Enclosure Design of Electronics Equipment
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Lecture - 28
Off the shelf enclosures

Hello. Let me continue from where I had stop last time. Last time I was talking to about how to make things in plastic using your own custom designing. And then I also try to tell you that this the conceptually when you start any design for an enclosure you have both issues about it: one is how does the enclosure need to look outside, that is you have if you remember my very first lecture is about the agronomic and esthetic aspects of how the equipment is likely to be used.

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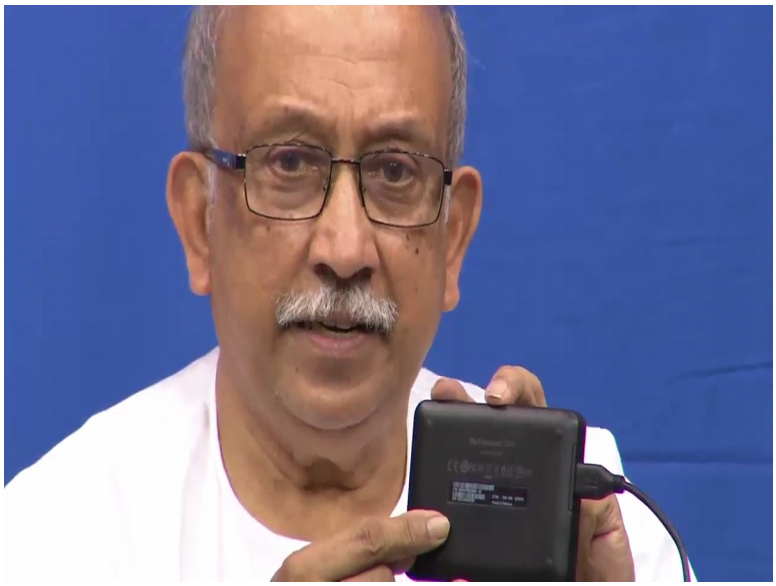

Said one place if you take a very general purpose thing like a pocket hard disk; it is very peculiar because there is a functionality which is required. And beyond functionality when all the products are all most generic, you also need to have a little bit of the esthetics built in to it. Can you see? A rare portion of it is about a standard. Standard means it is a usual thing it just does look like thing and then purely from the functional point of you have for small legs like the. In fact, there have made it a soft material which is also anti skin and then usual labeling is there.

One of the labeling here you see it talks about so many of this very frontally printed numbers on top of it they all relate to safety and compliance aspect of any equipment that is being made. This is statutory, what is give at the back statutory? Ignore the branding, because I was said it is almost generic these days.

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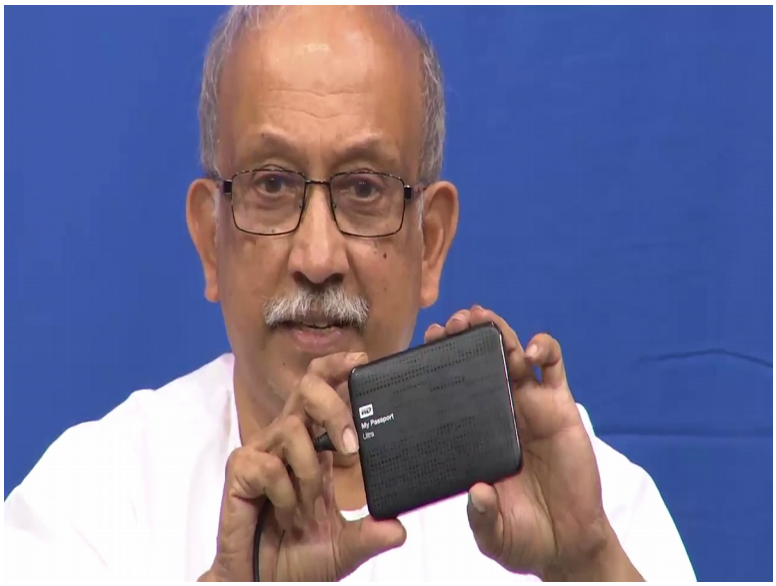

Now if you turn it to over the manufacturer a straight to add a little bit of novelty and then some distinct appearance for this product, which is once upon a time it was being called some proposition you know like USP not USB saying unique selling and all its not true. But these are the once that is without costing too much money to the manufacturer little add a little bit of different from one product to the other.

So, even if your to take a modem it is a modem is not a black box at all these days know they function is a black box, but the appearance and how it thing, how it sits on your table or where ever it is not. If you see last time I showed you a black color motor drive which can be made of plastic and I also illustrated to you if it were to be made in sheet metal how do you go about with the sheet metal aspect of it the sheet metal aspect. If you already seen the video you would seen that you need fabrication facilities.

So, my collogues in the in our fabrication shop have try to demonstrate something very quickly towards end I will try to take you to a little more complicated example that is regarding trying to make your own concept in sheet metal. Now the next second level was saying sometimes it may be appropriate if you make this thing directly in plastic material with you know give respect to polymer engineers I along bit use the very common word know just like where is a sheet metal sheet metal does not necessarily mean only mild steel anything in a sheet form is a sheet metal, but we understand.

Same way when I say plastic in generally generic name for anything which is nonmetallic and probably one of the. So, many polymers that are available there also we can make a distinction one distinction is that it is molded. So, 3 lectures earlier I showed you my starting slide which talked about depending on the form depending on the type of production depending on the batch size unique one needs to decide on; what is the production or design process would like to user make in the enclosure.

Last time I explain to you saying using lazar cutting, and then I also given you live example from the internet as to how the beagle board people they are started with saying why does code need to be universal and freely available and shareable, why cannot we have same thing with hardware why cannot hardware be easily available, why cannot we buy things in a generic form including its design. Then next level is, why cannot we have all the enclosure also with it. So, I will shown you to a examples one is the beagle bone which is made in a peculiar way and then coming back to the way which have shown you here all the drawings everything are available you can probably order it on the net and try to see what best you can do about it.

Now I will take it to the next level saying not every time you need to make all these new designs every time. So, loosely we use a word saying why do not use a standard enclosure the word here standard like so many of the other things has a small semantic issue with it standard also refers to something which is regularly common place items which is available of the shelf. It also means that probably it refers are conforms to some standards which have been laid out for interchangeability, interoperability and then most important is safety both of humans and other equipments.

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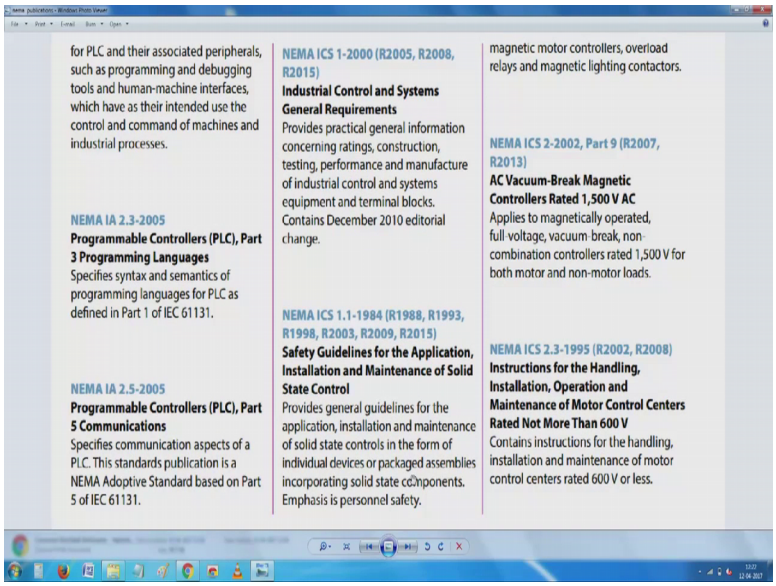

So, one of my slide if you look it; the monitor have a look it this; these all seem to world around the fortes saying industries where coming in to place and electronic is coming to place and then something which is very related to industry and electronics was alternative sourcing. So, you here at the left this particular picture is taken from one of the; what you call catalogs from other Philips or Schneider or. So, many other names are may be also will see here this NEMA you can look it up to see what it is something to do about something about the electrical manufactures associations.

So, we have beautiful programmable controllers right now the word PC means a personal computer not long ago PC meant programmable controller and by itself it is a programmable logic controller. So, PLC is content to use to very simple thing like a simple logic controller which is used in all over CNC machines and everywhere if you have this issue of everything being standardized here there is a syntax and semantics of programming then communication aspects, and then after that practical information concerning ratings construction performance and manufacture of industrial control systems.

Then down safety guidelines for the application installation and maintain of solid state controls and something very much related to this. So, if you see here to very important things are there one is ratings construction testing performance and manufacture of control systems. So, you have this issue of interchangeability best example you will see

at home is probably your power circuit. So, if any equipment or any routing things comes at home you can be very sure that if you are from the same country where it is sold the plug was into a wall socket but then the compliment of the other thing is all of you Europe had Euro currency once upon a time, but all of Europe never believed to have a common euro circuit.

Wherever you go your PC can be plugged in and then you carry multi adopter and then except what that country and your PC needs one of them will be missing from that that problem has not being solved we still do not have a universal per circuit system that a part our if you now go to various types of control panels.

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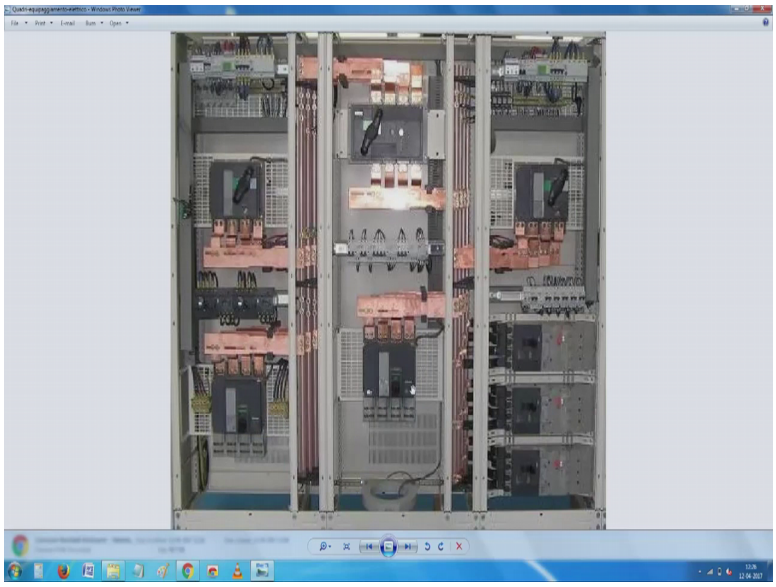

This is inside a control panel seen in things are fairly standardized you have cable ducting practice by which it does not look like anymore; everything is neatly laid out and everything connects properly to the place we are a suppose to with the if you get closure will notice that I do not know this may be a PLC or whatever it is and then at the top you have various other thing various types of terminations. And you see here maybe it is a safety device maybe it is a earth leakage circuit breaker and you see this copper thing; obviously, the copper is something thick conductor and safe, safe, safe, safe.

Here when we talk about standard it is talked about conformance instead know how well these thing conform to those things. So, people have been working in this field for quite a while.

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And they have come out with of the shelf systems and enclosures which you need to use you can use. But however, in specified things like this for example, there is a thing about hostile environment hostile environment is 2 parts of it: one is electrical part another is the environmental part.

In very first lecture I tried to tell you that this is a behavior a hot nets nest one small mistake everything stops working, but then if everybody every all the aspects are taken care of you have marvelous things. That is why your cell phone works and that is why I am able to probably stream it nicely from a server far away from where you are stay while this stags to the bigger enclosure.

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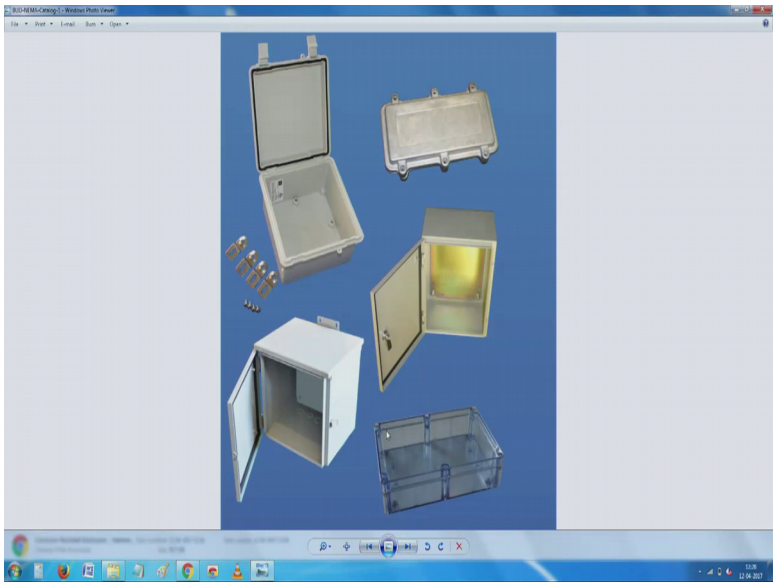

Let me get back to you to it look smaller once or can you see here very very interesting nice things here this are all at this point I would like to point out or confess to you or admit that these are not mind first part yes, but then all of them somebody has taken tremendous amount of interest and made sure that is conform to various safety and environmental aspects of it.

And the very fact that some of them also come with some sort of a certifications saying now if you were to make a system it is much easier for you to by one of these things and use them directly from that use point of you and procurement point of view. When we talk about a standard enclosure what we mean is a fairly proven, but of the shelf enclosure which is probably interchangeable with other manufactures- oh you see here very nice, beautiful I will use the what plastic box I know it is very what you call irritating and probably demining not a call it a box, but the reality is yes.

And then one more small thing will notice know I does not have that you know fantastic organic form which we talk about. Hence one we talk a box know probably it means separate box also, but the main issue is all these units well very conveniently go and they can be mount at their perfectly interchangeable.

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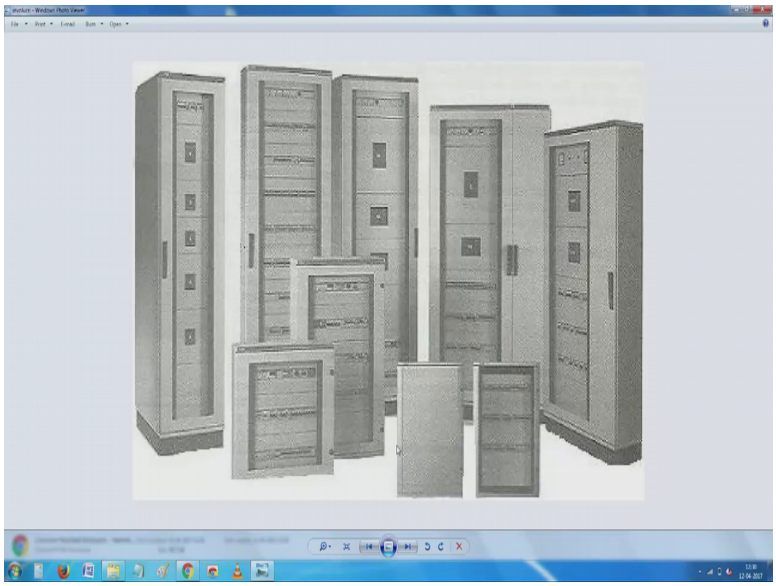

So, when you want to buy a contactor we know how to specified the contactor there alternates sources are there any contactor are similarly very simple isolating switch are I had given you an example of a earth leakage circuit breaker. And all alternate suppliers are there from this point a few its worth will for you now for go ahead and checking to the what is available of the shelf and how to use the enclosure switch are available from there.

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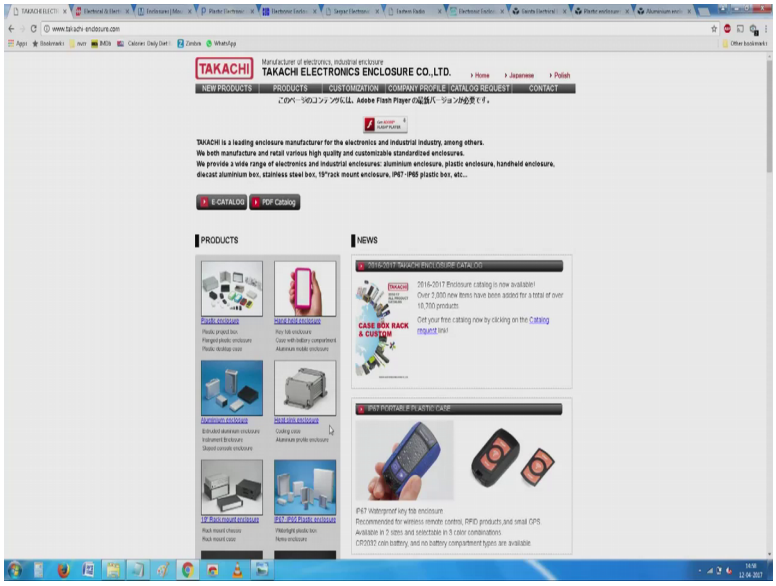

There are large numbers of alternative manufacturers for each of these items which we are talking about I have a huge enclosure here.

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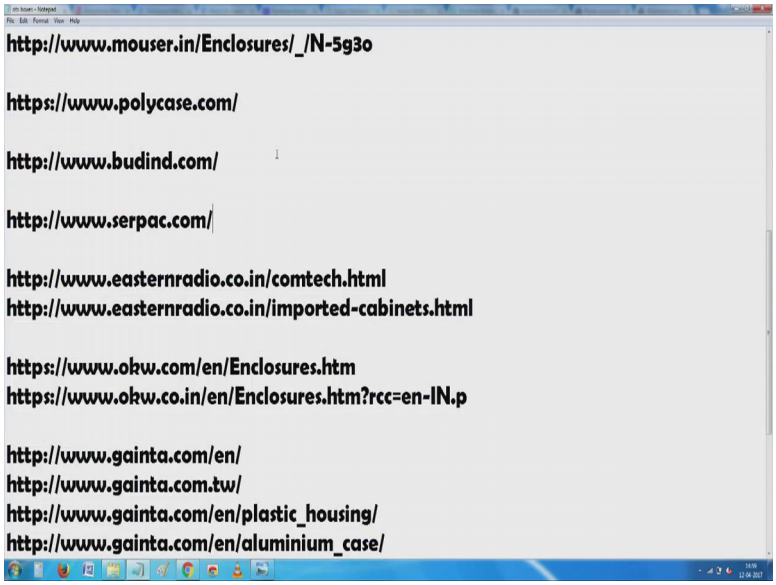

I mean has a list of suppliers here and other the main advantages like what have a try to tell you in the morning, these are all half the shelf readymade and beautifully detailed cases which you can use for an equipment that worth reasons allow may to repeat again.

First of all, I am not allow may to repeat I am not endorsing any one of those things but most of the things that have been displayed here I have a used it and I find them a good quite up to the mark and the large number of them. Now, these days this is some of these which we has stated are about 20 years back and online sources where little difficult it eventually we got most of them. So, I have tried ham and I was tried.

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Double you then have tried surpack then I have tried joint of from tai one and then several of the other things I have listed here if you see that list you will see here this all follow several of these standards which have been designed by various what you call panel builders what started as a simple panel building excise on where you need to have compatibility and alternates sourcing eventually has became a huge business by itself.

So, I will probably start here with this Taka chi thing. So, if you to any of these catalogs again allow made to tell you why we build from off the shelf is what I will you wanted to take the what you call decisions and many more than what you do not know somebody has worked have about it generally the whole classification is based on 2 or 3 things one of them is a matter of convenience. So, if I click on this here if for example, in this handled enclosure you will notice that most of the thing.

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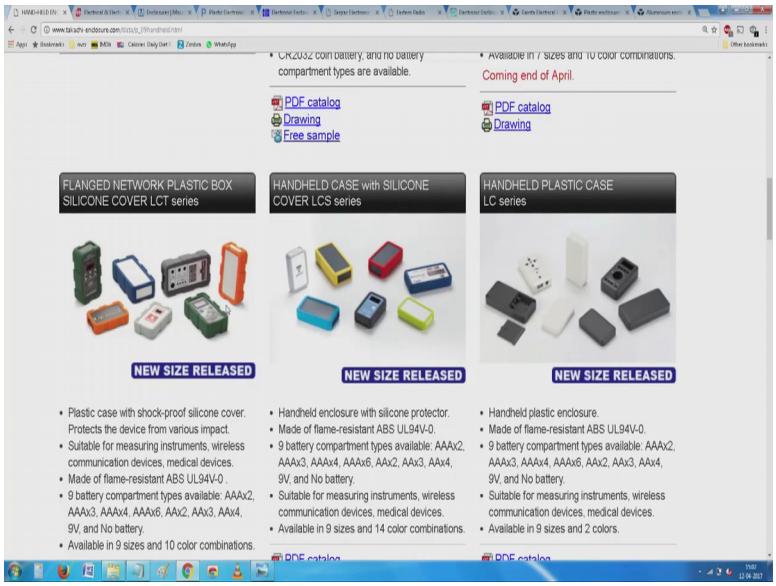

What would like to have are already somebody has worked details about it are seen that know there is. In fact, a large list of small boxes and invariably 2 things you need to think about it one of them is with leads to a PDF catalog.

The PDF catalog by definition after you download the catalog you can read all the dimensions directly of the seen here.

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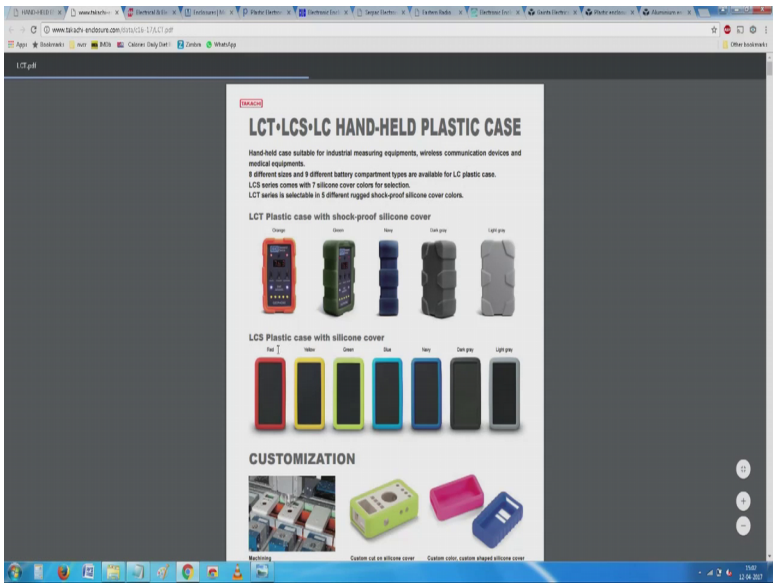

So, if you go to the if you can enlarge it noticed what all we have we have already somebody has worked has a details on how to make a hand held case for industrial

measuring equipment there are plastic cases shock proof silicon cover. Then there are simpler plastic cases. And most important is you can have them ordered to your requirements this is where typically you need to take a decision.

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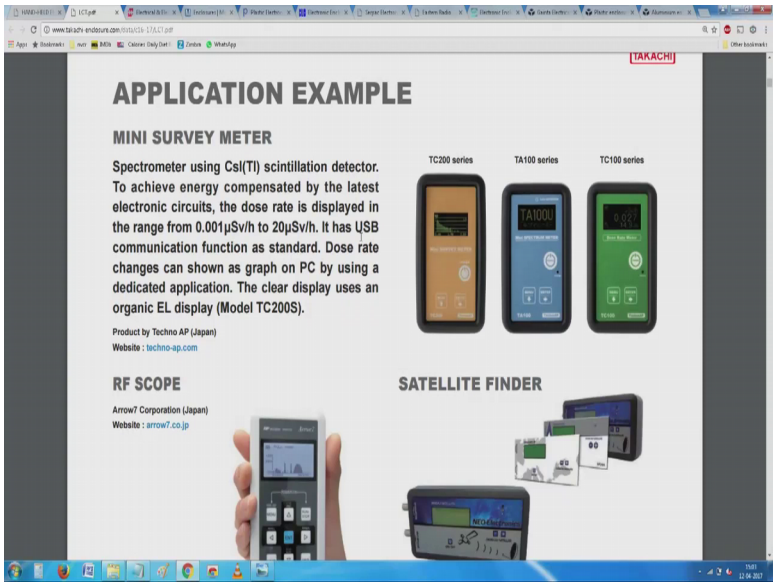

So, one of the decisions you can take here is put on the monitor I mean put me on the screen you need to take very important decision one of them is saying what is the role of your equipments. Secondly, will you depend on more than 1 oem supplier it is a large very large number of what you call a batch which a large number of repetitive identical things. Probably, even now you can take a decision to have it fabricated as per your news specifications, because in that case nobody can directly violet your ip you have your enclosure in which everything is as per your requirement. And then you can have a industrial design patent that is taken and normally nobody will dare to violet that by copying it directly, but if it very standard enclosure others can continue to make a similar thing with minor changes and you cannot limit.

Secondly though the of the shelf enclosure is available chances are it will be expensive you may have a access to making things cheaper by ordering it from alternates sources. Even there the standard enclosure person for all we know he may be one more a design house the design house ask people to make design for them and then ask fabricators to fabricate the part. And then there are people who do product detailing the product detailing includes how to fit various things and so on but like most of the other designs

and you fresh you will be making specific equipment or inter face boxes meant for one particular purpose if already it is made you cannot sell your expect as a commodity.

So, you would like to add value by making something which probably does not exit which is very very exclusive to here using those conditions and if the number is large enough you can always go ahead and by one of these of the boxes are as I said it is a very exclusive equipment like this know this is probably they would designed it themselves understood know this wireless; its cause of a x is wireless system you see here again know there is something about a antenna. And then there is something about it there is a connector here there is a clip then various features have been added and so on; that is a enclosure which have made customize.

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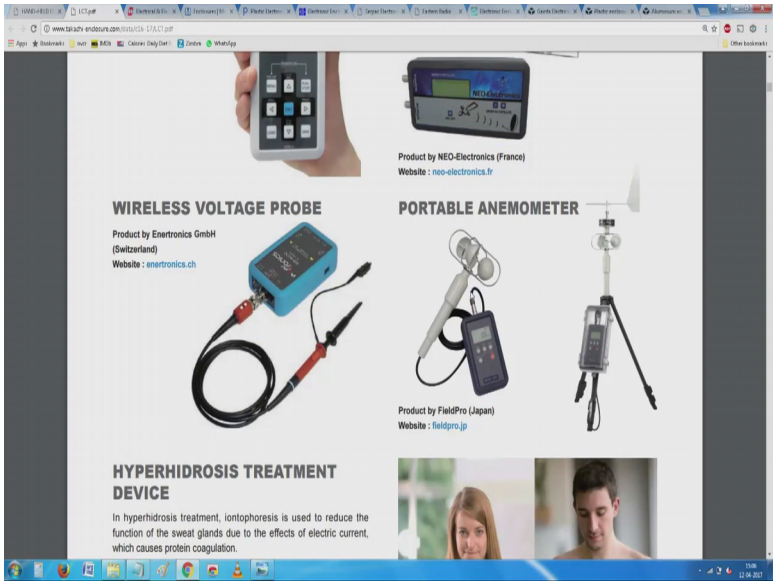

Now going back to my monitor and the that thing they gave an example of a small thing called a survey meter incase spectrometer using scintillation and so on; know what they have done is using a standard enclosure from these people they have made these various other features around you see here you have a anemometer and so on. I am showing you to is an example of how to use these of the shelf enclosure for you to go ahead and build your own equipment. So, as a go down any detail you would like to have is already built here in this you see here you have all the parts here hm.

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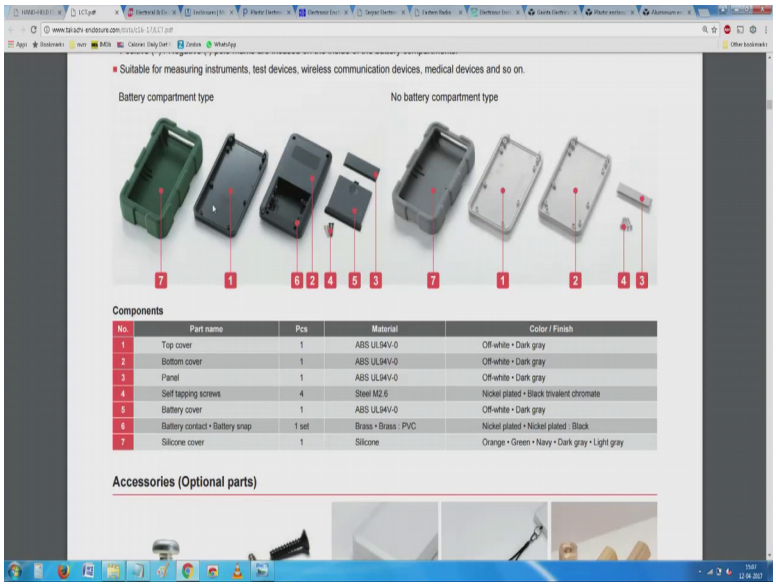

The whole thing comes as you like and then you can select the sizes.

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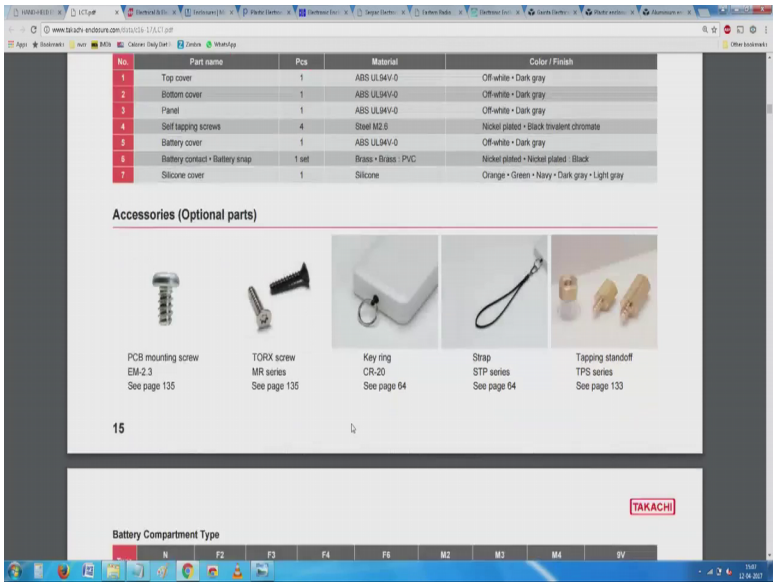

And this is where our critical issue comes is a so many variants are there.

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And more important than anything else all the dimensions what all you want to have are probably already included in this you would have never guess to know.

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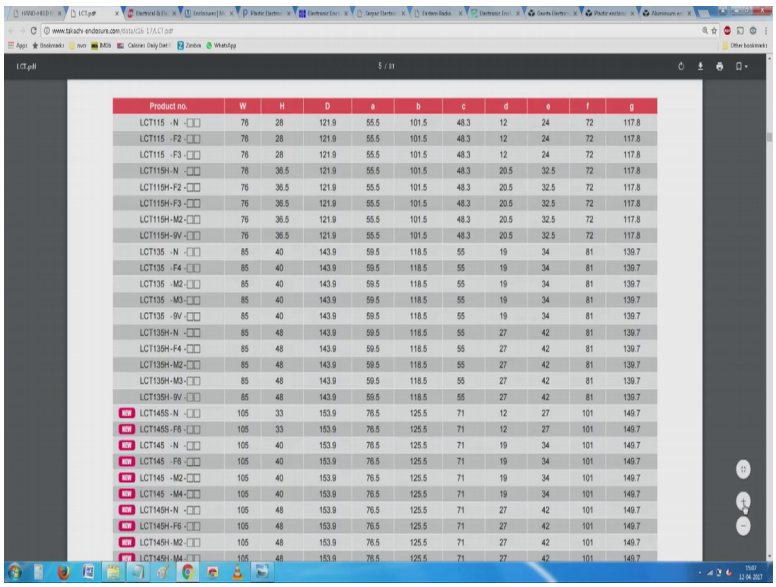

So, many types of products may be required. So, as if go down necessary dimensions everything are given here.

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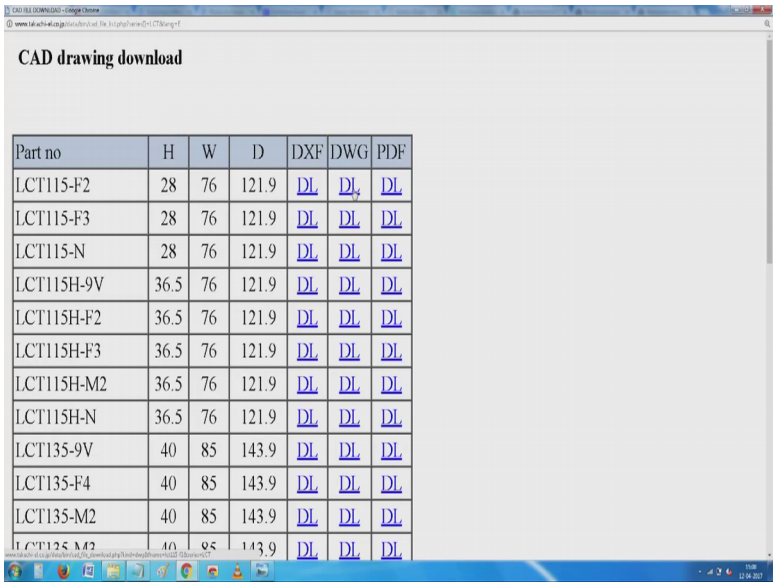

Now I will close this window try to go back to something called the drawing here. So, you see here a large list of for each type of an enclosure they have given 3 types of documents DWG format is typically used by auto disk and compatible for most pororance. So, I have a reader like version which I can download earliest catalogs only had simple DWG which is in a 2 D plane softer download it. And then I open it with whatever I have it on the screen here is DWG G will get loaded and so many of these programs are probably compact will with the I hope it shows it is come here there is some problem about the layers and colors and all that you do not worry to much about it.

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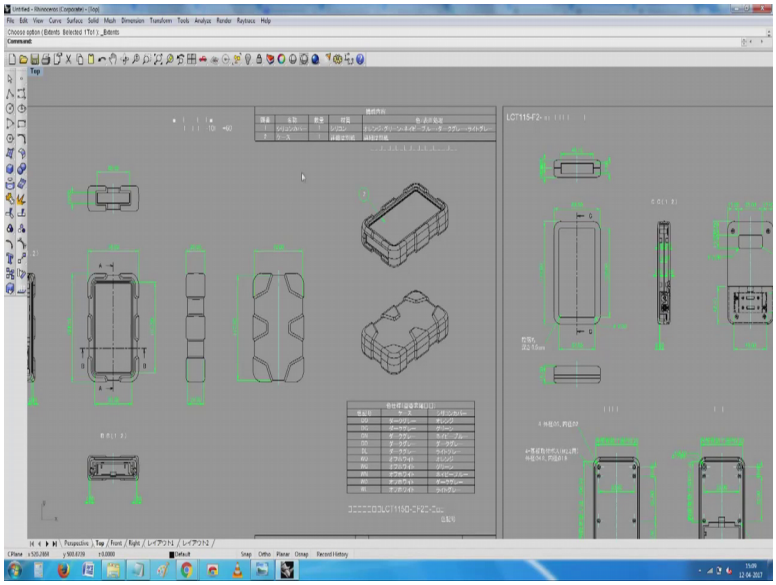

The advantage being already what all you wanted to do a drawings are available it is a needed DWG format in case you do not have a program that makes use of the DWG g you can also download the DXF format DXF format is nothing, but drawing inter change format while it is released means anybody can use it. And you can import these drawings are the vector associated with the various lines into any of the programs you like.

So, this is typically one of the things you can think about seen here. So, anything you want already somebody has done it.

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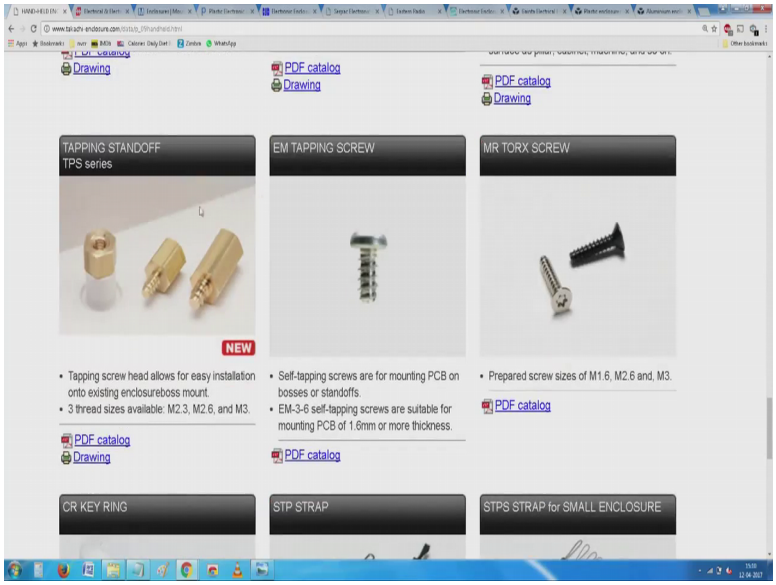

As seen this and I will take a separate lecture on this something which very rarely we appreciate are this various mounting accessories and if your to be one of the small time design houses you will probably have to depend on somebody to give you all these small he calls it a tapping standoff he means it is a 2 things one and this and of it directly goes it to a opening there and then like a self tapping screw it is automatically on this and then other side there is a regular thread it screw.

So, that you can use other metallic screws which will go and sit inside the thing and then you seen this.

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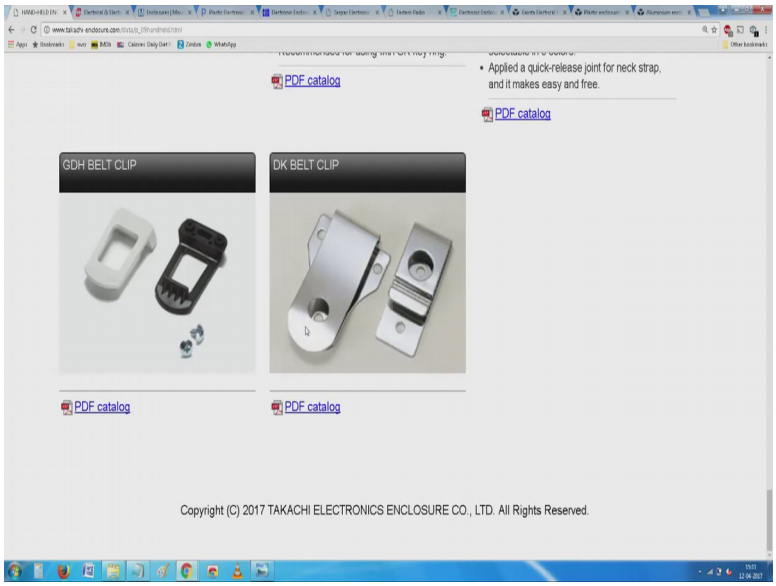

So, there is a very positive advantage here I get it like to an acknowledge that this is a; the right survey shut is being a educational video.

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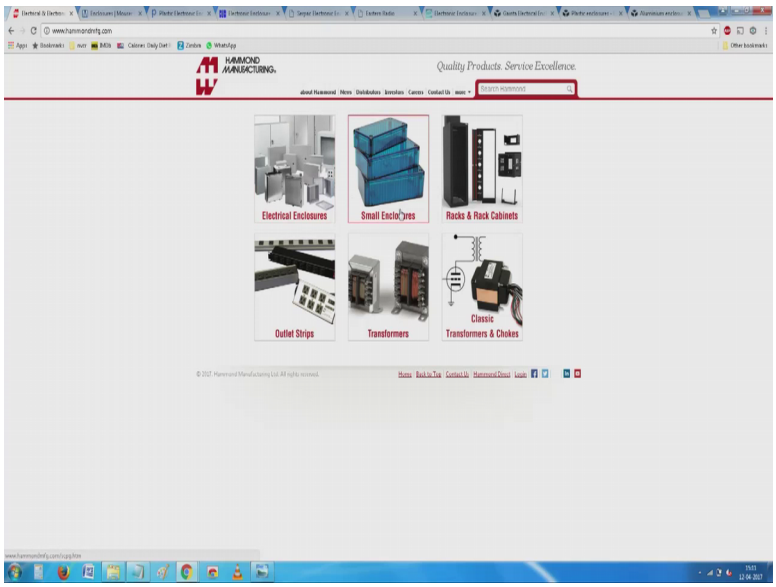

Then you are likely to use all these items.

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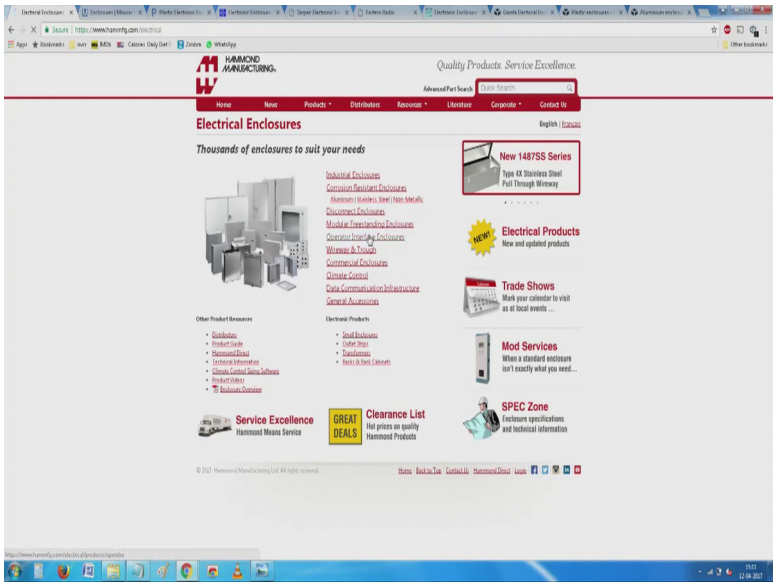

I am asking you to go ahead and examine these things if I go to a large number of electrical enclosures here.

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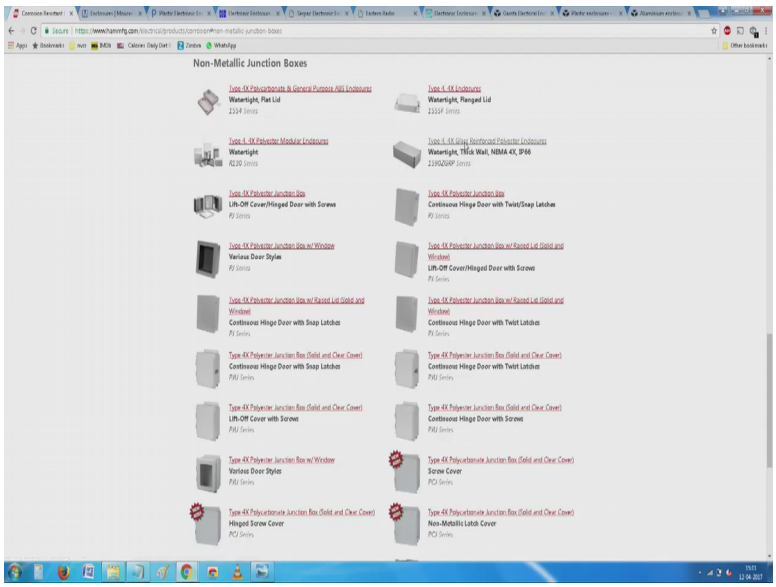

Add you sold non metallic remember once again enough number of these sorts of items are available for us.

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Now the second decision is required do a deploy do we depend on one sole supplier or can we also look for alternating sources alternate sources not for the purpose of any other negotiation or anything its only meant for to see whether in some unlikely case of difficultly in sourcing or difficulty in batch sizing saying some of them insists that you by a large batch some of them in come with the smaller sizes. So, it is possible for us now to go around looking for alternate suppliers.

After having finish that I will now go to another company called mouser, mouser also something is very much related to it in so, stopping with the standard enclosure.

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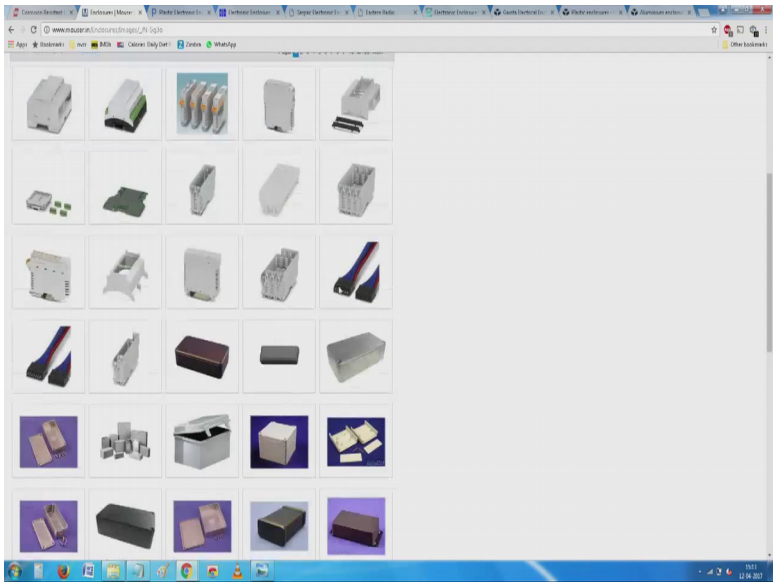

So, you see here they also come with very large number of alternate small items which all the details are given here you seen here small USB enclosure. What with arted one time probably no involves making a separate USB device.

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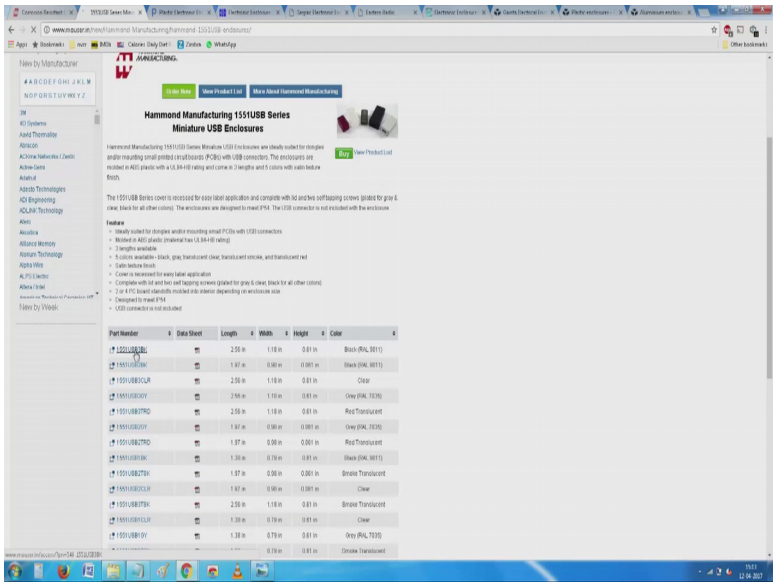

Let us say you come out with high own something which needs USB connector one side and it continues various our thing that is possible for you to by one of these off the shelf what you call small enclosure and then get yourself in to the manufacturing.