Electronics Equipment Integration and Prototype Building

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Lecture – 15
Off the shelf enclosures and making a user interface

If you remember, the last I was talking to you about saying one needs to make a small presentation to your colleagues and give several options to them so that they can now decide to work on that. It is a allow me to what you call keep repeating again it is not the full over the wall type of things it is not fully over the wall, but still you need to concentrate on your design and continue it forward. So, let me what you call take you to the power point.

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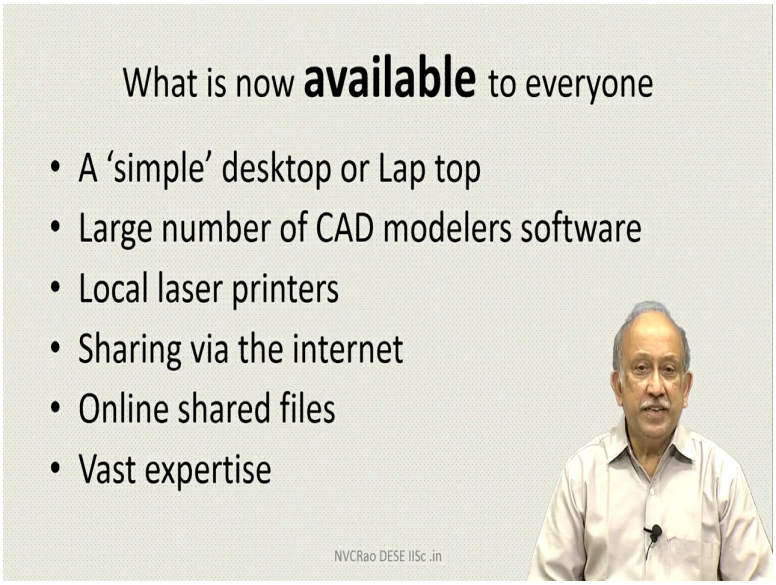

You notice here that we have a simple desktop or laptop everybody has and there are large number of CAD modelers softwares. The advantage with that the cad modeler software is

some of them come built into your other this thing including a schematic capture and so on. So not a big deal to get one and any number of you know simple things with you know non xav everything is available can always use it and best part of it is you have the local laser printer. It can be directly on your desktop or it can be connected to your, what you call small LAN, your own VPN or WLAN. So, you can always share files where the internet.

Then you have the, what do you call files which you can continue to share online. Then another thing is there is a vast expertise on technical things. So once you have started you are very much you are ready absolutely no problem.

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So, if you take a very complicated layout like this just for presentation I have shown you. Now, you can always make a mock up and present it to your other batch mates. It is a little

like over the wall, but then also it is you know it does have certain facilities which is there. So, you decide what type you want.

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After having decided on what type to build here we again go back and decide. So, here I think I have showed you already saying we have made a model and that model did not come out as well, but if you see the actual prototype built is much better ok.

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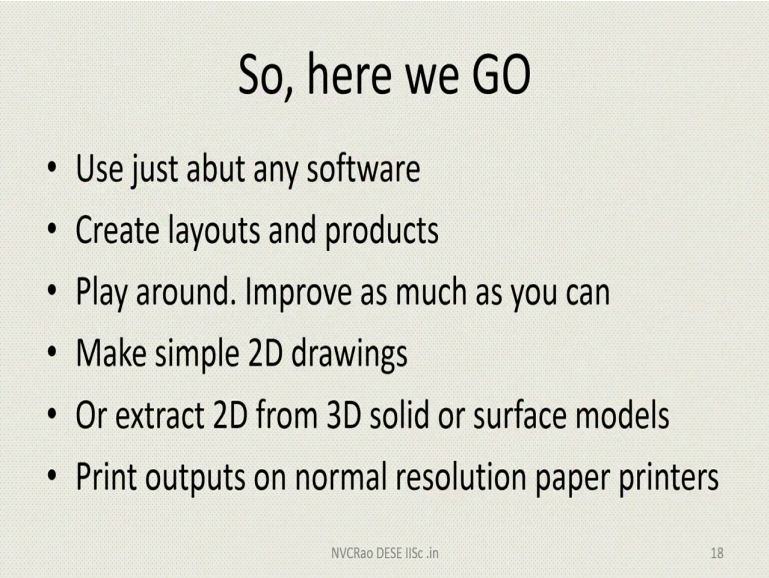

So, I think I will repeat it again play around and this is where it is now. You can do iterations and make simple 2D drawings.

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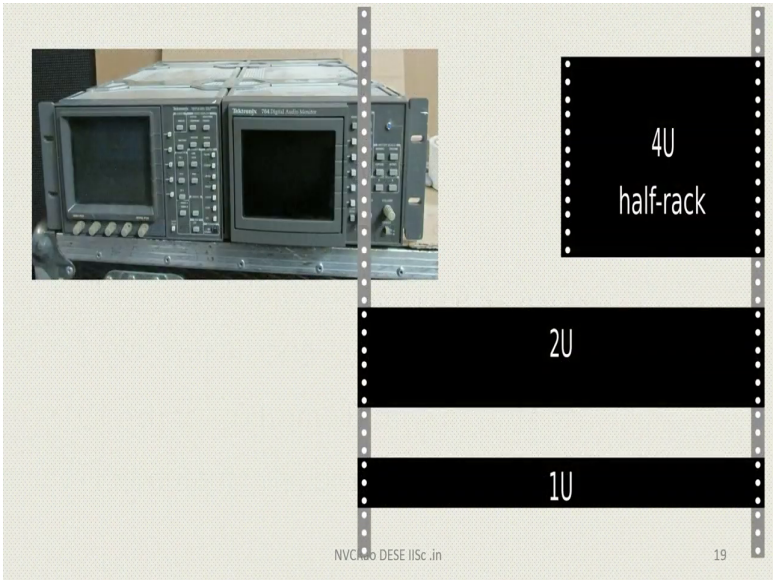

And, then I also you know I think I showed you this saying eventually everything ends up on a rack.

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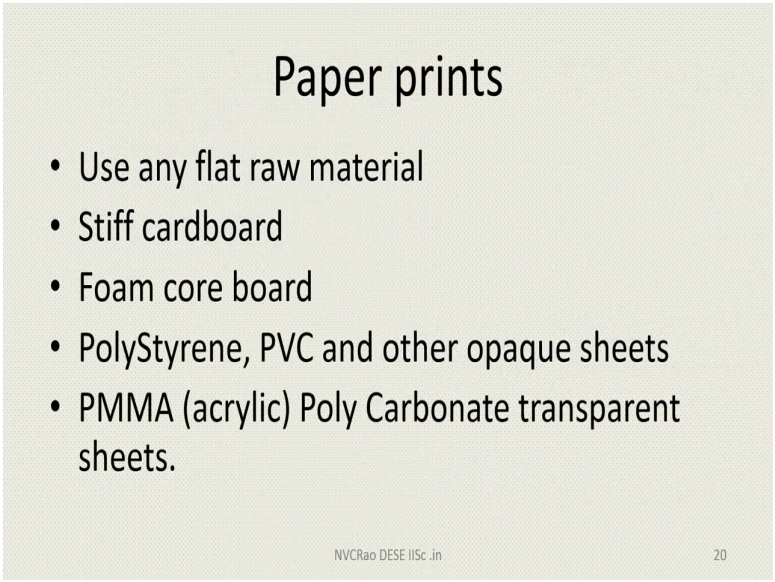

So, you need to build something using any flat raw material, cardboard, foam, polystyrene, then you can have PVC and opaque sheets.

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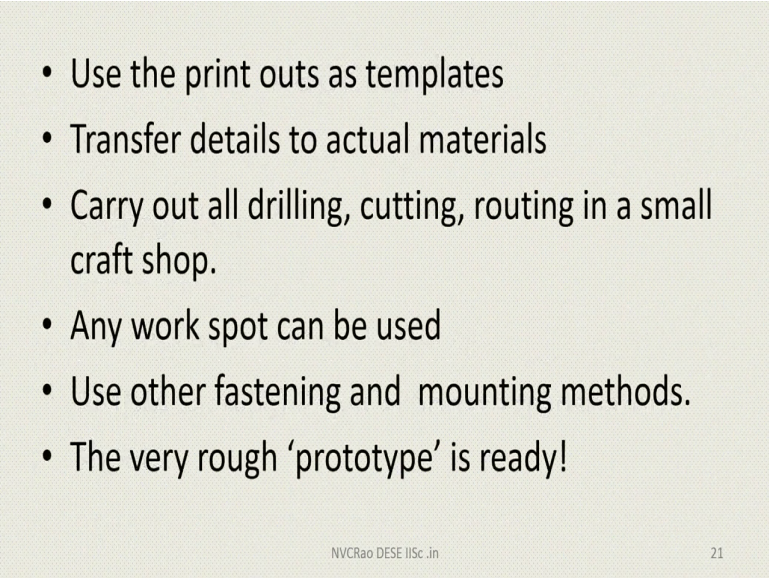

Then the important thing here is that templates can be made; templates are the issue. Earlier what you had to do by going to the workshop and depending on the accuracy and often you have to get back because sometimes you will notice that something which is important is getting compromised and something which is you know which can be accommodated has been unnecessarily stressed upon.

So, you have things under your control you can do anything you like and cutting, routing in a small craft work shop and fastening and mounting methods. The very rough prototype is ready most important is that know a beautiful this thing compared to that.

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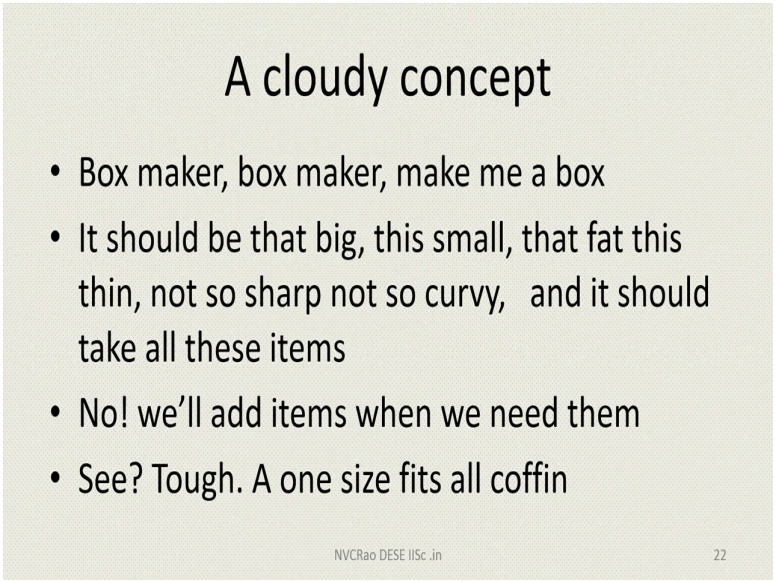

You can just go to a box maker and say make me a box. It will end up like those what you call central as the slippers it will only fit one not everybody. And, describing something saying you know make it in what you call just description without engineering drawing is still problem. Now, we have come over the engineering drawings and come directly to 2D and 3D modeling directly. Now, once you start you can have this advantage of we can add items and even coffins know come in probably steps ok.

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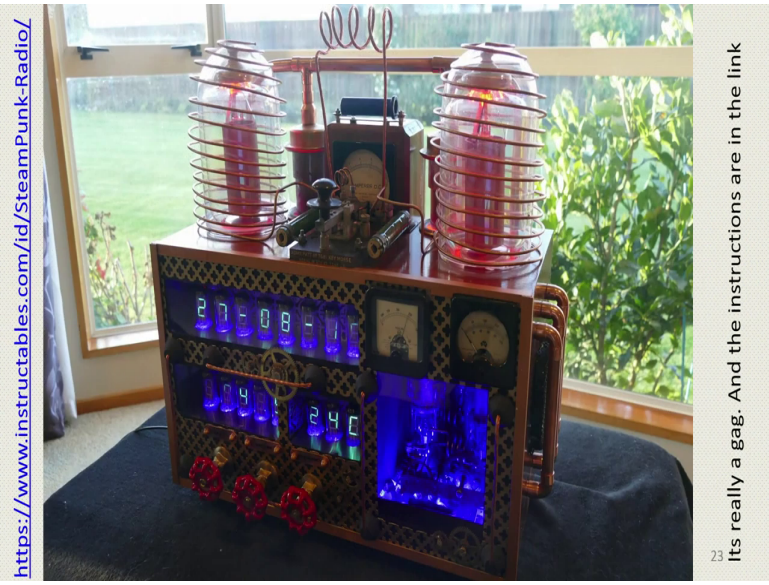

This is early a gag what do you call I do not even know what it is I have just made it for the; this thing about it.

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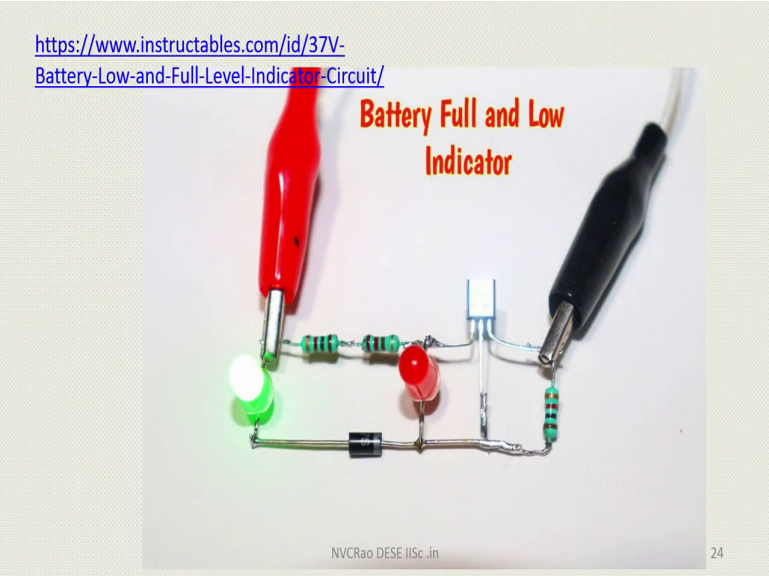

So, even a very simple thing like a battery indicator this is circuit, but then how will you actually put it into a box that is still a big issue.

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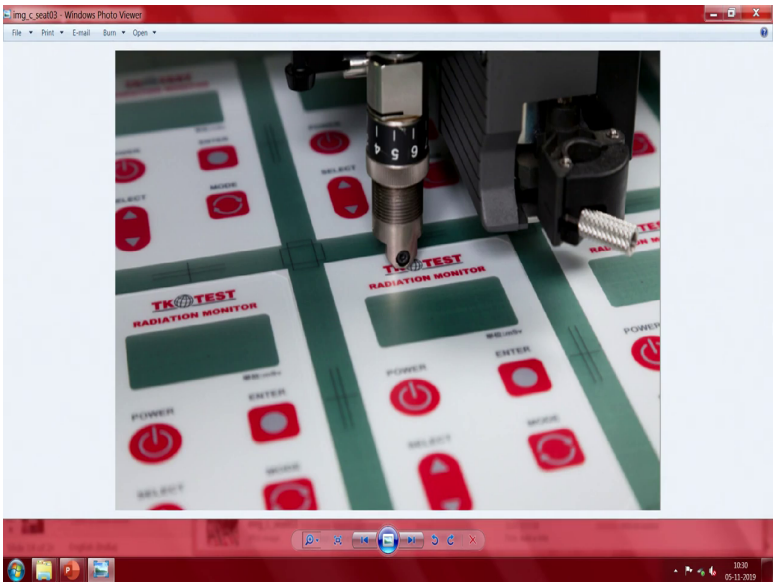

So, I will now see this is taken from one of the manufacturer's catalogs. So, you see here even you can use an off the shelf device.

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And, if you send these files to them understand know the file you want they will print it, cut it and give it to you. See here what is going on very very interesting concept. This is probably a laser cutter which has taken a pre printed sheet and it is cutting it.

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And, small equipments like this know this is you can configure it as your like this is the reason why I were showing you know now it is in your control. Most important is your scene here things like mode, enter, power, up and down and all that you can make different products for different people.

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You can position them differently you will see here. One thing you will notice is this is probably a off the shelf item. This is off the shelf item they have you know made it into a probably it is an attendance register device and you can put a RF ID card.

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And, it works here. Since these things these are all off the shelf devices that are built using aluminum extrusions and end pieces. Before you actually fabricate it is very easy for you can just order it online get one piece, try to push all your items inside and design the control panel. You see here everything is under your control you can do whatever you like. Now, here it comes to the thing do you freeze on the PCB and come here or alternatively, do you parallelly develop this layout along with the PCB routing.

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So, you see here this I think I have intentionally taken it from here. This probably both of them come from a similar manufacturer, but you see the way this front panel has been made which can be easily you can design it. So, like all groups one person may be very good in making these interaction things.

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See here large number of things here and then one thing have you noticed here the sticker know is here it is empty, transparent and then when you put it on top of this probably this is a reasonably watertight IP 55 type of a enclosure. So, even if you drop it on a corner it will not fall and then you have the small openings here, depending on the purpose of it you can always plug them.

The thing here is not about what you call the functionality of this, but it is a lot about the design of your make your own design you see this is the best which you can do.

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If you remember in the ppt earlier I showed you transmission test setup, but typically if you had to use a general purpose device you may end up with this. To me I mean I a what you call at 12 key keyboard like this it has two extra keys I do not know what these things mean and you know while this function keys and these keys and there is a home and these things have been done maybe you can improve on this things and magic is was to by changing this sticker you can make a different equipment completely.

Suppose, you were making an equipment for a professional user which has only a limited number of what do you call scenarios for deployment you can just freeze all those things here, remove all the unwanted things and then somebody maybe introduces sample and press the go button. And, then you see here these are all sort of now universal; we know that it means it is connected to a LAN somewhere and it keeps working.

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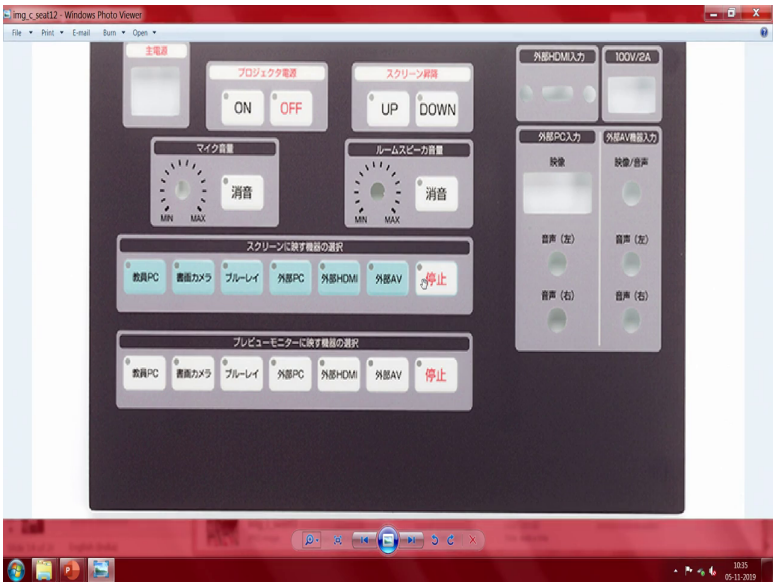

Now, you see here very very interesting things. Somebody has printed all of them and probably now it will be cut on a polycarbonate sheet and somehow using an engineering adhesive it is attached to the box. It is very easy for you. You can now you know use as you like and actually why I probably brought it is you see here some are known well known and then on the top these are meant for the local wherever your I mean it is being used so that it should be natural.

Sometimes when you buy these products which are marketed for the world you will have a huge booklet like thing by which only two or three pages are relevant to you remaining are all in other languages. So, you can avoid all that all by just making a sticker you see here there is a small provision for an LED here and all the stuff is there.

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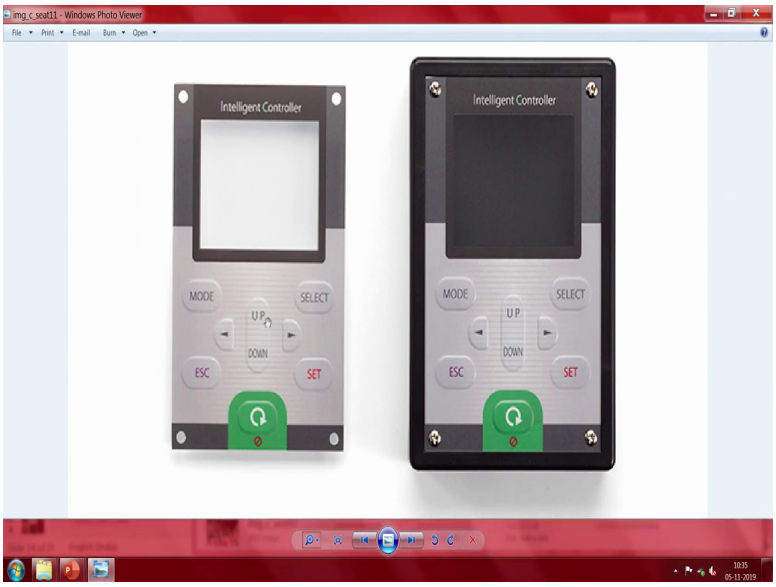

Now, you see here it is as intelligent controller. This goes directly on top of this and you have a equipment and the beauty is you have made it. And, most likely this thing the first of your pieces you can put it to somebody and whenever you go into a discussion some people would like to take a call on it saying no why it is this here and why it is not anti clockwise maybe you can make one more and make people group dynamics and then you can have it like that.

You see here something is up and down, but here there are two arrows to me it is a little confusing, but there is no problem I expect all these things have been done.

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Now, you will see here what it is being done here. So, you can make any standard device like this and attach a your own what you call graphic on top of it also called decals and you have an entirely new product. And, slightly unethical is you can buy an existing product line I do not know whether what it is I think I have shown you earlier, but I have not shown you. I can buy something existing like this and now pill of all the things I had my own decals and make a product for presentation purposes only not for the selling; selling you will be what you call unethical.

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I am not sure probably it is a vinyl cutter, but typically if you make one of these designs this one know you see here then making it in small numbers is very very easy. You just have to send it there and I mean I do not know whether this is the plotter there is only a follower and so on.

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And, we are here, we are in business. The future are actually this is the past extended to the present and very easy for you. You can easily any number of these things you see at the back if you see this is how it started.

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Now, finally, when you put it into a black box beautiful box has come.

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So, very easy for you to do. In this case they have done probably it is a what you call demo piece from their website and you can see I just wanted to tell you a few elements things also like if you have the red back at the thing and then if you key it with this very easy to identify and that probably this is for a radiation monitor.

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Something else can be something else. Same thing, there you have seen this they have.

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There are things that are just attached on top of it and this is what I showed you in the last time pictures also.

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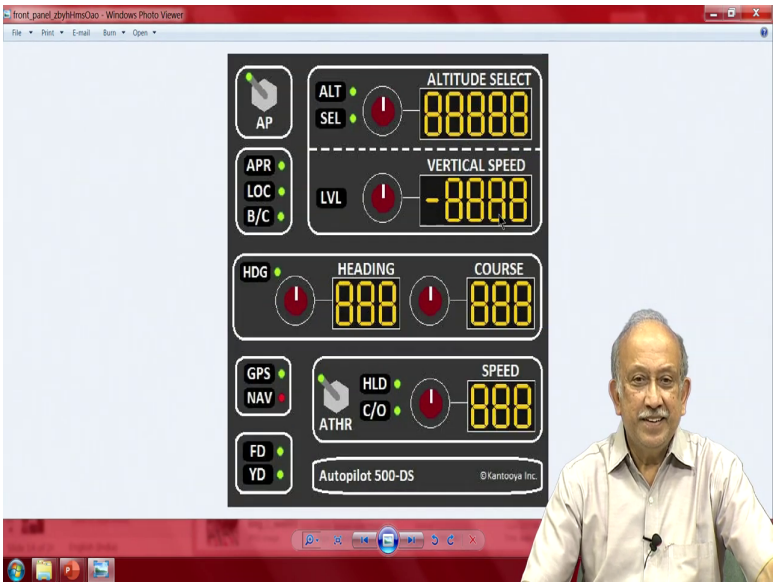

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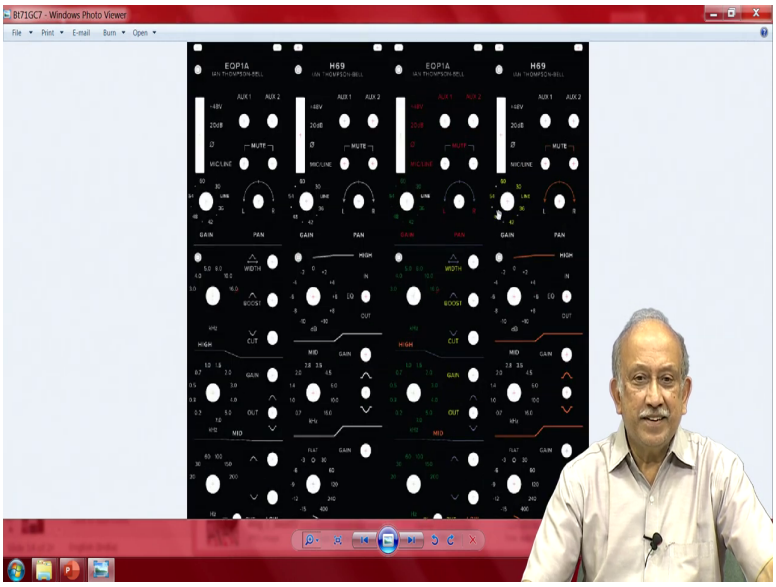

Any of these things are relatively easy.

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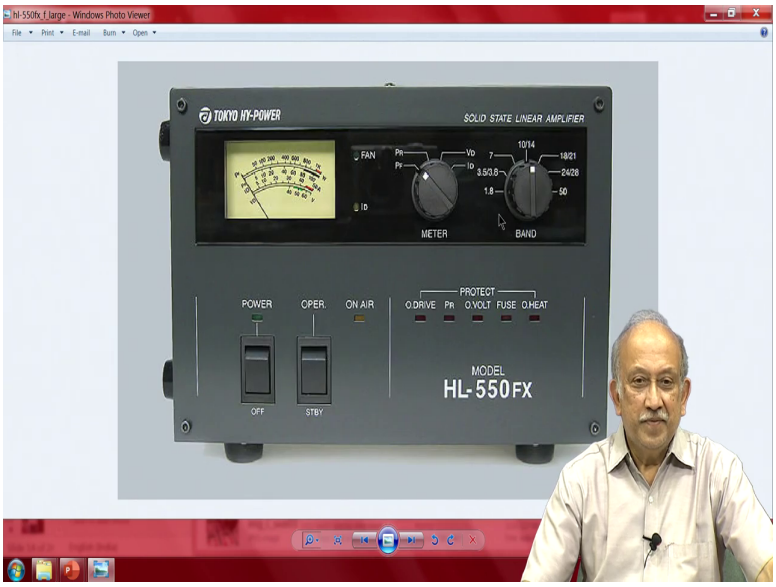

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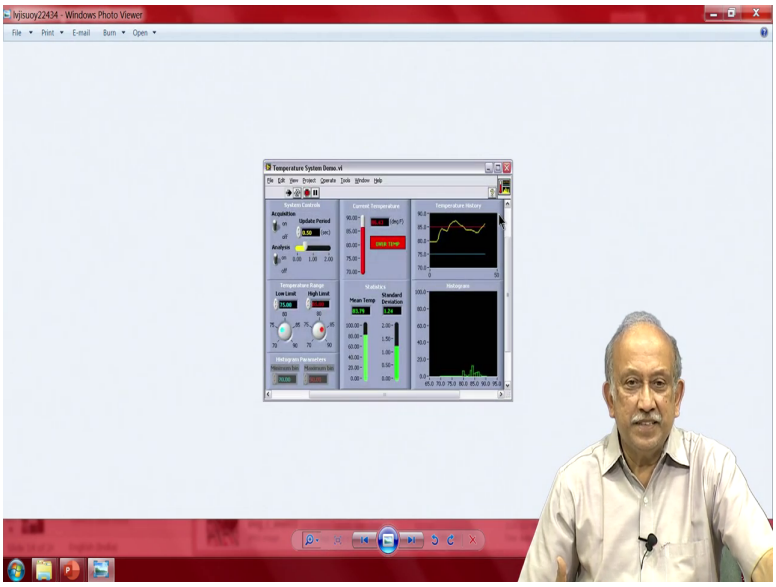

It is easy. Once upon a time it is very very tough to make these things.

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Now, these days it is as easy as see here there are this probably belongs to this you can see these things at the top they have some push button, then they have some toggle switches here and then the bottom they have potentiometers and then there are rows of I do not know oh, I think it is the reverse these rows of already is come on top; then these are some potentiometers which come here, then there are smart toggle switches the another range of potentiometers. All this without actually constructing anything you can make it while this is the front this is the rare of the equipment.

You see here once you make this downstream it is very very easy and you have full option of how it is see why not put all these four of them in one line and what is the rule saying you know all of them should be there. So, obviously, you as a designer will have full control about it.

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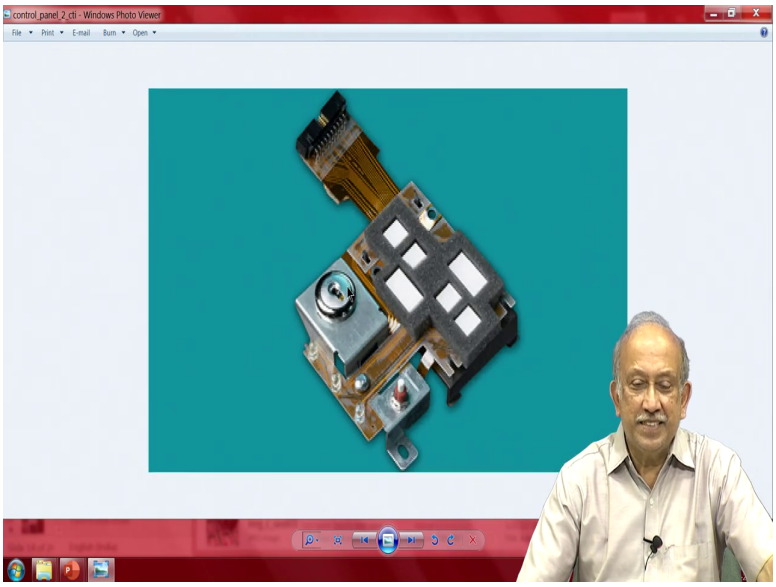

So, I feel you take charge and start making these things ok.

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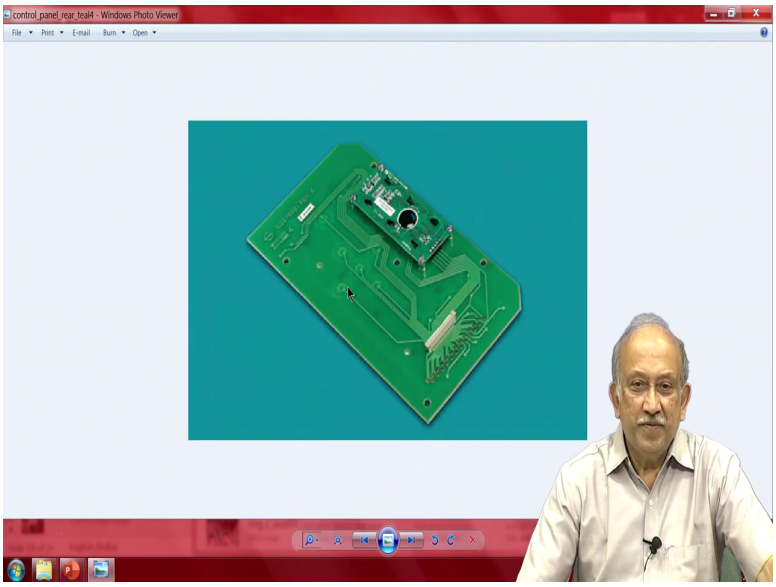

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I will just go through very very interesting things here, can you see? Quite easy, but before you get into all these thing this is obviously, a keypad where there is a circular piece away there is something here.

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And, then there is something here all these things it is easy for you and you read it for you on top here self.

So, long ago when the Cell One started I am not sure whether it is some European company, but it is there everywhere it does everything for you. But, first one I expect that you have to do the engineering to have full control. So, this is the one which you know probably I should have started.

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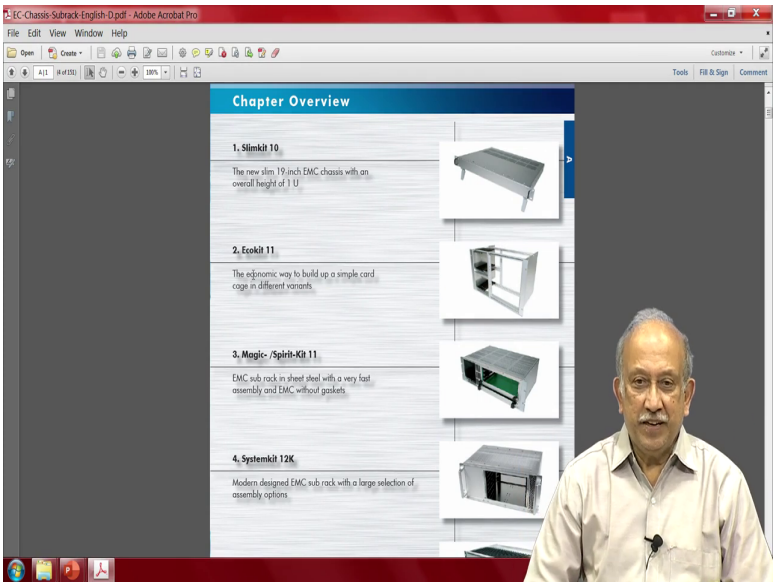

Now, I will give an escape go back and see where rather on the internet various things are available to show you much more in detail about how to populate the rack equipment that you have here. So, we have a large number of these what you call kits that are there. This particular one talks about all this hardware that goes into making rack mounted equipment.

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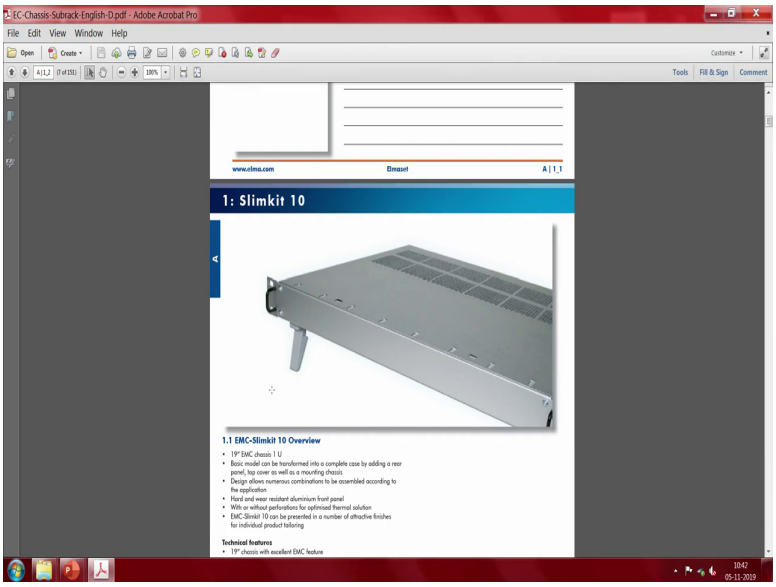

So, while I will not go through this you will notice that here know several options have been given. You can probably still continue to keep it on the table then it is a one new rack mounted device then attractive finishes.

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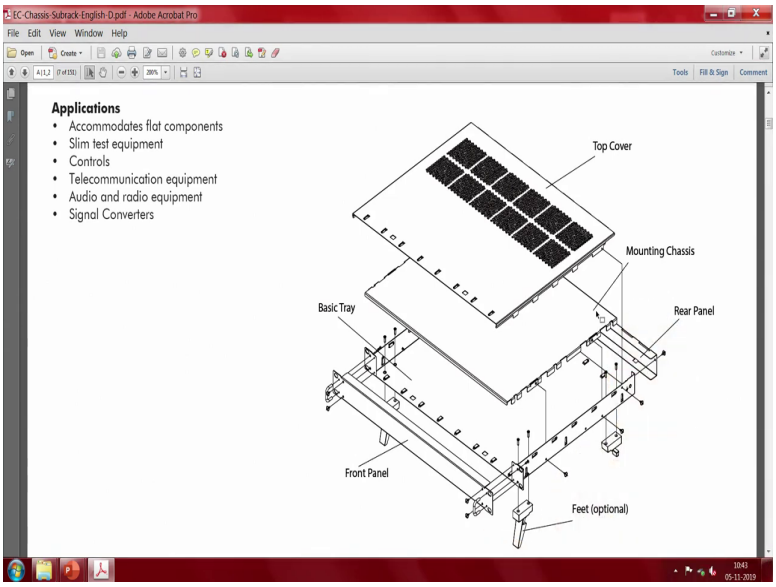

See in this here, perhaps the interesting thing here is this is what I was trying to tell you at that point earlier this is a fully rack mounted equipment, but however, when you want to use it on the table they have provided these feet optional. So, it is for you to now see whether if it is a standard worthwhile equipment to directly make it into a one new or two your device and then add feet or like in our cases because that was specifically developed to buy for one I think some sponsor we made it such that you can avoid these things.

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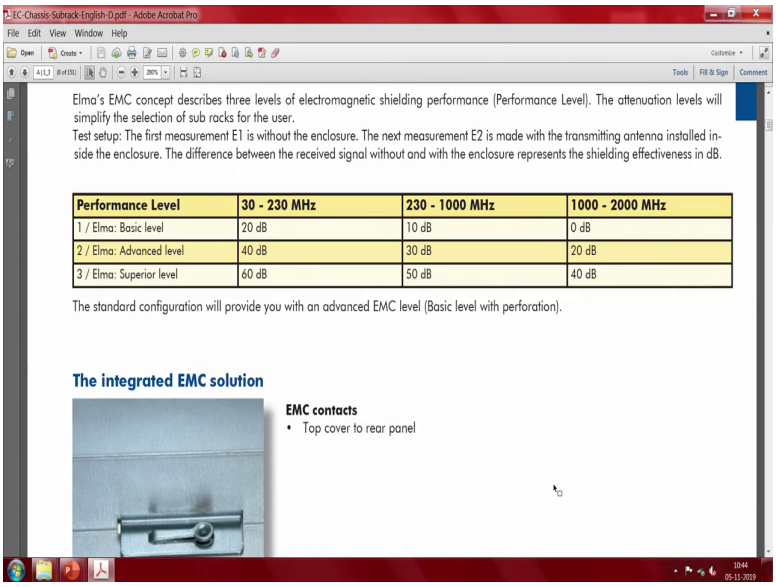

And, then and you will see here the advantage here is being fully EMI protected cabinets everything is available in such cases all you need to do is add a front panel. For you to add the front panel it is very very easy for you to buy one of those boxes, add a front panel.

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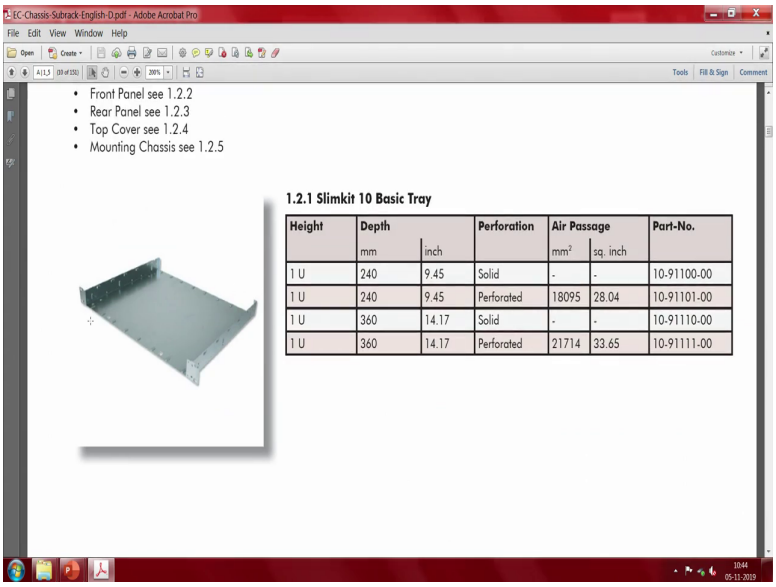

And, then they will recommend mounting hardware or in this case no it is a mounting chassis on how to complete your this thing. These are all hardware items I mean you cannot wish them away they will be there absolutely. So, you have all these you know fantastic amount of details.

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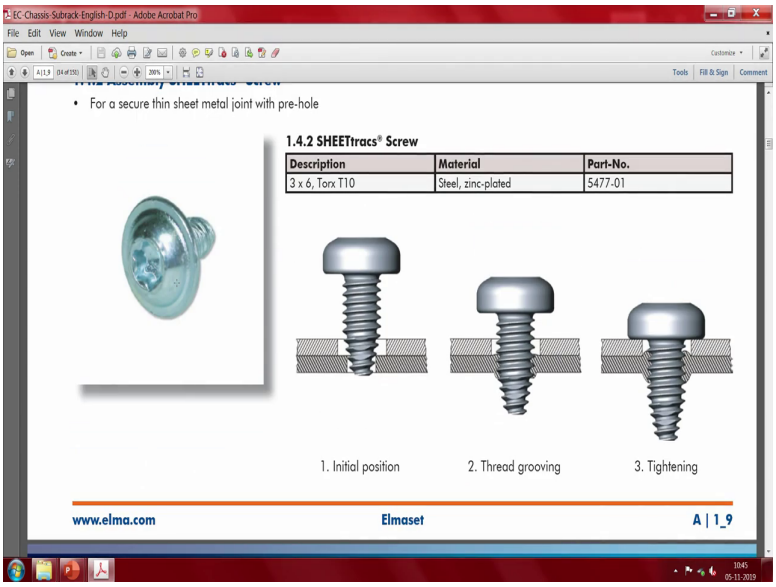

So, it is for you to now and one thing which I am sure even I too do not like are this fasteners you cannot add these things onto your design as an afterthought. You understand know you cannot add them as an afterthought, but initially itself if you build them into your layouts it is easy for you. You will have very very presentable beautiful equipment. So, I just I mean I got a chance to go through it I had thought I will present it.

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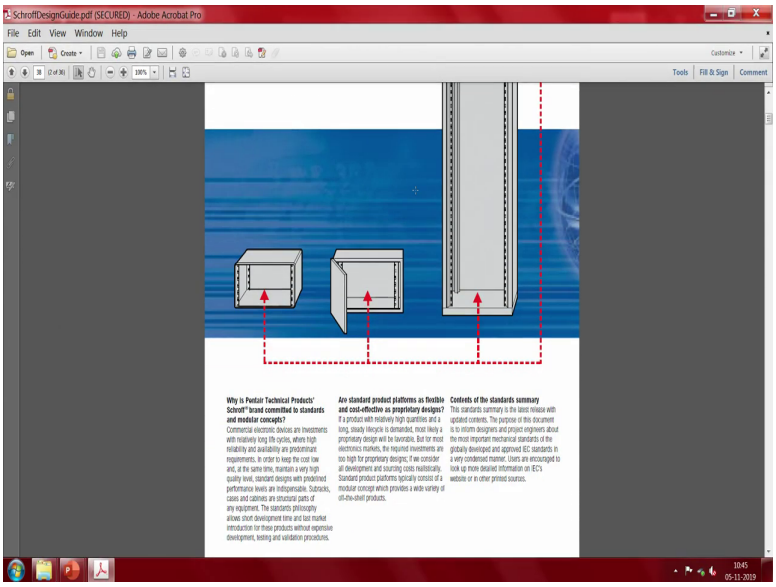

Like this you have for everything summary of all the standards.

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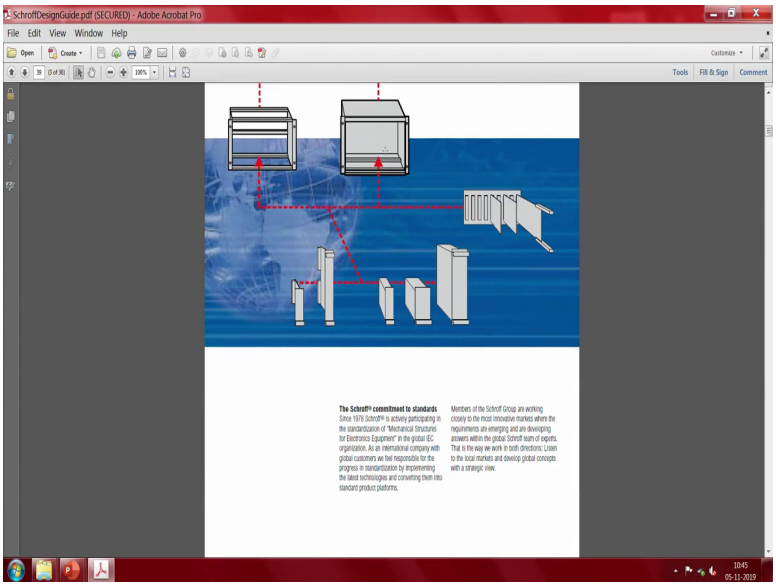

What are all the racks, how do you do it and then why I am saying is sometimes while in this case it is an independent equipment, but you see this thing these are all what you call the whole thing is called a sub rack these are plug-ins or this sub rack where now you need to design for this that is where the future is if you have a say bandwidth management tool or if you have a network management tool and all that you just need to make things in this attached to them and then there is a large collection of this hardware and things.

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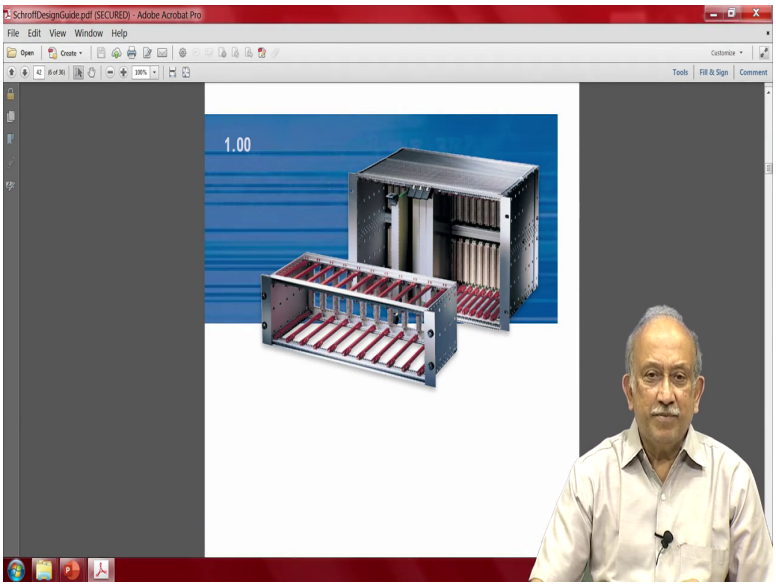

You can just plug it in as you are like including some of them come with standard what do you call euro card this one is called a single euro and the other one know that is called a double euro or number 2 euro where one card occupies two slots and even standard backplanes are available.

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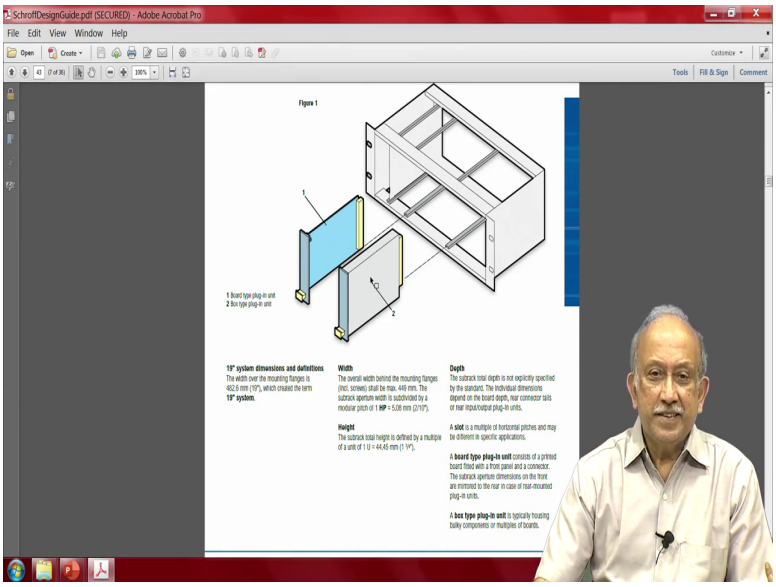

So, somebody has to just buy the backplane and design these components. And, very complicated systems including half a rack can all be accommodated in one sub rack with all this thing.

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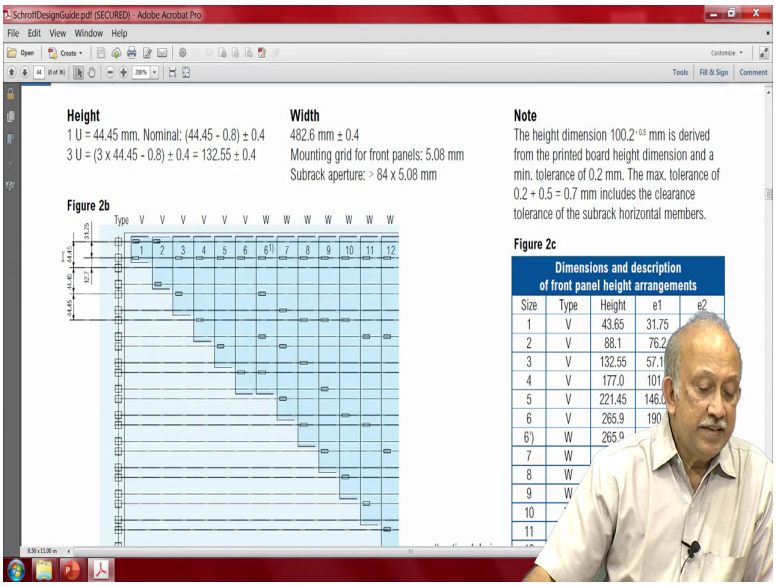

This I have showed you earlier it nothing it just shows how much is the you, what is the pitch, what is the front panel and then all those numbers I was bending around earlier you can see them here.

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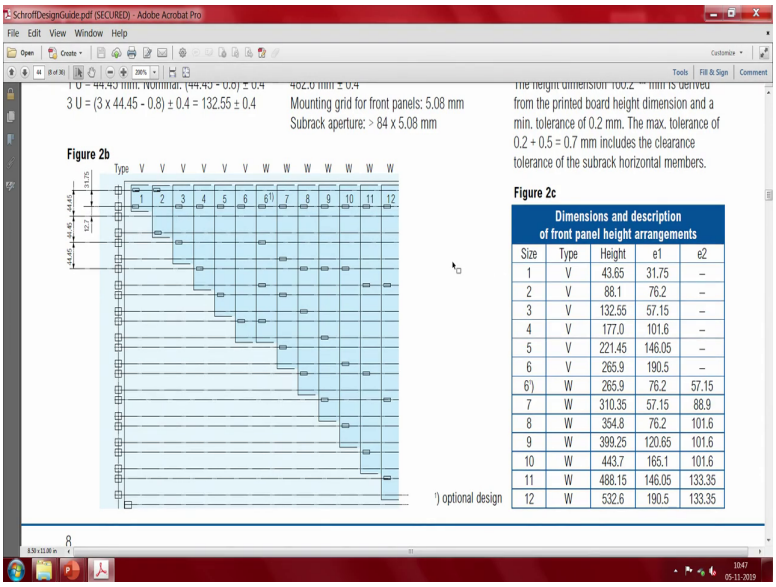

You can see here, there is something called 44.45 and then there is something and you know adding all the size 1, front panels and so on know, you have 88 and then you have so on. It is easy for you with looking at one of these tables. And, then if you remember somewhere I showed you I am saying there is a captive nut though the openings there are shown a circular actually all the professional racks come with a square punch here you have to push the cage nut inside. Once you push the cage nut inside you have enough float and everything you know happily.

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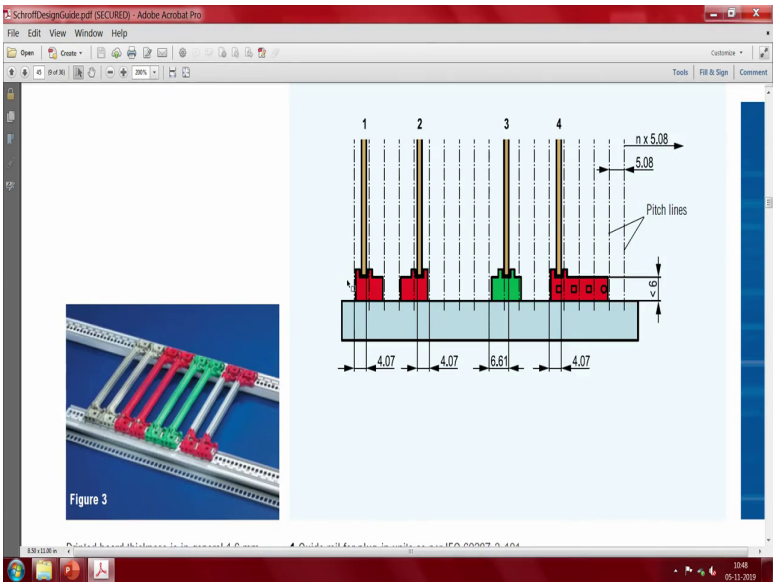

This is a little about detail about how the card guides and all that.

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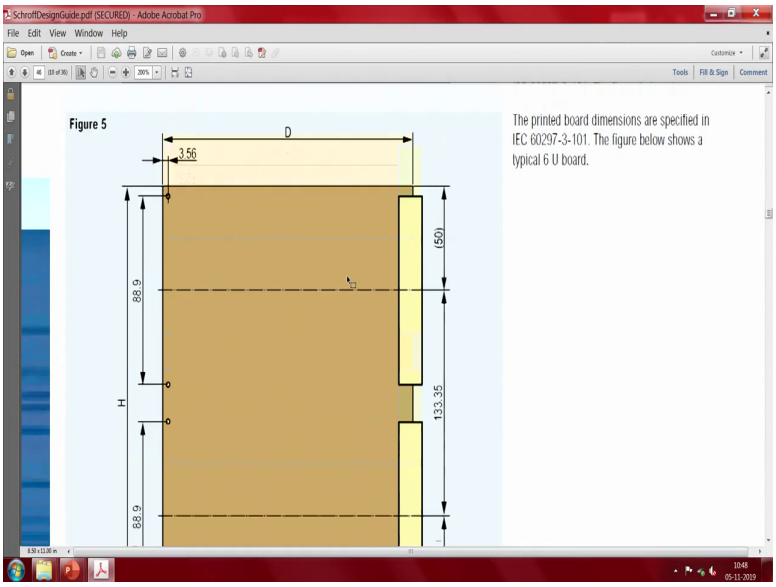
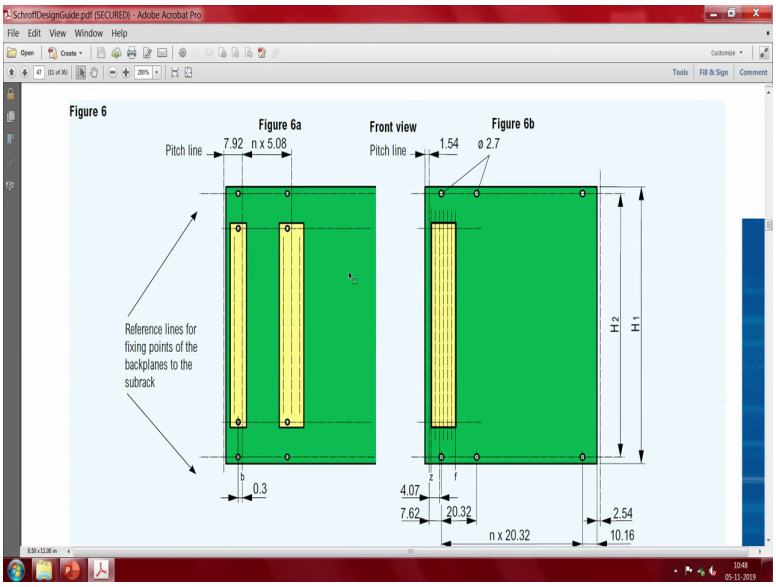


The why I am showing you it is all these are available. This is the detail of the double euro card.

(Refer Slide Time: 22:37)



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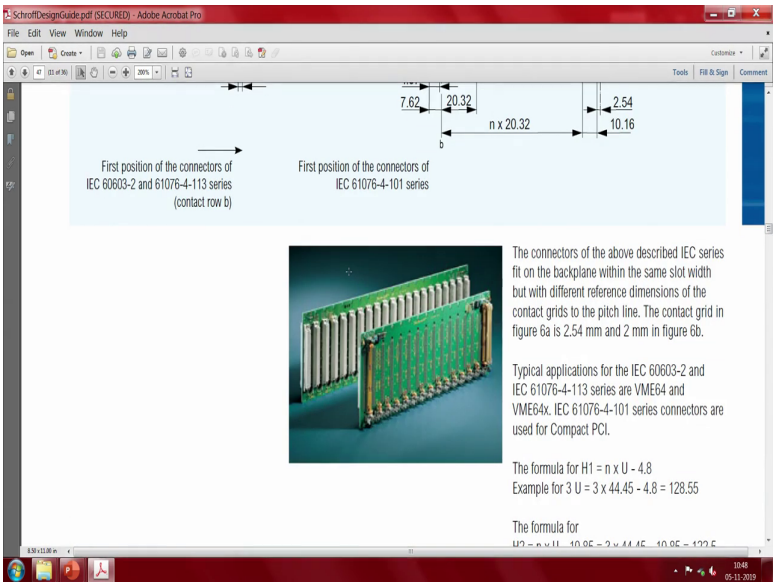
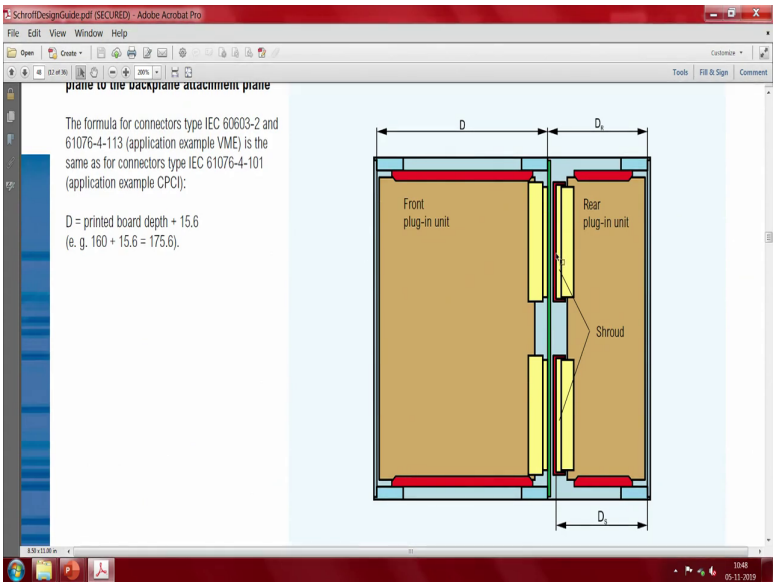


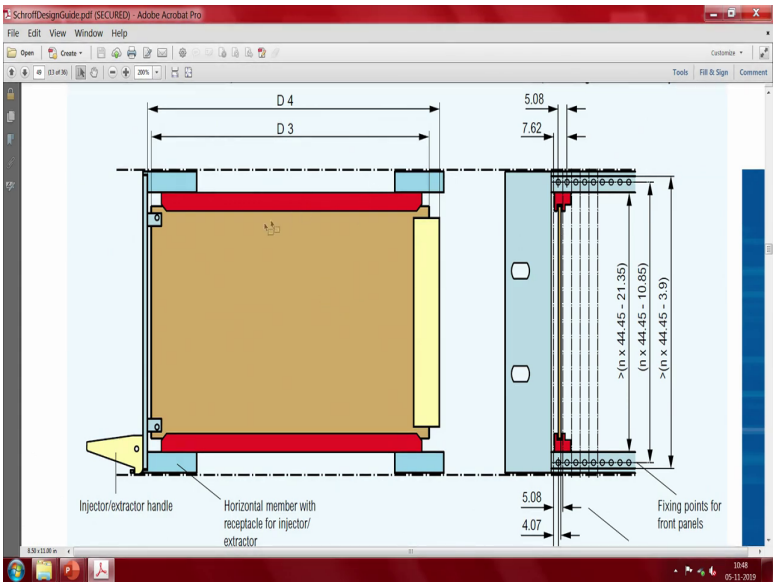
Then the so many you know large number of things like type of connectors all this data and then this is a power back panel which is very very useful.

(Refer Slide Time: 22:48)



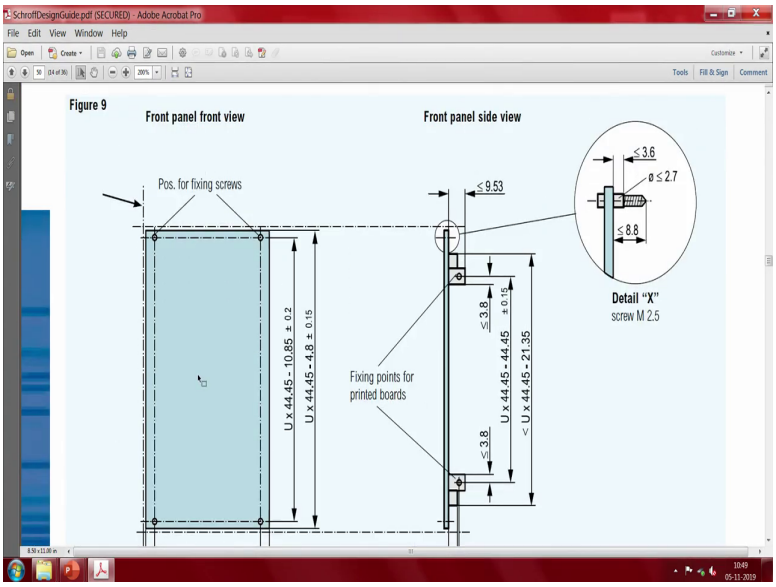
So, nonstop we have enough there in fact, there are things which are even back to back. So, we have a front plugin unit, back plugin unit we can attach them together.

(Refer Slide Time: 23:01)



And, while there are a little expensive they have been tried and proven including for easy plugging in and plugging out. You will see here there is a something which pushes it inside and ejector. So, with this you can build very complicated systems, but finally, everything has a front panel which you need to add to that.

(Refer Slide Time: 23:29)



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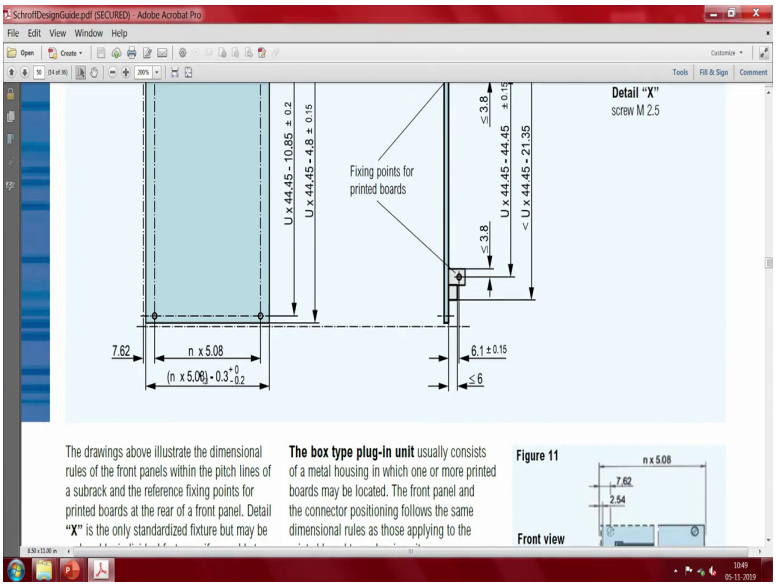
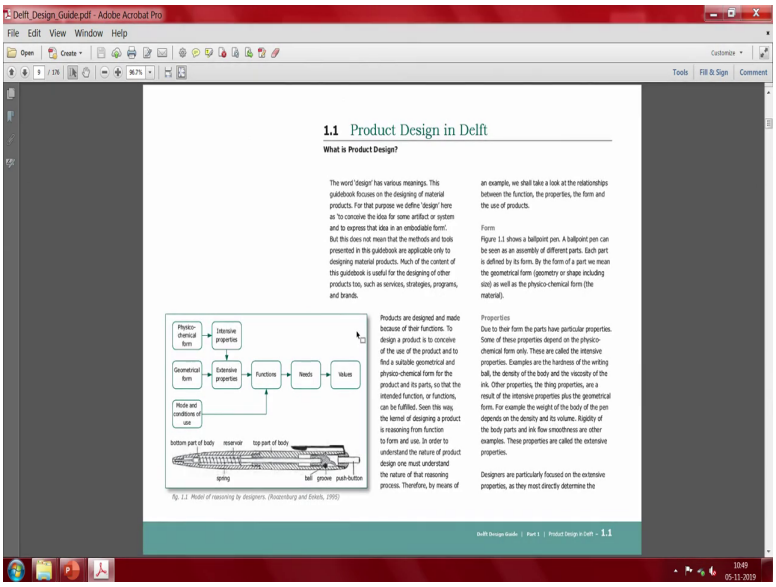


You have seen this front panel view. This front panel view you need to make a call you can in fact, probably have a printed circuit board here and they can you can make a sticker once you present it in a complete what you call form it is unlikely that anybody will ask for a change.

So, I will now skip to the next this thing here.

(Refer Slide Time: 24:09)



A beautiful guide from Delft is available it is called delft design guidance.

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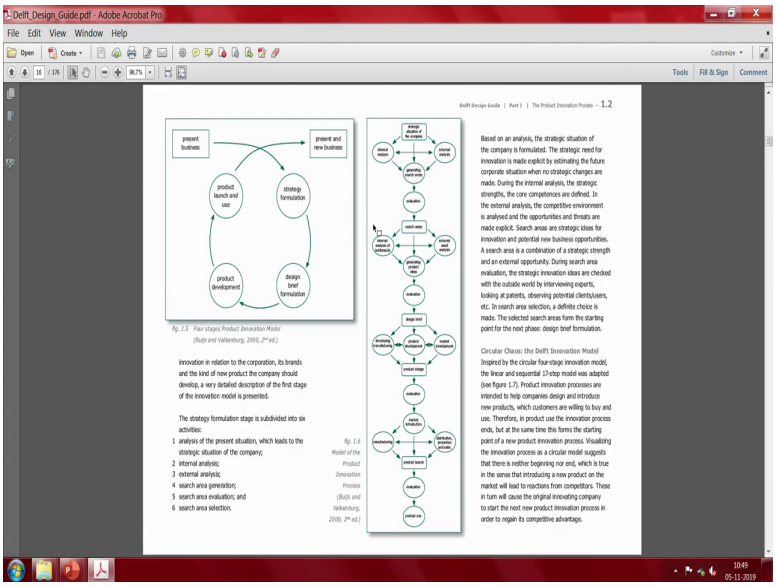

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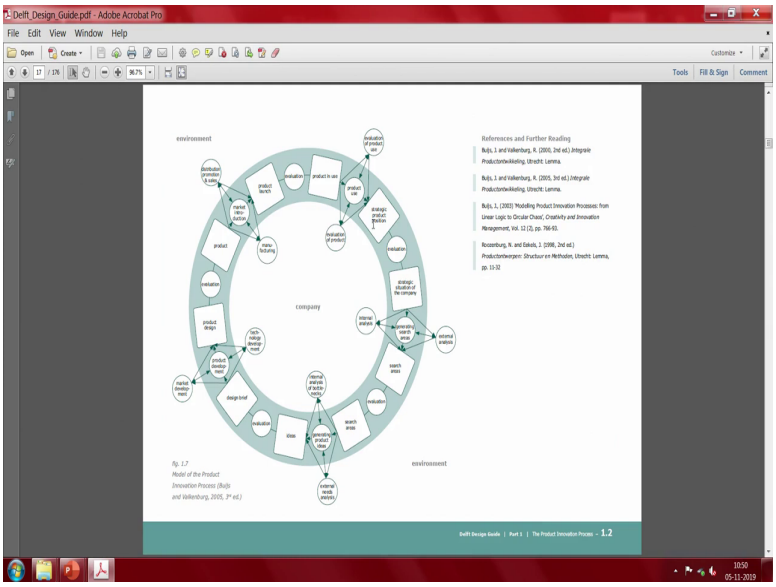
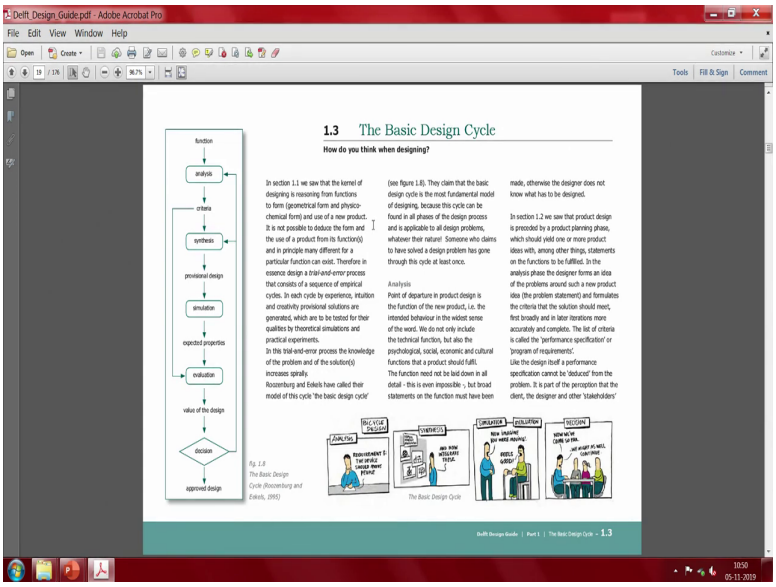


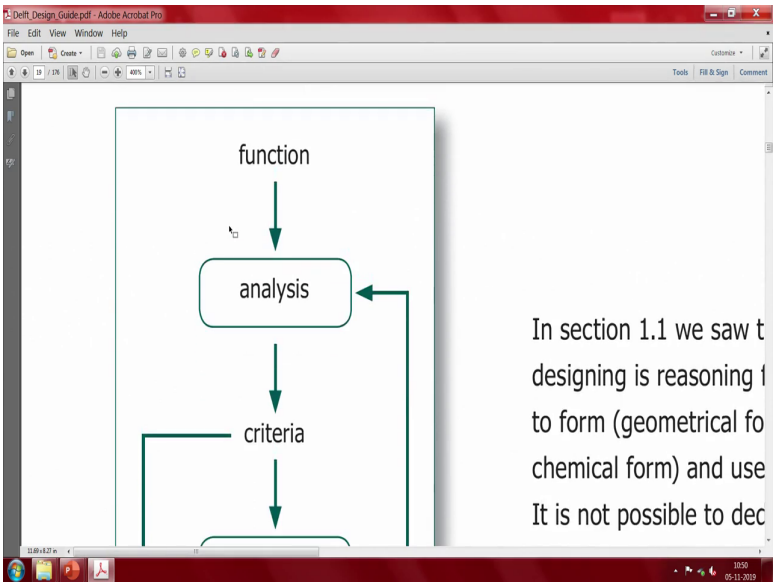
So, if you go through all what all you have what all I have been talking probably I have taken a few of these things from here.

(Refer Slide Time: 24:28)



And this whole cycle you can basically speed it up and I will try to go a little closer.

(Refer Slide Time: 24:38)



We are all very clear about it. It is just a way of doing it there is a synthesis and provisional design at this point.

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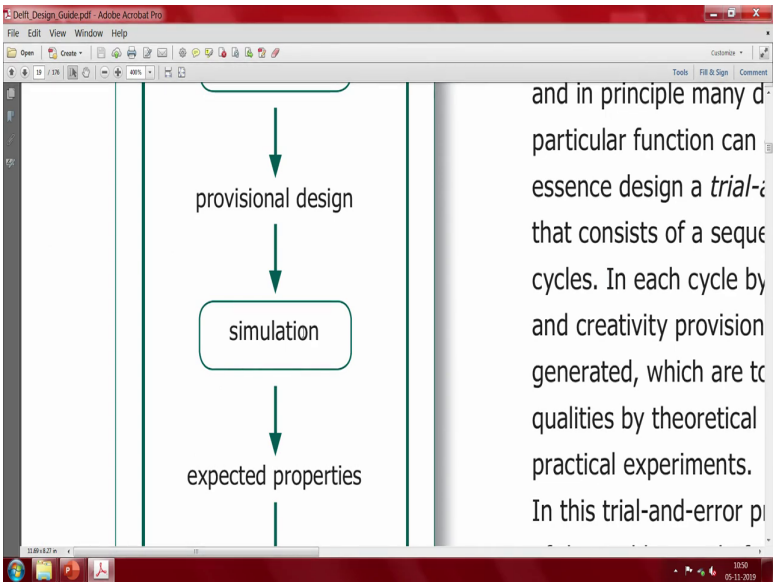

Simulation, while electrical simulation is all been taken care of saying mixer mode analog digital is there and a little bit of even things like if you had to make a programmable logic controller these are all made here.

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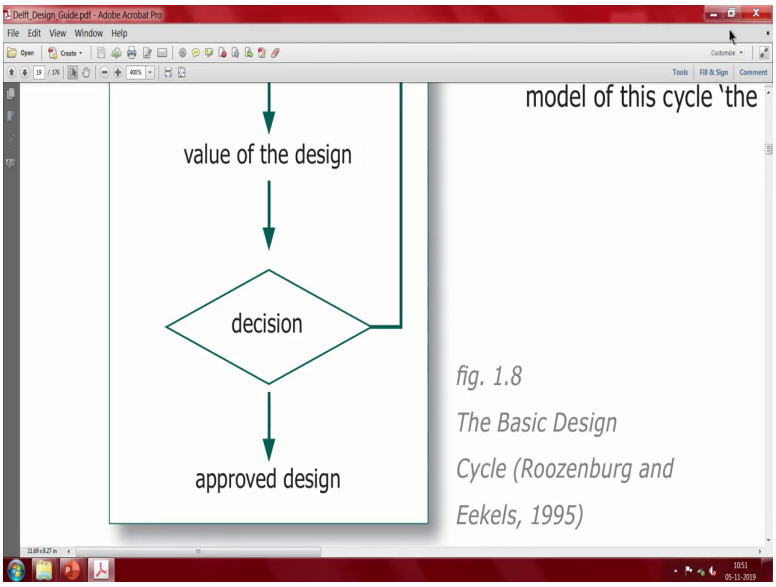
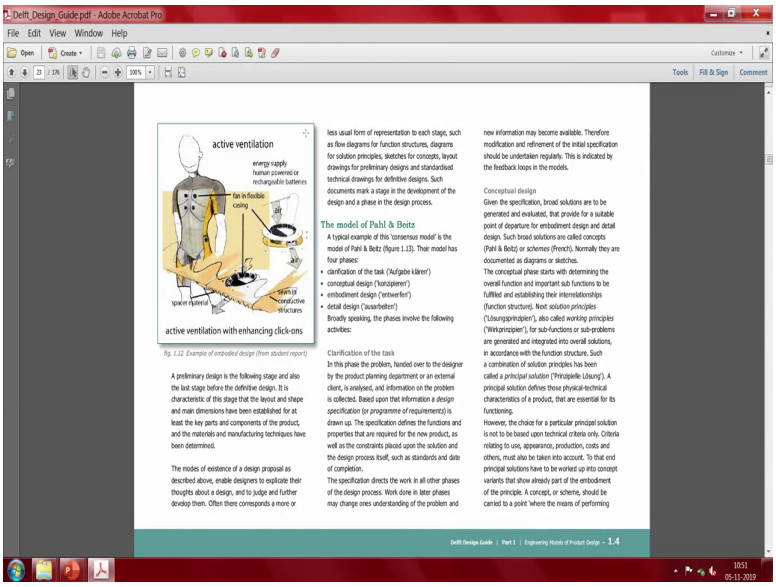


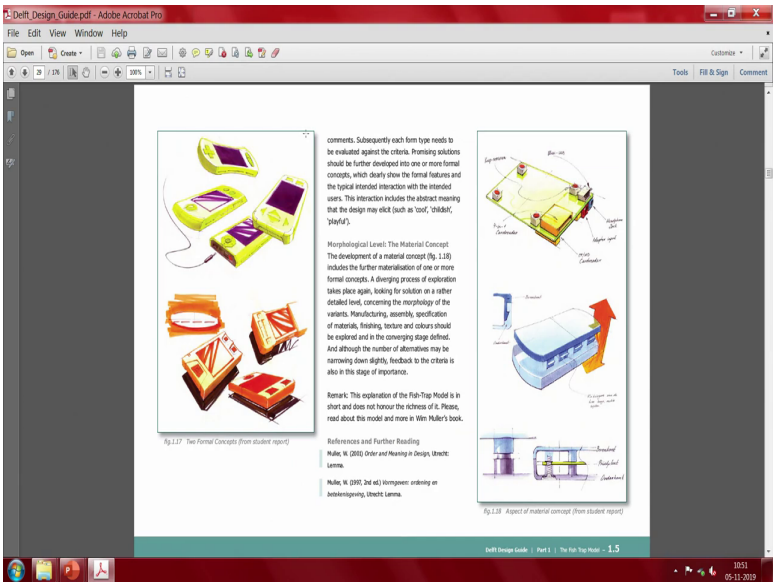
Finally, after the evaluation and value of the design in the decision making we can make it a little faster if we have made all the modules as I was talking to you about.

(Refer Slide Time: 25:19)



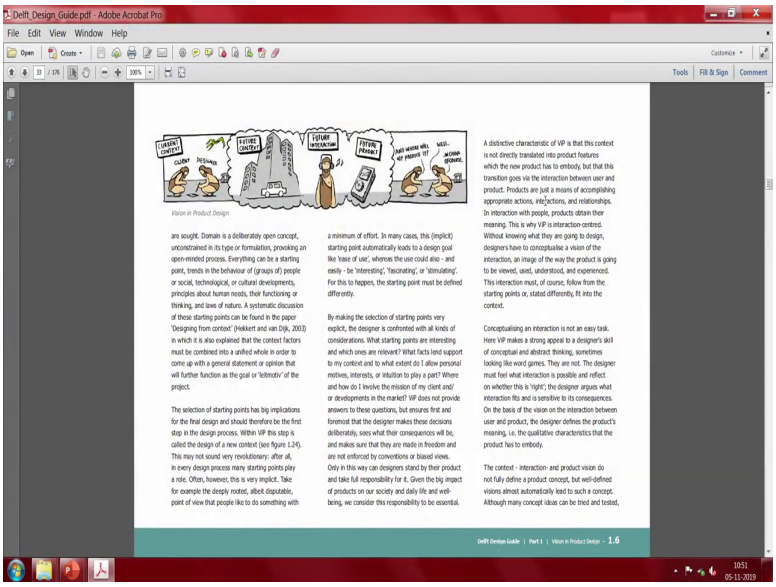
So, this is a good design guide, if you get a chance you should be able to just download it and you can read it.

(Refer Slide Time: 25:27)



It is what you call free resource and some of the pictures and all I have taken probably again I cannot say you know intentionally I have copied the full thing. These things have an influence on me saying, first thing is you start with earlier sketching and all this and eventually after you make the first beautiful what do you call few prototypes you will have a beautiful product already and easy to be manufactured and taken up.

(Refer Slide Time: 26:00)



So, further while I will stop this let me just go through.

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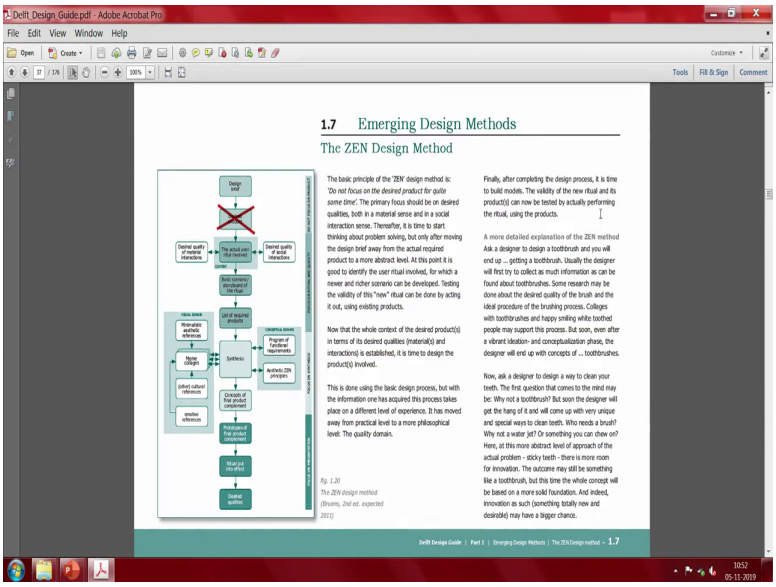
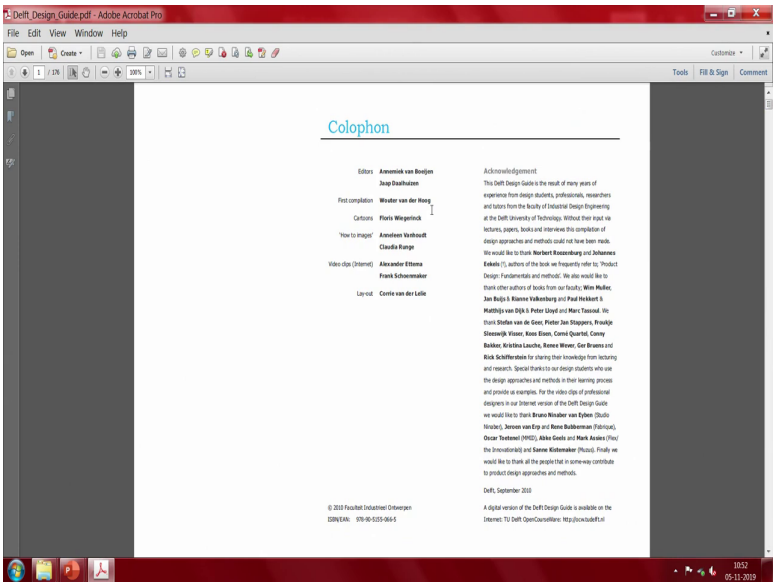


(Refer Slide Time: 26:09)



This particular thing I will go back to the beginning, I suggest you go and you know look for this. The title is Delft Design Guide to your Delft Design Guide it is a very very interesting and useful device and you will be able to I am sure manage things from here ok. At this point let me take leave and start on a different thing next time so that I will be able to get on with it.

So, thank you.