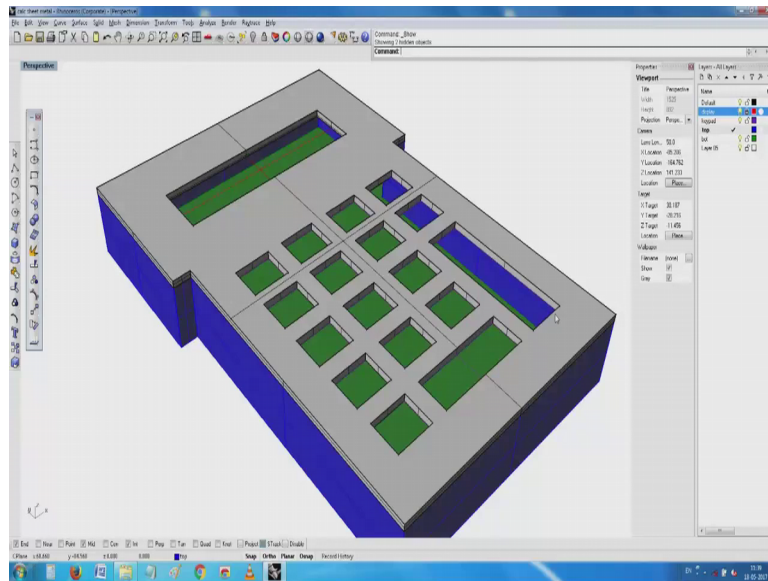**Enclosure Design of Electronics Equipment**
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Lecture - 60
**Sample of Simple Organic Shapes**

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If you follow this procedure and then if you have a leave various things like keys and all that things are relatively easy for us, I will just what you say for the present; what I will see? I will see if I can; you know get all the things back, see I have all those beautiful keys that are still present all that I need to do at this point is make all this and see if I can make some keys in this, if I see this one know is probably unique, I make a solid out of extruding this planner curve seen take similarly I take this, I am sorry, I will take this make this also into a planar thing make this.

Seen this; so, I will make one more thing; one more new layer which I shall call keys, give it some make exotic color, in this case maybe little purplish color, little dark is better, otherwise it will not show change all these into that layer. Make all this properties change them into keys layer and see if I can play around and see I have this nice keys that are ready for purpose of this thing, right.
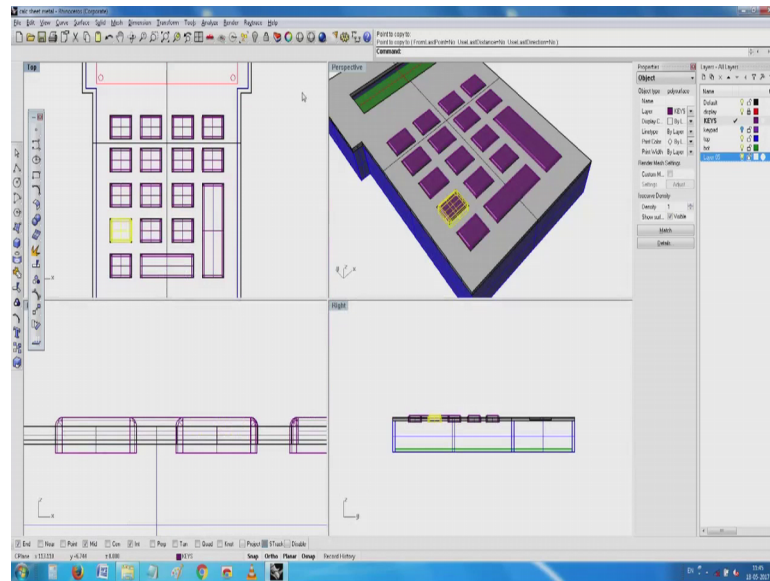
Now what are you doing only the filleting of the top, I will show you I have a nice key there seen that; it is also possible for me to make the other corner also of a similar dimension.

Unfortunately this; my package here does not make such beautiful things, whatever I will try you see here. Now I have a see nicely beautifully created thing here, you see here, the difference is now if you see the corner compared to the other one, here the corner also is rounded which is probably one of the ways. Now this I can use as it is or go back to that point I have shown you and see whether what I can do with this say one of the case, I managed; I will go back with the other case quickly finish this there.

Not bad; works. So, and I switch on the top then I switch on all other layers including the default, see here, I have; you have notice nicely, I have those cute keys sitting here in this place. So, you see one of this key is this one knows seems to have a popped out a little; I will see if I can push it back, I have a keyboard in which all the keys are sitting comfortable and flush it is just for me. Now to take one of this keyboard keys and then try to copy it in the suitable place, I have got 4 keys copied here, I will now say it is whole bunch whether I can take it there; not bad, I will take this 3 keys copy them here again my devices slowly getting ready .

At this point, as I have pointed out to earlier, if you are to make it in just simple plastic or sheet metal, my suggestion is you can go ahead and leave things as there. So, if I now

switch off these; what you call go to the; it say top, switch off these keys, see I have those openings back where they are said this point if you remember the corners are not very good, after the first key which I have made this appear sharp here, things are not sharp, say it is possible for me. Now to go and see whether I can repair this old same solvent; I again try to make the solid fill it and it. So, that large time it are generally know I will try to use a smaller diameter see what is happened of it, if I just switch on the keys layer, again you see here, this seems to be more what we were looking for understand know.

This seems to be a little better than what it is; color does not look very elegant; however, I just wanted to show you that this is simple way of how to tell building those things, but the moment you have more of this fillets; more of this things drawing is likely to become big and my the small ancient are in desktop is not able to make this handle this and effect regeneration. Now for us to make this, it is very; if we are to fabricate it, it is very easy to fabricate this. I just need to take only this top portion, you have seen this; take a printout which is what you say take a printout of this say 1 is to 1 print out, stick on another think it could be sheet metal or it could be a plastic sheet or it could be any other thing, keep it on that and try to open these things and if you have a file of this, this file can be sent to the laser cutter.

So, what the laser cutter does is depending on how well you make the proportions and you know the caps and all that; it will give you an identical piece like this. Now you are in I mean it is convenient for us to make things very quickly. I started with a simple outline then I will start remove the various keys and all that; this I can conveniently pass it on to the any other fabrication facility. So, in this case at this point allow me to what you call sort of deviate and go to a way of can I make something which is little more elegant thing this all that needs is. So, I will just start to working with the what do you say, let me call it the green portion of it which is the bottom, then the blue portion of it which is here and then I try to remove all other things.

 I have these 2 together, now I will say depending on what you call and what moved my; what I call this software is today, see if I can join these 2, this is the solid, this is the solid, I go here and try to make a union, I hope it works, I do worked, surprise, does not often work, but today it worked; you have seen this. I have a nice cover made out of the middle body of the thing and then the bottom they have been joined together its

convenient for me because I can turn the other piece subside down build up all my things including the PCB and all and put it here one way of making it is that.

Other alternative will be maybe make the top and bottom make it into 2 halves. So, I go back to the bottom you have seen this, I can maybe join this to the other one and then try to put things inside with which is equally convenient and easy for me seen this here as you had these 2 are a different colors its very it is a matter of you know very simple principal for me to join these 2. So, I will try to; now try that I will make a union of this with this, it is join together big surprise for me yes, I join only thing is the color.

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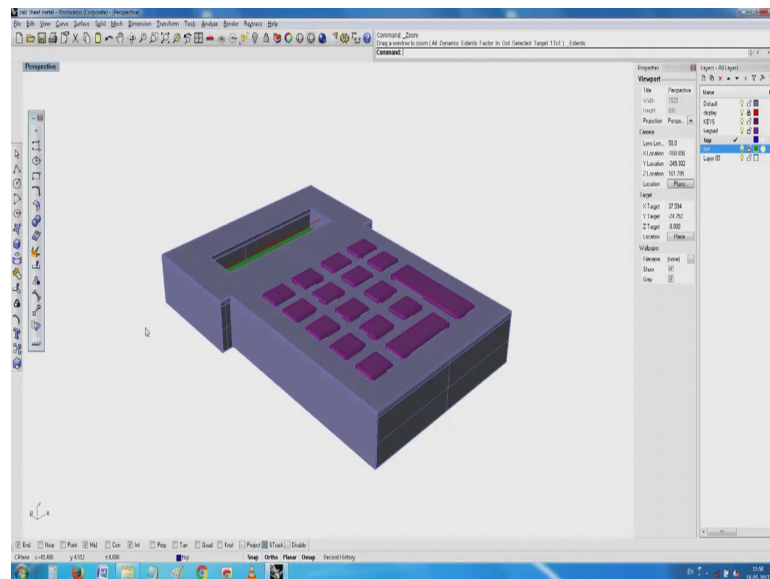
Now this color is very different from the rendering color. So, I am happy that I have an object like this, I will see which layer, it comes to the default layer, I will see if I can change the default color to more pleasant see here I have a top cover with a bottom.

So, for the present, what I will do is I will try to shut off the bottom like before, you seen this, oh, I will say if the color can be made little brighter. So, I have all the 4 corners. Now at this point I need to see if I can do something to make things a little more easier. As I said, this is a very the machine is simple in the packages equally simple. So, put up within I will try to fill it these only these corners this part I will come back later. So, I will see I make a solid and then as before. Now I try to make of fillet edge and then by default, it shows some 0.4, I will see you have seen that it looks like a small fillet has been created there or can you see here a gentle filter of the body has been create.

This around with the construction line construction lines, I will hide and you see nicely away corner that is made their that is the filleted corner can you see here small internal 0.5 I have given. Now I will see if I can continue this in all the corners, I will get back to the old filleted edge here and then to make things a little faster, I will just take to one what you call edge filleting for all the openings and say how will things comes out. So, thanks for your patience that you are trying to hold down as I have said have no option, but to wait I think most of the things have been covered.

If you have few or not covered see here, now you are notice that nicely this thing you have seen that all the edges have been smooth on the outside and similarly on the inside also things look better. Now I have a reasonably good enclosure. Now I will switch on the keys and then now I will switch on the bottom and I have a display come everything and everything which is ready, let now I have not yet talked about the material properties.

I have not talked about actually how to do the rendering and so on. It is just that using basic surfaces I have started with the; what you call key, I am sorry, they I will display PCB which I have wanted to use which is again taken from the wish boarder the bread bold and then try to go back to the drawing and then try to build a an enclosure around it use in standard case this is one of it.

Alternatively if you are very sure that you know it should be only so much so on and I can show you; this is the older one and then this is the newer one you see everything is smaller and all that both have their place. So, it is possible for you from go from outside to inside or inside to outside; if we had only stuck way the known available components progress would not have happened. So, things like this have a place; there is absolutely no, wish you about it, they all have a place and they places saying we have tried to assemble and made this only you just a modeled which can be eventually scaled up, but then industrial designers all the time or in general designers have been working on this things and coming out with concepts like this seen this to start with this is not very symmetrical.

You have see that now in reality symmetry is not the; what you call thing which is there because if you hold something in the hand something extending out is no problem.
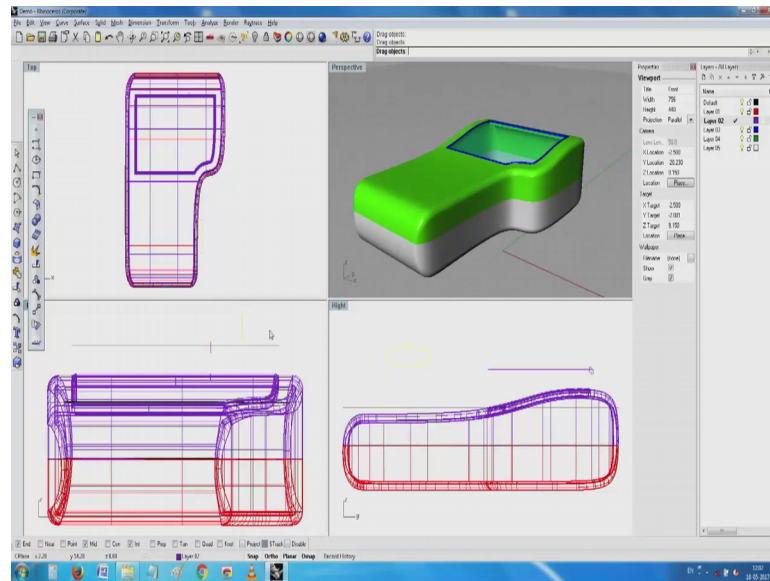
And still we have place here in which we can provide certain keys and whatever small things we want to do maybe we can provide a key here maybe we can provide a key on this edge. So, I still can do certain operations on this object and see things like a simple on off or a rockers which can be put here and. So, on just a few more minutes I will see if I can do something here this time what I will do is instead of this.

See I have 2 entities here this one I will use for making small opening here. So, I will put one switch here and then maybe one more here see here they have conveniently those to openings are sitting there for me. Now I will see that maybe this not that what you call elegant; can I play around and say what best I can do with it I will say if I can rotate it by 15 degrees; same thing here, I say if I can rotate this also by 15 degrees, you see here I have now to opening one here and one here with sit like in that. So, I have I can put my fingers and maybe operate this things to make keys, I will use the same thing instead I will scale them down I will see if I can scale this down say this could from the key this could from the other one.

So, would make these things comfortable I will just move it and kept in the middle. So, I have a set here which part of it makes the outside see here I have something which I have created on the fly. So, what I will do it I will try to do a solid with a difference and opening has happened see here I have a nice key which now sits here; do not ask me what it is because I have created this things on the fly trying to work easily then I can

play around this opening looks a little bigger and then maybe I can scale this up this definitely looks much more presentable compared to this key can you see not too much of a gap there.

So, now I see if I can whatever it is; I wanted to do I can play around and then try to make what you call fillet of this edge here and see how well it fillets I have a cute key there I just need to copy this key seen this I have nicely created some object I want know what it is and the thing being this thing can be now done by any of this rapid prototyping process including that I mean. So, called three d printing I can use it for molding and third layer a process still use occasionally it is so called vacuum or thermoforming.

So, we can make you know matching mold on you can keep a sheet and press it under do it these organic shapes can very easily be created by that. Now it is for me to just what you call I can you know make different colors of this and then for convenience I will make this into yellow key this, I will make it into maybe a blue key you have seen this here I have a blue and a yellow key.

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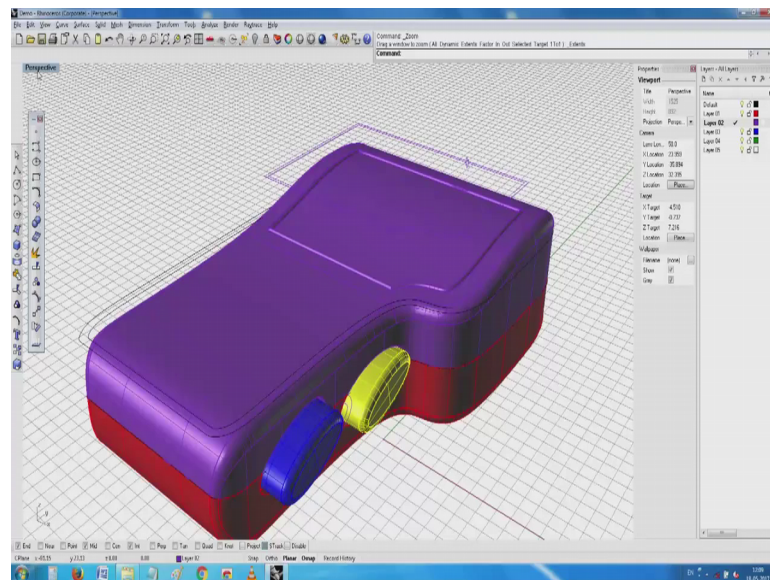
Now, if I go back to the original wireframe, I have it like this and maybe when I regenerate it. Now it comes here only thing is during rendering material say if I give the corresponding material, I have the necessary object I just wanted to point out.

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You that the starting point is this in this case they are real life components and I make the circuit and then after that I do all this necessary operations and then put everything and then eventually we have a bugs.

Now, the thing being that designers will parallelly be always thinking up of things which are better that is the things like this beautiful whatever objects you see are always there sometimes there very functional, sometimes it is a matter of making a small differentiation for different market segments there is always the up market people would like to own things initial stages, I showed you about a where to what you call that mobile phone whether you get a strong signal is not important. The fact is it is rare and then other backup devices are concept service and virtue is very important. So, we have very expensive thing same thing as you may have a watch which is diamonds rolling around in it or something which is made with a bracelet or if you see toys for boys you have diverse watch and you have an marionettes watch and then you have aviators what you call aviation watches where everything is there they can also be used, but routinely you would not use it for that.

This is the differentiation or product positioning product positioning these days refers to maybe putting a few products in your video games when I know the shooting is going on you see a vending machine originally it was about how do you position the product in the mind of the consumer. So, we know that certain things are valuable if you buy something

and then not easily attainable what I have shown you. So, far is a very simple and effective way of trying to mix small things in the vertical in your fabrication shop and lamp, but eventually you have to probably work both backwards and forwards decide on a set of features which the marketing will support adding a small extra value people pay a little more money than required.

So, if you have a price versus features a little more price and people think you are getting more features people will buy the more useful things. So, one of them is it may be future proof for the next say five years nobody would have thought that the features we have in this mobile phones these days in a mobile phone probably people worry about the camera and similarly people worry about the connectivity; how well you can upload it to the extent that several SLR say Wi-Fi built into it you take any of the new Canon EOS things most of them come with a Wi-Fi and remote is not so fashionable these days. So, if you take the there are not very expensive also. So, the camera transmits pictures here and then I can use it for updating this thing these are all features which have to be built into the equipment.

Some of them are external. So, if I see a mouse like this, I have probably picked it up by just looking at it how nice it is, but then un closer observation, I see that this is has a nice grip in surface and this has a smoother surface and then I have wheel again this wheel alone has a beautiful grip and at the bottom there are 4; what you call spacers which will ensure that it removes smoothly absolutely smoothly and then all other features are there. So, how to make things is partly here what to make is where you know you have to use inputs from focus group saying this; what we are looking for not what is already in the market what is little ahead of it.

So, depending on what you worried; we will come across saying how many products are successful; I will leave it, you go and check it up on the net or you know you retrieve today to see out of all the new products how many actually make it.

So, thank you until we meet again in the next lecture. So, bye