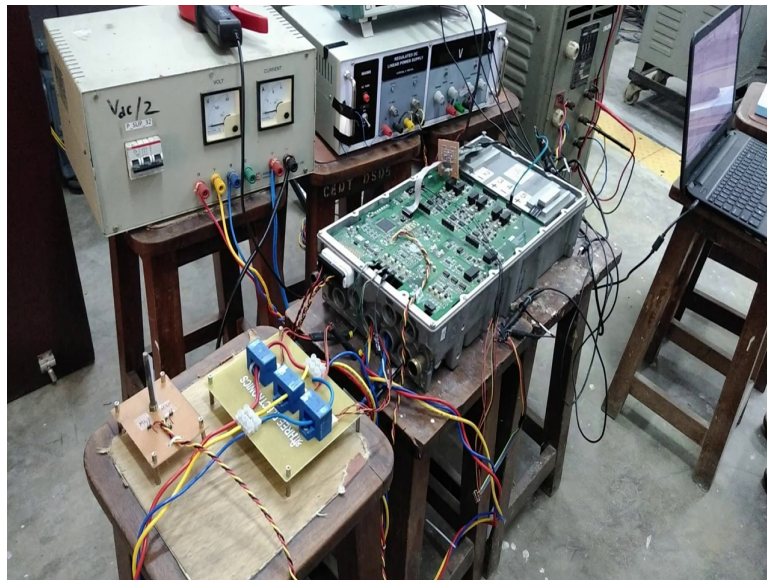


**Electronics Equipment Integration and Prototype Building**  
**Dr. N. V. Chalapathi Rao**  
**Department of Electronic Systems Engineering**  
**Indian Institute of Science, Bengaluru**

**Lecture - 16**  
**Looking around for concepts and integration**

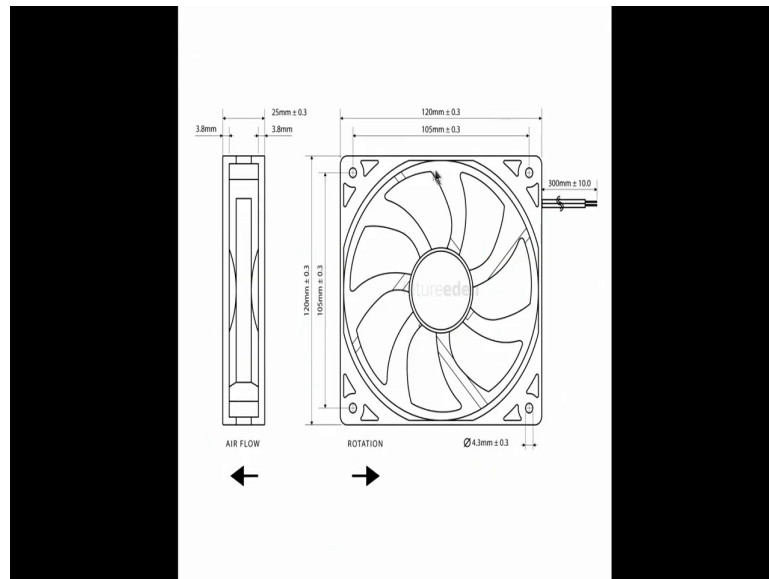
I will now start with a few of the real life situations in which you may be asked to make a small enclosure for actual practical applications like this.

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This one is taken from our power lab. You see that the main what you call the device here is a layout for a very complicated some device.

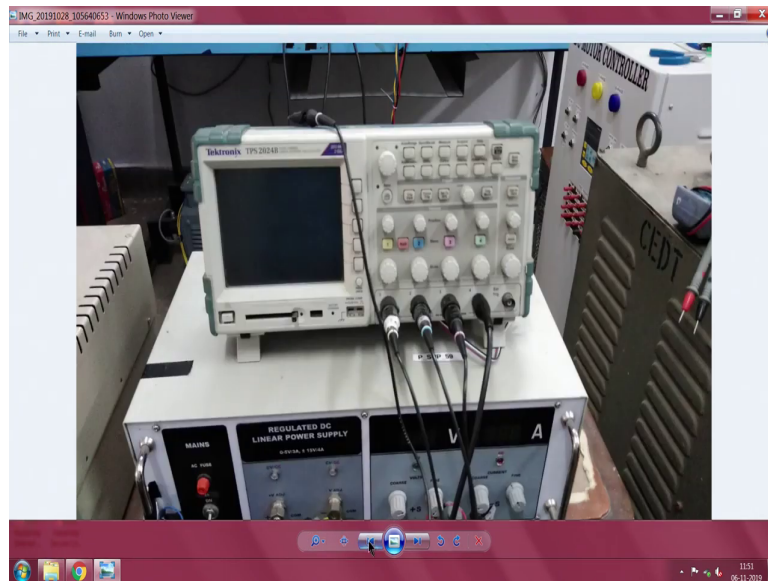
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Anyway if we get into that we are likely to get lost. So, I will avoid that. So, the thing here is saying 2 things are there which you need to see here. One is at the back. Can you see? They have power supplies and they have something else also here. I am not very sure about the what you call technical specifications. I just wanted to tell you that in practical applications, we will end up with having to work for equipment which work under that very what you call potentially hazardous and dangerous situations and any small mistake here, somebody can you know wrongly connect something or it is likely to lead to injury. Seen this?

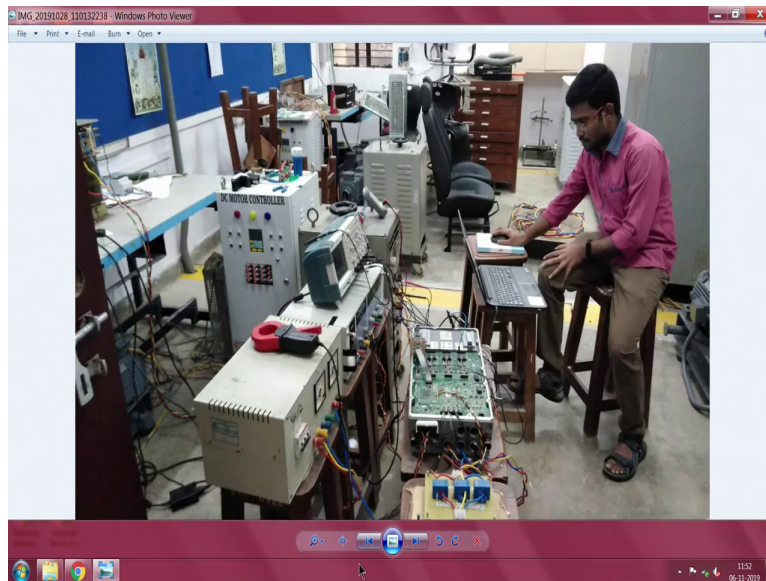


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So, at the bottom they have the same power supply at the top they have this new what you call range of oscilloscopes. So, it is very critical that you design a proper human interface with the whatever computer they have. So, a small error here is likely to lead to sometimes fatal consequences.

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So, you see here. So, one of the what you call students, he is trying to get on with his work and just nothing I am not sure what it is all about, but you are expected to make equipment for these things and somebody has to you know work it should work without any error.

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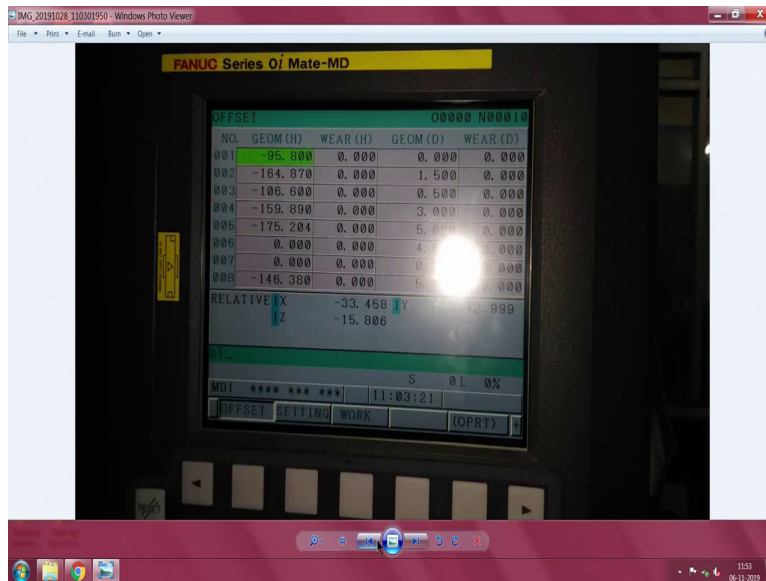


And this is this similar thing, but part of a CNC machine.

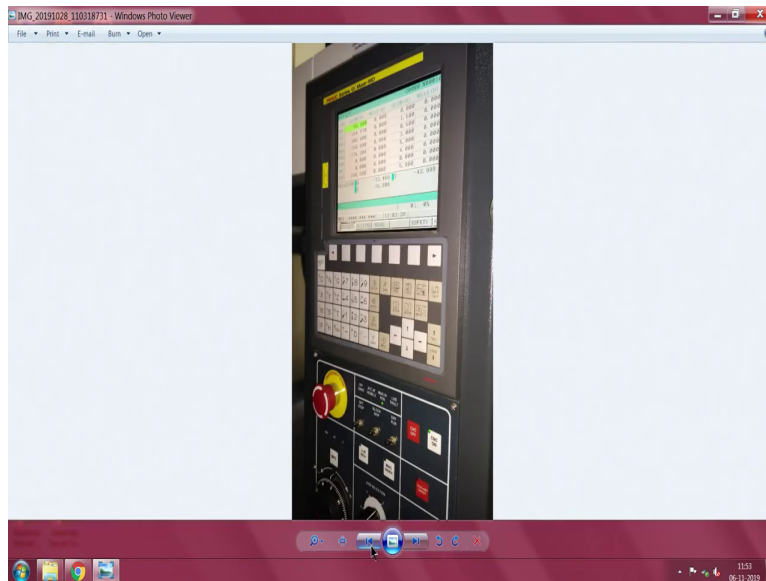
You see here while at one level we are I mean quite happy with it. We have a very complicated display here and then there is a keyboard here though it is supposed to be fully computerized numerical control, still we end up with a reasonably good front panel. So, at this point what I wanted to stress for you is this is in what you call part of a horizontal machining center.

So, the way these things are laid out are slightly different from. that laid out here.

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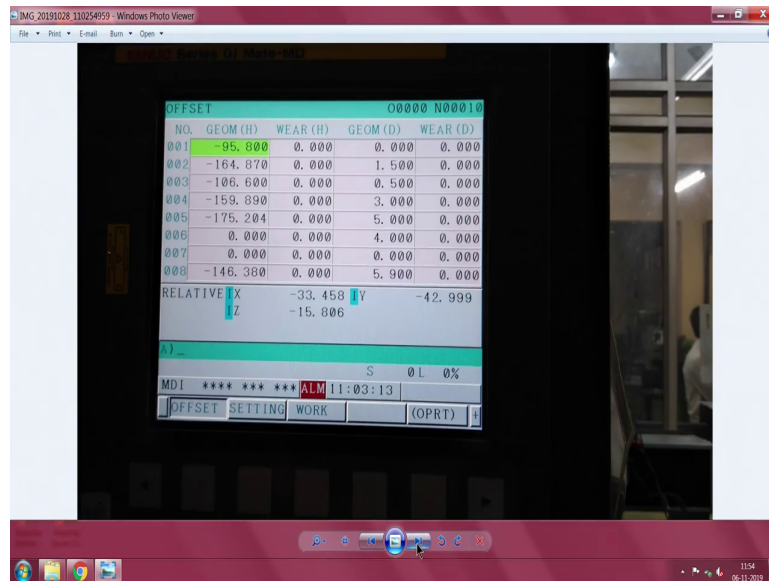


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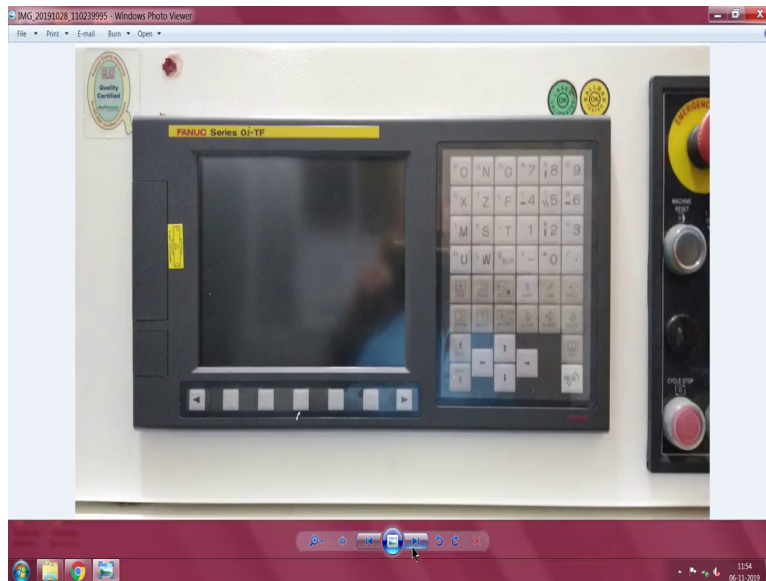


Can you see here? This one is that same this thing. I could not have enough space for you to take a proper photograph. This one is a vertical machining center. If you see that keys and this organization is a is actually the very same thing what was here.

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The same thing only instead I have keeping it on the right side they had to bring it to the bottom such that they can operate it and including that what you call the actual override control plus all these things, it needs a lot of design of the panel. If you notice inside this can be done by software there is no problem, but; however, the outside the basic structure we end up with making having to design that and then at this point I still feel you as a professional or what you call serious or mature can easily make all these things and you can present it to your friends and in between this is taken from my garden.



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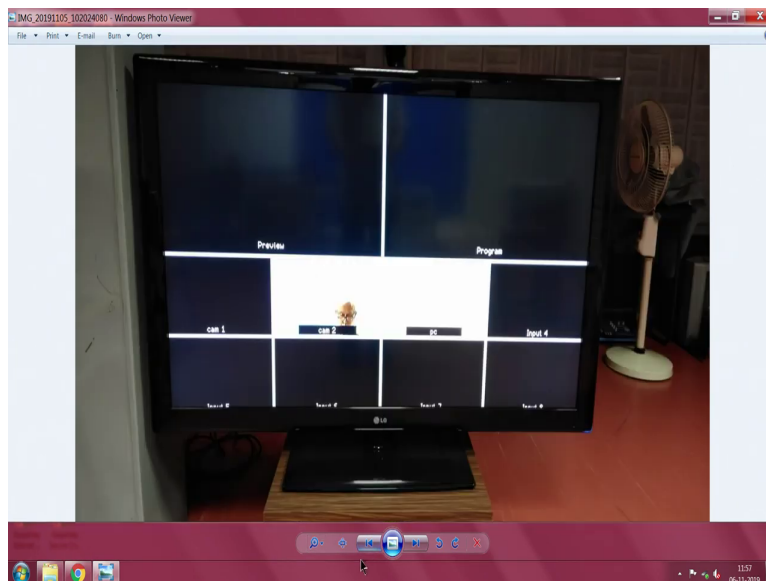


You see this is the usual what you call I do not know what you call it, the small temperature measuring device elsewhere another one I had opened it and showed you everything even in a place like this while it looks I would say easy or anything certain improvements can be made.

So, in this case it is of course, obvious saying well I will not pick on these things know saying I wish these letters were above and something else you know is there and of course, this displays a dollar there. What looks otherwise, simple still does take a little bit of design and most important what you will notice is probably here we have a display and this blue sheet is a mask for all the things that are underneath, this is probably all of these are mounted on a printed circuit board.

And you need to make this overlay sheet and it becomes a product until that point it is not a product and you will notice that most of this bottom half is probably occupied by the power supply. This is this can be used in the you know environment and I mean you can measure the soil temperature just near the now the human says otherwise a little deeper where a little more activity takes place.

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This is the monitor which is placed in front of me. So, I am here. The small fellow in the corner is here and our people you know set up these things before my work starts.

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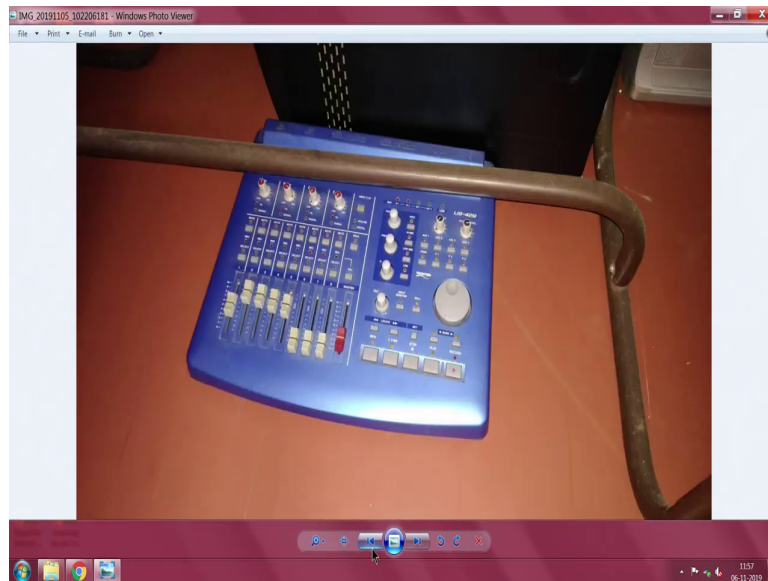


I will just keep all these.

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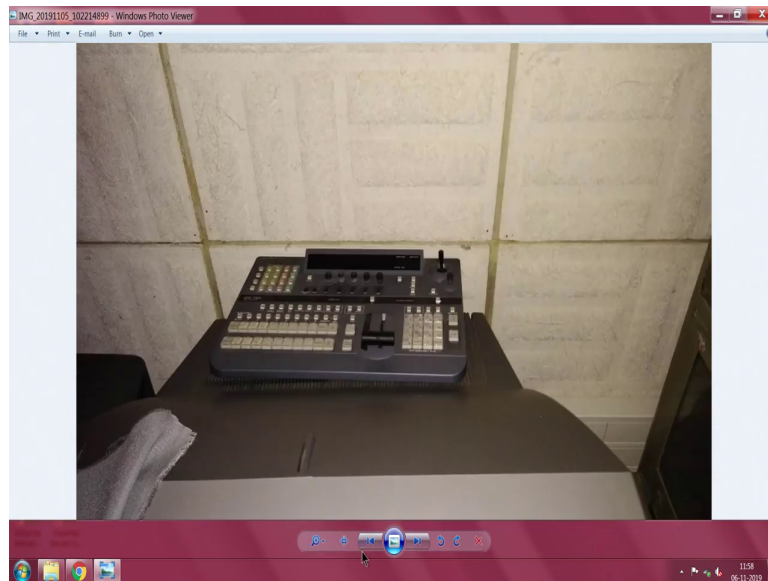
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You will notice this is some old equipment. This could make sense if you had lot of desktop space and the total amount of these gadgets on your desk is limited and then this is probably an audio mixer which was purchased for something else.

So, when you want to make something important decision is do you think this main wheel should be on the right or is it on the left and you have all these you know mixer, slider and this thing, should they be a right on the left and then how do you need to organize these things, you can always make a mock up and discuss it with your friends.

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This is getting a little more professional. This one is the master I do not know what they call lever which does all the mixing and so on and these are all the various options of wipes. Looks easy is it not and then we even have a joystick there.

First time when you need to organize it, you probably have to make several alternatives presented to actual user. Actual user can be any professional and there a little what you call used to operating it in the conventional way in which their previous things have operated or it is not exactly a population stereotype, but easy for them to adopt and a new course they can change things.

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This were our early camera controls. I showed you a camera picture earlier. These 2 were the camera devices which control the various things of the camera. Right now fortunately we have very good things which do not need all these, but these are all professional equipment which I have been borrowed from what is called the 3 camera chain of old time studios and this is probably something used for mixing the 2 and so on.

I have no clue, I just wanted to show you that if you take a thing like this and present it to somebody as used everything earlier he will become a member of a focus group. That focus group will now decide and tell you, it is not a matter of putting any random color you like. In this field these are all the expected things there is a standard related to this.

So, the focus group is likely to give you all the necessary inputs before you actually fabricate a full-fledged prototype. So, you need to make all these what you call decals and stickers and all



that so that eventually it can be used, tested on the focus group and you can make beautiful equipment.

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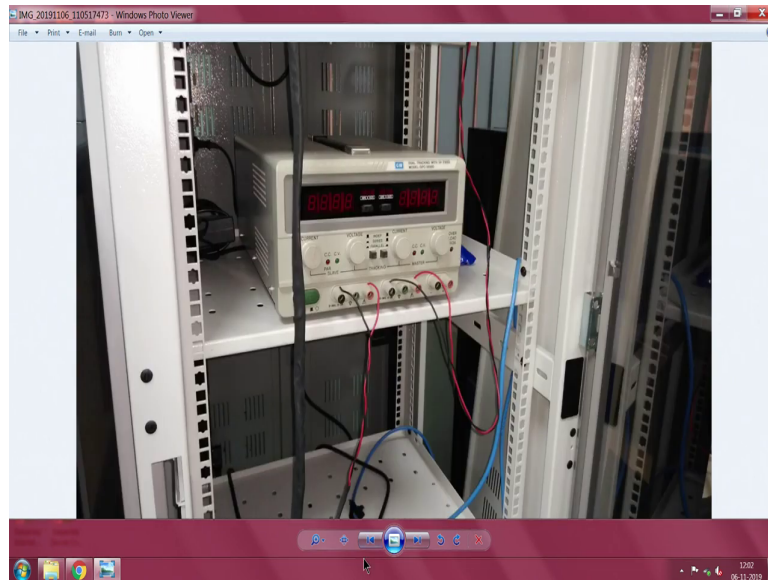


From here, I will take you to an actual lab where some network activities are going on. I have no clue what these are, but this is part of the lecture I try to tell, I mean I try to demonstrate earlier. This is a typical 3 u rack, 3 u sub rack I am sorry, these are all the plug in units and this is the as I told you we have captive not see here floating nuts by which you assemble these things.

Now, when you get the sub rack, first time you will notice that yes I need to plug in various devices here and over there are cables in the front end and you have noticed something here, this one is a small battery which temporarily they have replace there. Normally, such devices you know like these batteries and all are not packed here there will be in the rare side.

Yesterday if you remember I showed you one picture of a rack which is populated from the front as well as at the back. So, this is probably one of those you know, this is a back panel and this is only temporarily a storage is kept here.

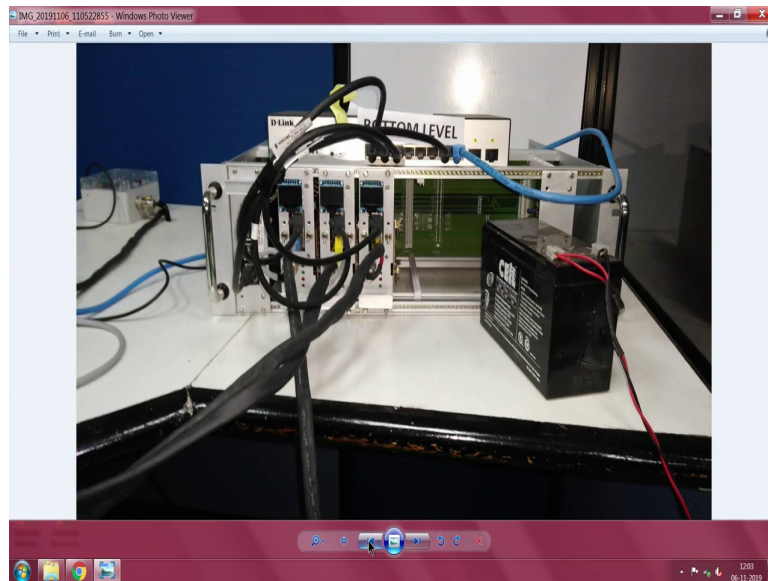
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Are you liked or not we keep ending up with these equipment and there is a simple shelf on which these things are placed. And, eventually after the work is over and everything you know works either this is removed, this device is completely removed or replaced by a rack mounted supply. That is where I told you there are half rack, one fourth rack and devices where this whole thing it is just it has a small display, next pictures I will show you.

Once you plug it inside this power is no longer drawn from the front, it is probably taken from the back end then it will come back here. And, this is a very convenient way of mounting it in a shelf.

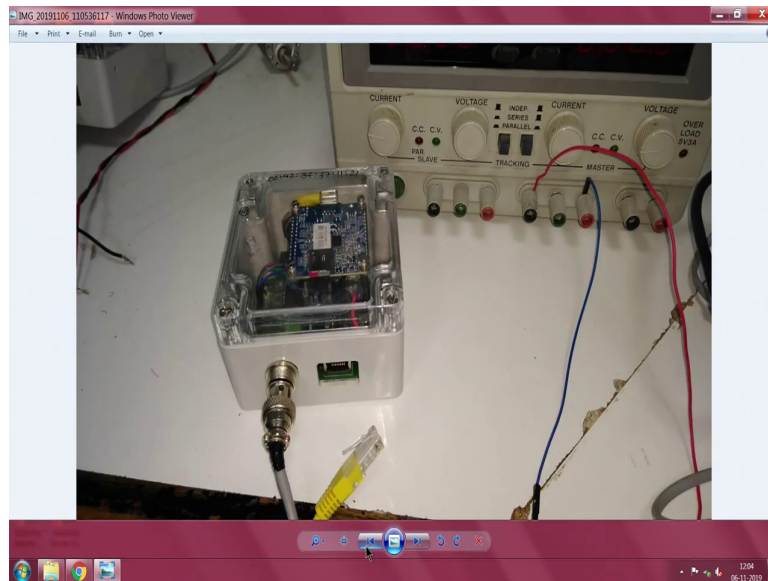
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Invariably in all the designs and when you are trying to develop things this is part of it. You have seen here, they have removed the small 7 ampere battery and I do not even know what these things are, but since there is space they have just populated this small modules here.

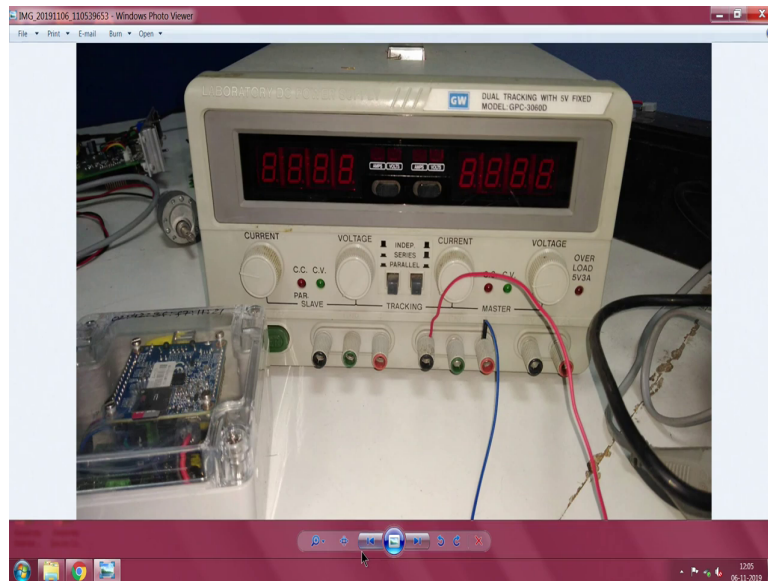
Once your test is ready, now it is possible for you to go ahead and try to produce these things here. Can you see here? So, we have something here then I do not even know what it is what it goes there and wiring can be made very you know a very convenient if probably keeping something here and making the you know links short. So, something equivalent to a large number of jumper cables can be kept there. So, I do not know where this is coming from where this is an RF feed or whatever it is.

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You have seen that this is a small transparent covered small equipment like this. So, part of the feed which was coming from there probably has to go here.

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And, then you have a working thing ready. It looks like a miracle, but it is really it is a hard work.

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This is a closer look at it. So, there is a display there and then I do not know what these electronics are and then this looks like a different type of connectors we have and then you have some indicators. So, when you are working with these things usually there is a way of making a printed circuit board which sits there and then you need to attach this front panel.

And, this is where I would think I will tell you that if you take all the necessary dimensions and all from the catalogues you will build a library which will be useful for you for the for this generation of equipment.

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It is a some smart switch. So, you have all these nice beautiful colored things and whether you like it or not we have this power switches.

So, next, when I have the time I will show you how this is go into the regular rack.



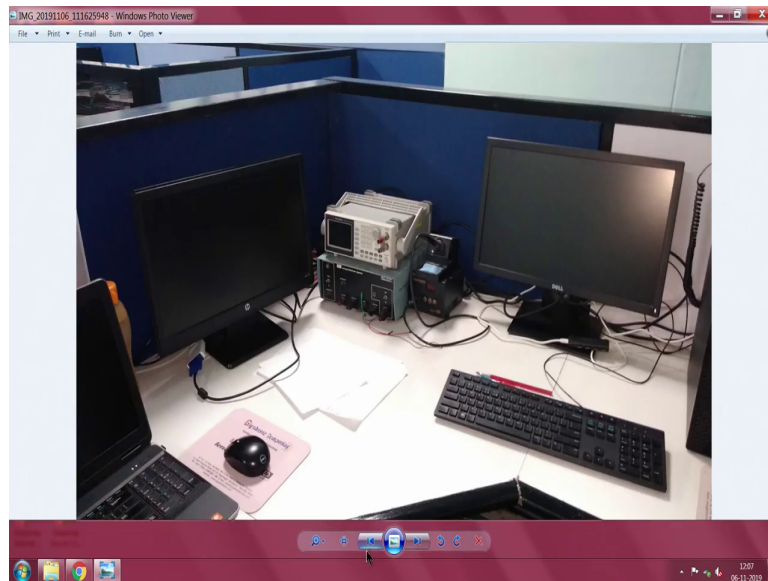
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Now, you see here this one of the sub racks were already at the back. You have a backplane and you have all these slots for the printed circuit board. This was a very elaborate thing which I showed you in the previous lecture, you can go there and check with it.

In general, if you are in the new networking products you will end up with these things and if in the initial stage itself you take a little bit of precaution you will be able to use them optimally to the maximum.

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And, this is from the work table of one of the people have been working there. We are into computers like you know there is a display here, there is a display here and probably there is a laptop here and finally, whether you whichever way you look at it, you end up with this things here, I still do not know what it is. This is one generation and this is a previous generation and anyway this is not part of it this is a something to do with the soldering technique.

And, when this new generation equipments have come this old generation also it is very easy for us to convert it into that type of an appearance by just what you call improving it. So, while paralleling the electronics inside improves tremendously, the front look also you can practice by using any illustrated software and you can come out with very interesting combinations.

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So, one lady is operating one I do not know what exactly it is. It looks like it is some UV curing equipment for this printed wiring board where there is some heating and. The thing important thing to notice here is you have a profile for ramping up the temperature and ramping down the temperature. At this point you probably do not actually require a very complicated LCD display. All you need to do is you just need to you know make these points and probably there is a small bit of selection.

So, this ramp 1 ramp 2 everything is you know displayed here and by manipulating these switches they are able to get that thing going. So, I am impressed by it.

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This is actually a real life very I mean to me it is dangerous. I do not want to go any closer. This is some power electronics equipment. First time you will notice is these are all very high voltage, it takes 400 volts rectifies and keeps it there. And, you have this many what you call things to work on, eventually all that will go into the drive which I have shown you. So, I think this is made for some 100 kilowatt high speed what you call multi phase drive.

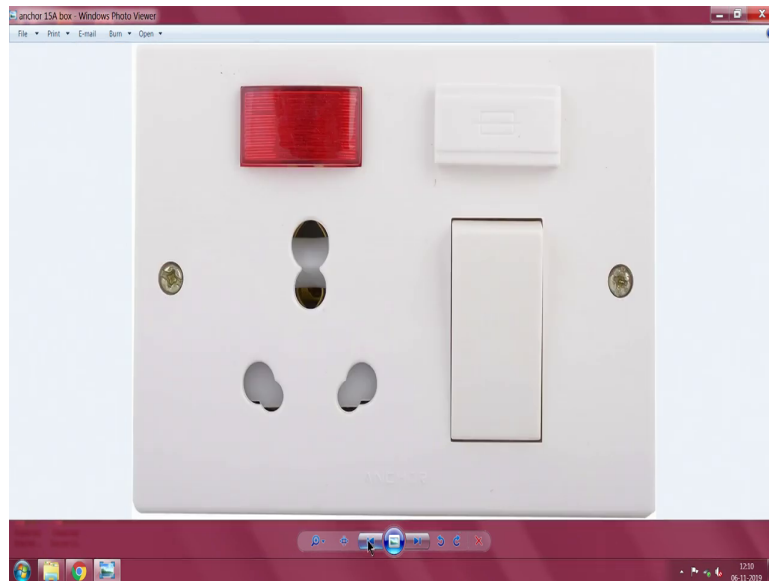
When the people want to package it now, they need to come and show us what is it they wanted to do. Say this one I he told me each one of them is some like of some part of an inverter while in the beginning we start like this eventually everything will be you know made better.

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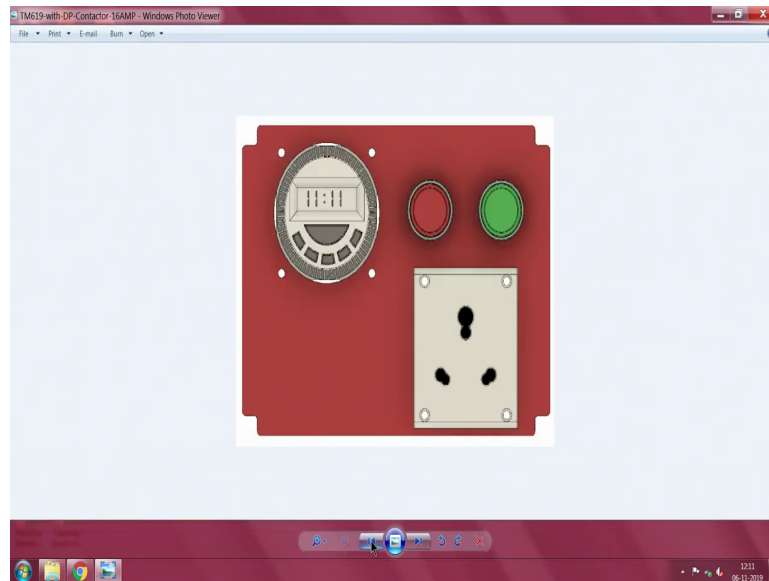
So, it is this. There are so many of these printed circuit boards here, probably this is one of them. And, this and this and all that after the actual test is over finally, they will get neatly packaged and you will have a running thing.

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This is something which I have taken from my home collection. This is nothing, it is a 3-phase I am sorry it is a 3 pin single phase some power device. You will see that here you will notice that you have a switch and then you have a fuse and you have these. These things once you buy it you probably need to add an extra cover plate on this which shows to what type of load this is connected; what load has to be connected here, what is the operation that is connected here and what is the status of the power, in case of fail what goes and all that.

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This is not a actually real life product, it is not a full product actually. This is only what you call a 2D rendering and this particular one talks about a you know start and stop button. I am sorry green is usually start stop button and there is a load here and this one is they what you call in famous timer which you find ubiquitous more than infamous famous ubiquitous so called I think I do not know it is called fortune or something timer which you find anywhere.

So, how do you arrange all these things and once you have this it is very easy for us to move on to the workshop and just follow this template and carry out the operations. And, where do we get all the information?



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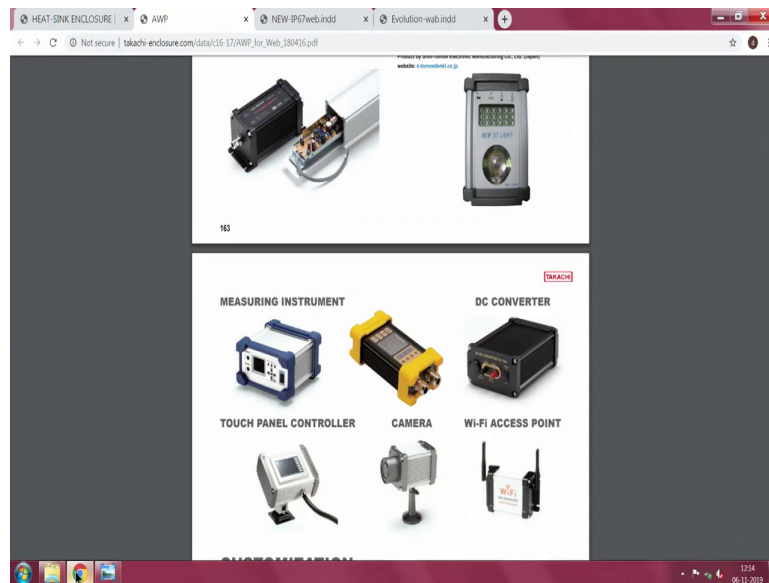


They are always the this is actually I taken from my Childs book saying if you do not get the information or if you are lost you can read books. But, in this case I refer to various types of catalogues, any information you want is probably available somewhere in the catalogue. And, over the years if you try to build on this, information like this is freely available. You see here whole centers 105 mm for a 120 millimeter fan.

And, for arranging these things if you make just two views saying one in the front or back view, one in the side view or the top view your thing is ready absolutely; life cannot be better and easier than this.

Now, for a while I will just close this.

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And, try to take you back to electronic enclosures.

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HEAT-SINK ENCLOSURE x AWP x NEW-IP67web.indd x Evolution-wab.indd x

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- Aluminum enclosure equipped with a highly efficient heat-sink top cover.
- Suitable to be used as a fanless PC, power amplifier, power supply etc.
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mounting


- Aluminum enclosure equipped with a highly efficient heat-sink top cover.

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- Cool silver anodized end-panels give its look luxury finish.
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**AWP IP67 ALUMINUM ENCLOSURE WITH SILICONE PROTECTOR**




- High impact resistant aluminum enclosure with tough silicone protector.
- Functional aluminum enclosure with IP67, heat release and EMI-Shielded effect.
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- 30 sizes, 8 color combinations.

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- Functional aluminum enclosure with IP67 and heat release effect.
- Normal and EMI-Shielded version are available.
- Heavy-duty enclosure. Extruded aluminum body with heat sink and the decalated panels.
- Suitable for measuring instrument, industrial control box, industrial camera housing.
- 34 sizes, 4 color combinations.

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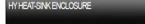
**AW IP67 ALUMINUM ENCLOSURE WITH WALL MOUNTING FLANGE**




- Flanged side plates for easy wall mounting.
- Normal and EMI-Shielded version are available.
- Heavy-duty enclosure. Extruded aluminum body with heat sink and the decalated panels.
- Suitable for outdoor use of LED power supply, Control box, junction box.
- 34 sizes, 4 color combinations.

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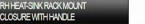
**HY HEAT-SINK ENCLOSURE**



**HYR HEAT-SINK RACK MOUNT ENCLOSURE**

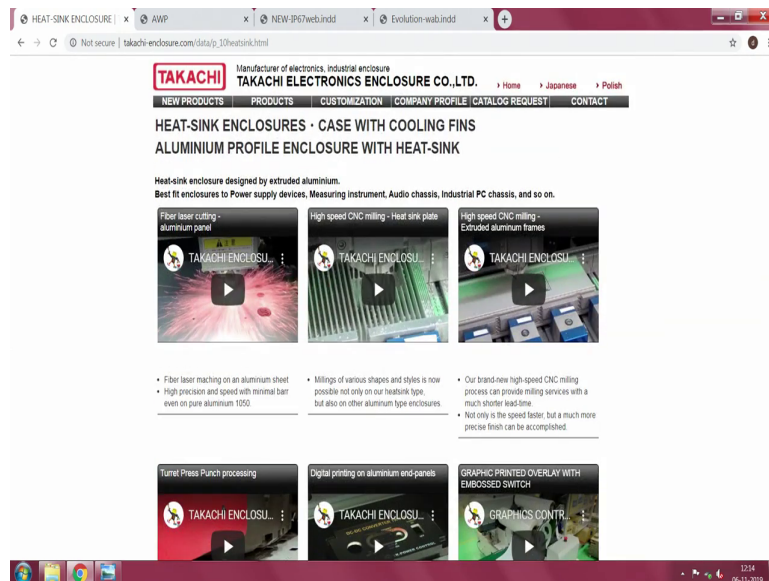


**HYRH HEAT-SINK RACK MOUNT ENCLOSURE WITH HANDLE**



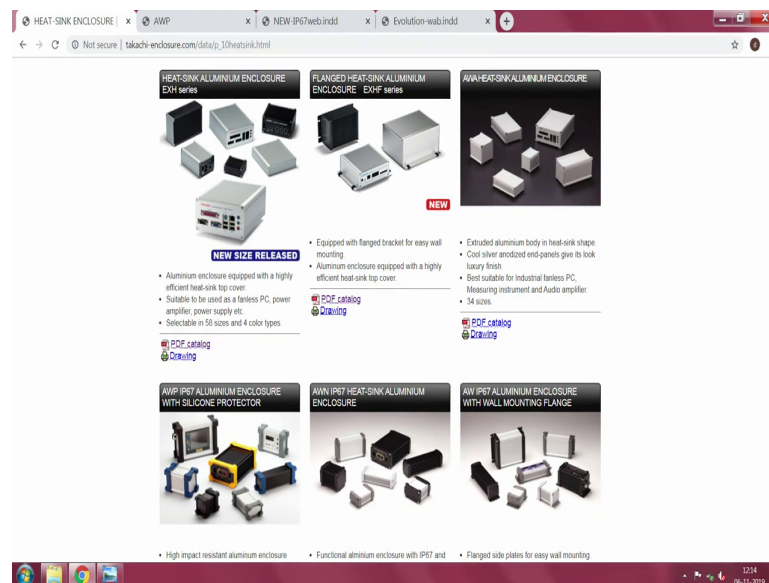
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See in this first thing you will notice in this is anything you want, especially if you say the that the other device which I try to show you there is probably useful equivalent devices available for you.

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So, we have aluminium enclosures. Fully sealed IP 67 is you know you can even immerse it in water, then we have all these things and in these cases all you need is I try to show you the other day, all you just need to do is try to make a just a front panel. And, to make the front panel without having to worry too much about it if you have all the necessary data from the books, you can very easily make any of these things what you wanted to do.

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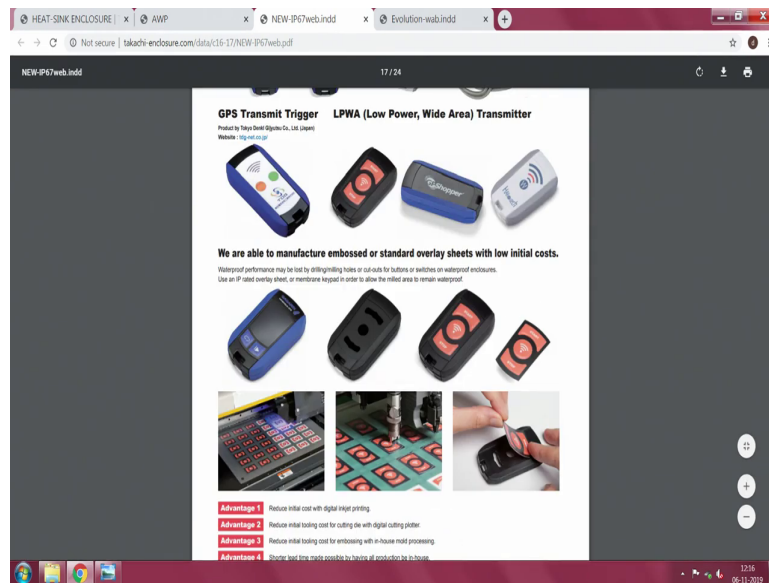
Main thing is you can talk to your other people in your group and get things going. So, two levels here – one level is just to concept conceive the product and for that this is where I was trying to tell you this I would earlier I had shown you this. You just need to think about it and eventually you know if you now send the file, it is easily milling and all can be done, but the first time if you do it properly everything fits properly. So, we are into new way of manufacturing things.

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This I do not know whether I had shown you earlier.

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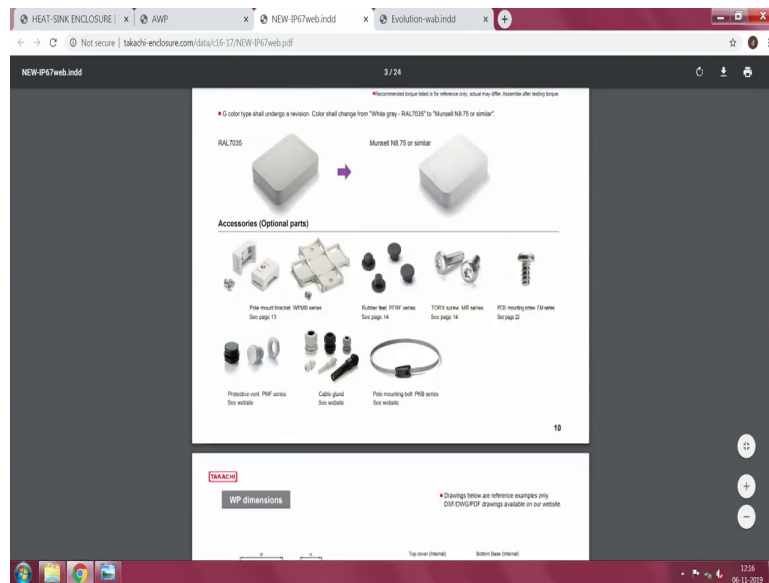
But, I think no harm in our checking it.



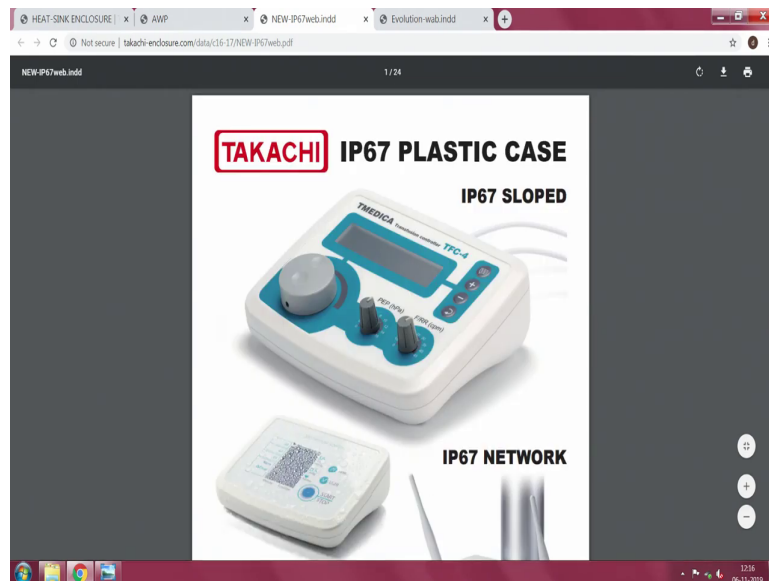
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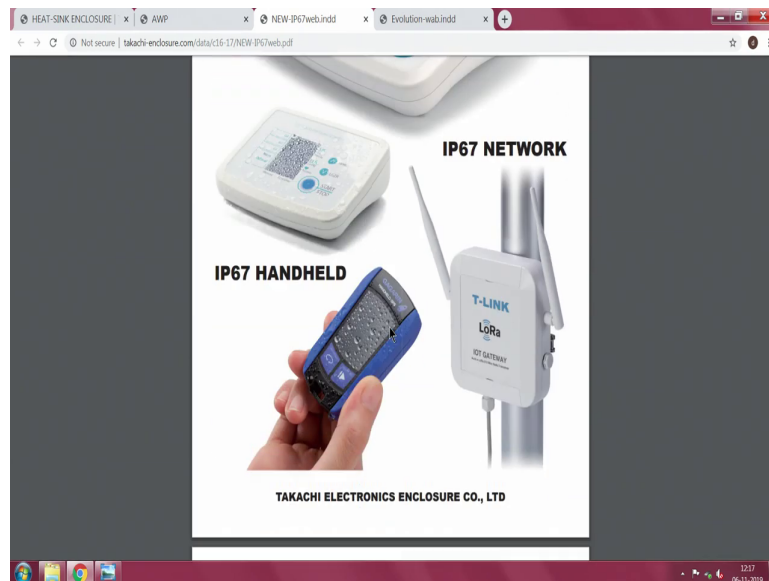
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Anything you can think of all the hardware is available. It is for you to just to conceive a product and then as I said earlier probably you pass it on to a focus group. The focus group will now give you a feedback saying while in your layout it this looks ok, I would rather this device not be present here, I wanted here or I wanted the side or anything. For you to make a mock up is very easy.

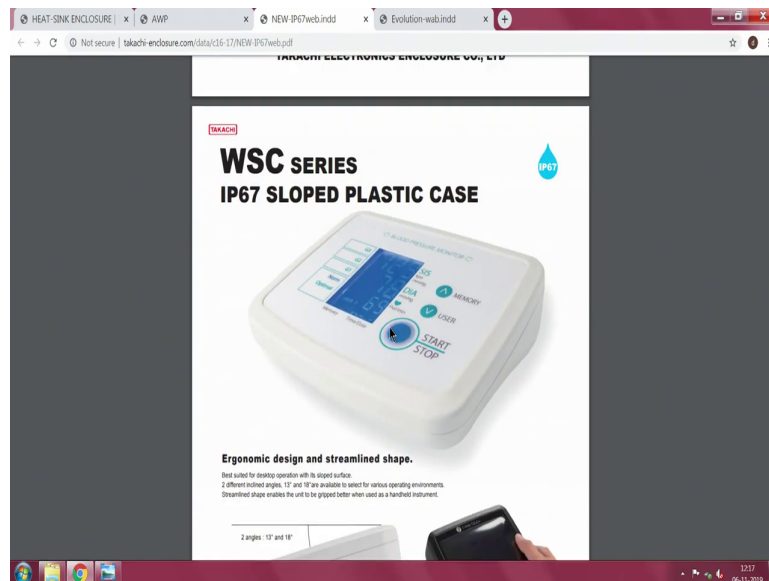
And, while the 2D mock up can be done with any illustrator or even any 3D software you can always attach all these small devices directly onto your cardboard model and make one yourself.

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Or in case it looks a little you know not worth the making, you can always exchange it with your other team members will be quite.

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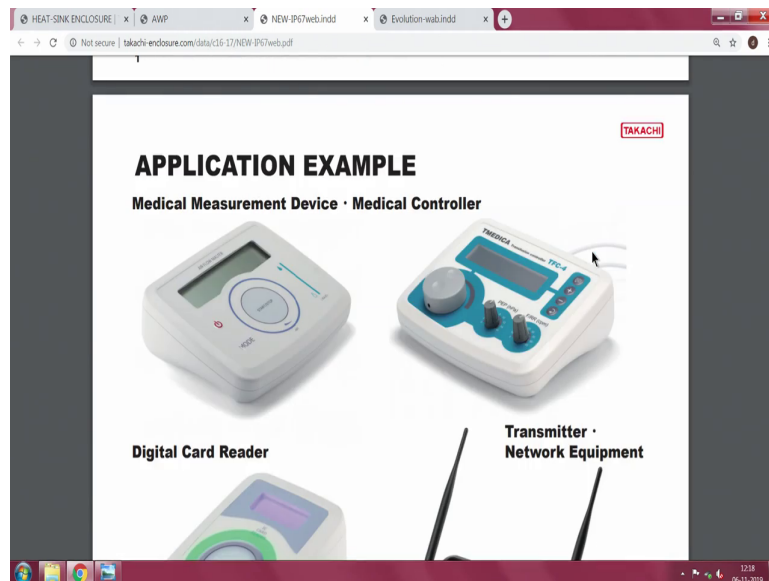
I am sure eager that one had if you remember that earlier thing what I showed you and the knob. Instead in this case it is just a overlay sheet with a tactile feedback switch.

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So, you have see in this somebody can operate these things and all you need to do is just to create a overlay sheet.

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So, from here this is directly taken from the catalogue, it is a full I mean nice example. So, we have various things made out of basically the similar thing.

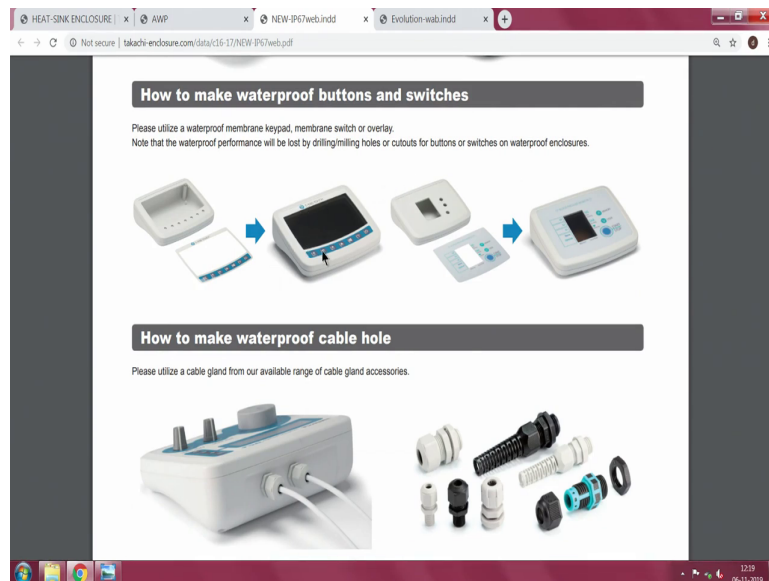
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If you remember I had shown you this digital card reader earlier and in fact, what even is a very simple what you call a black box can still be made a little more interesting by arranging things such that they are very convenient.

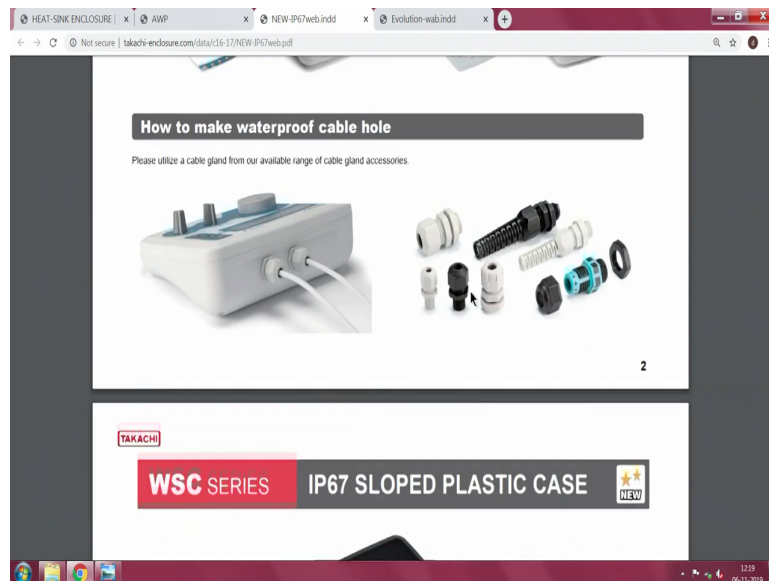


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See in here anything you want all these things are available including what looks like a beautiful display.

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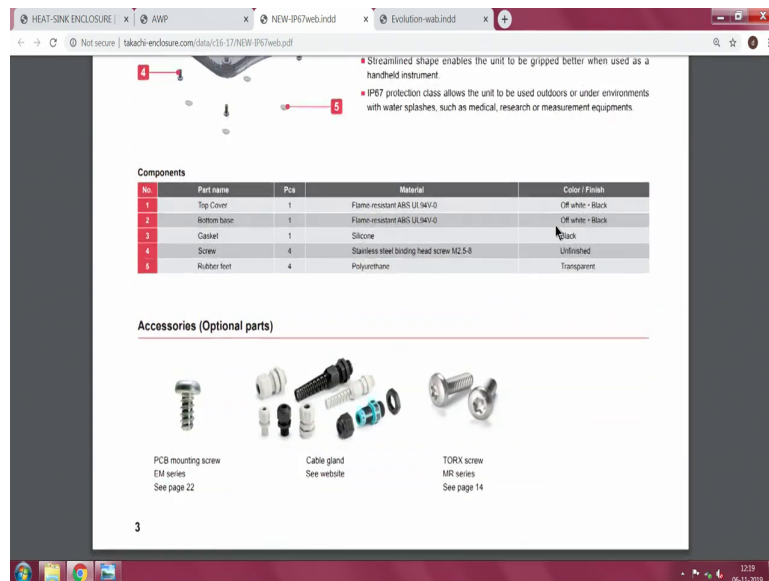
And now that because these are available, you need not spend too much time on the hardware.

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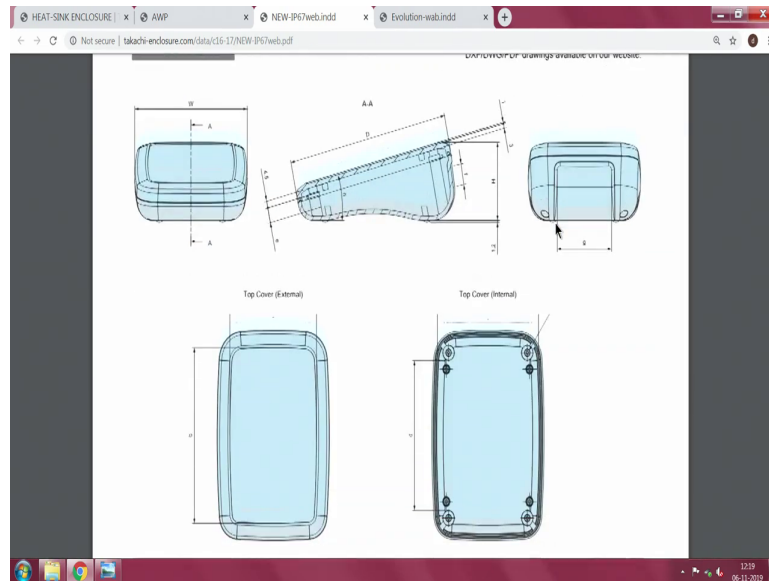
Yes, this will be maybe I expect know if you want to make it in bulk production it will be 3 to 4 times the cost of your own making. But, if you are making a few hundred pieces and if the market supports it you can buy these things directly.

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All you need to do is think a little about these dimension.

(Refer Slide Time: 29:43)

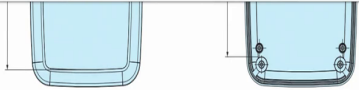


This is where I said books come to the rescue. So, necessary details are all here.

(Refer Slide Time: 29:56)

HEAT-SINK ENCLOSURE x AWP x NEW-IP67web.indd x Evolution-wab.indd x

Not secure | talachy-enclosure.com/data/c16-17/NEW-IP67web.pdf



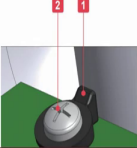
Product no. / Dimensions

Product no.	Product no.	W	D	H	a	b	c	d	e	f	g	h	Face angle
WSP10-14-5W	WSP10-14-5B	100	140	52	77	117	87	100	10	13.9	48.2	13°	
WSP10-14-7W	WSP10-14-7B	100	140	72	77	117	87	100	22	27.4	48.2	18°	
WSP14-14-5W	WSP14-14-5B	140	140	52	117	117	128	100	10	13.9	80.5	13°	
WSP14-14-7W	WSP14-14-7B	140	140	72	117	117	128	100	22	27.4	80.5	18°	
WSP18-14-5W	WSP18-14-5B	175	140	52	152	117	163	95	11.3	13.8	103.5	13°	
WSP18-14-7W	WSP18-14-7B	175	140	72	152	117	163	95	23.7	27.4	103.5	18°	

WSP-M2.3

INCLINED SPACER

NEW



- Due to the sloped shape of the WSP series, boss-tops are also angled. So when mounting PCB on, some gap between the screw head and PCB surface will be generated as shown the diagram. WSP-M2.3 helps to fill the gap.
- EM-2.3-8 as PCB mounting screws are available for bosses in bottom base. (See page 22)

No.	Part name	Pcs	Material	Color / Finish
1	Inclined spacer	4	PCB	Black
2	Screw (2 pieces M2.3x8)	4	Steel	Trivalent chromate

At the bottom they have given a large table of available dimensions, see in this.

(Refer Slide Time: 30:04)

HEAT-SINK ENCLOSURE x AWP x NEW-IP67web.indd x Evolution-web.indd x

Not secure | talachit-enclosure.com/data/c16-17/NEW-IP67web.pdf

surface will be generated as shown the diagram. WSP-MZ.3 helps to fill the gap.

EM-2.3-8 as PCB mounting screws are available for bosses in bottom base. (See page 22)

**Components**

No.	Part name	Pcs	Material	Color / Finish
1	Inclined spacer	4	POM	Black
2	Screw (Tapping M2.3-8)	4	Steel	Trivalent chromate

• Torque 0.1N • m

**Product no. / Details**

Product no.	Suitable enclosures	Pcs
WSP-MZ.3	WSC (for bottom base PCB boss)	4

4

**IP67  
UV-PROTECT  
NETWORK  
PLASTIC BOX**

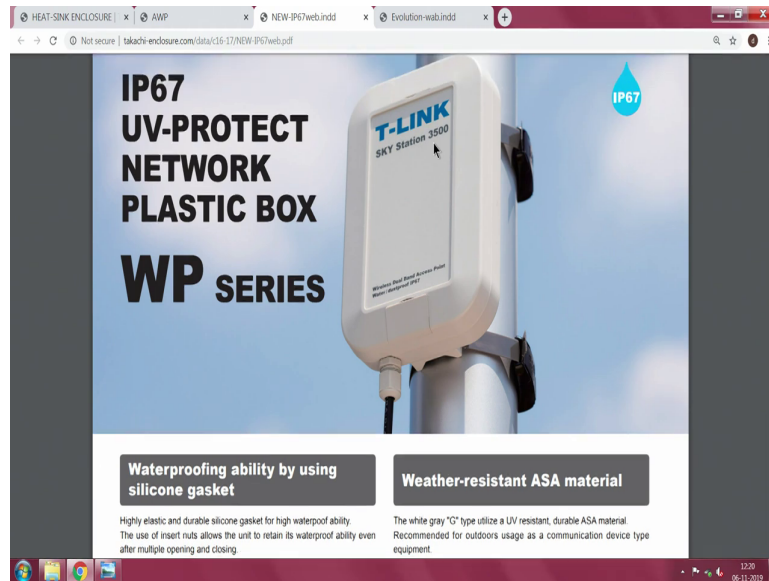
**T-LINK**  
SKY Station 3500

**IP67**

12:20  
09-11-2019

So, it is for you which I feel is relatively easy.

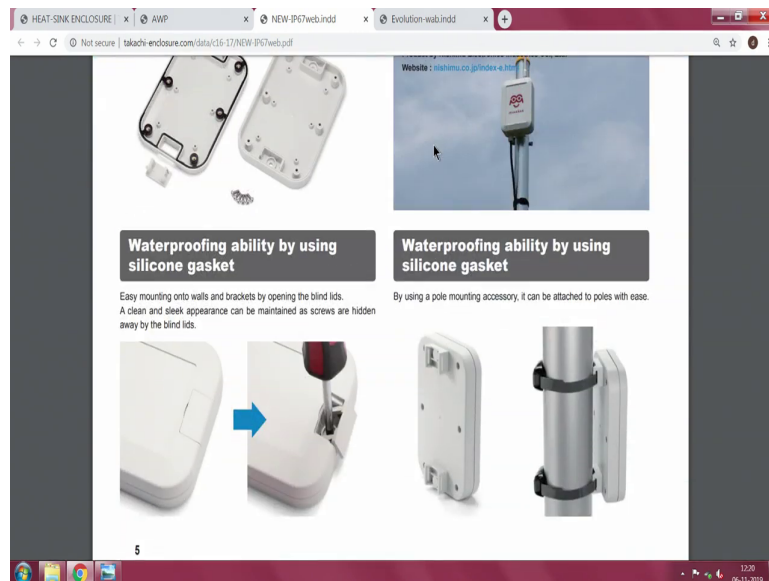
(Refer Slide Time: 30:07)



To make anything you want. All you need to do is a little bit of forethought so that I just make a appropriate sticker.

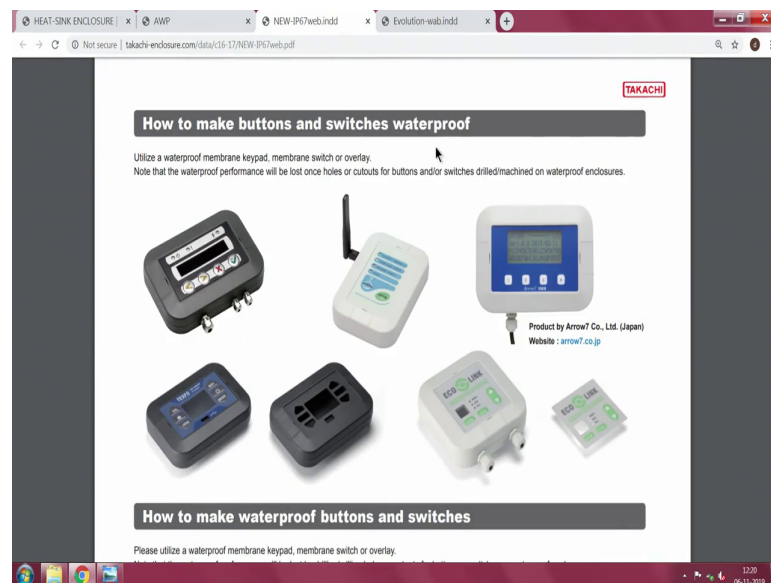


(Refer Slide Time: 30:20)



And, make things that much more interesting.

(Refer Slide Time: 30:24)



Things are this I think we can take a just a closer look. See near the actual utility enclosure and then here you see the openings and if you conceive of the product and make the printed wiring board to suit this and you can upload the file and all these things are very easily they are all made easily and they are available here. Can you see here? Large number of things I come in.

(Refer Slide Time: 31:05)



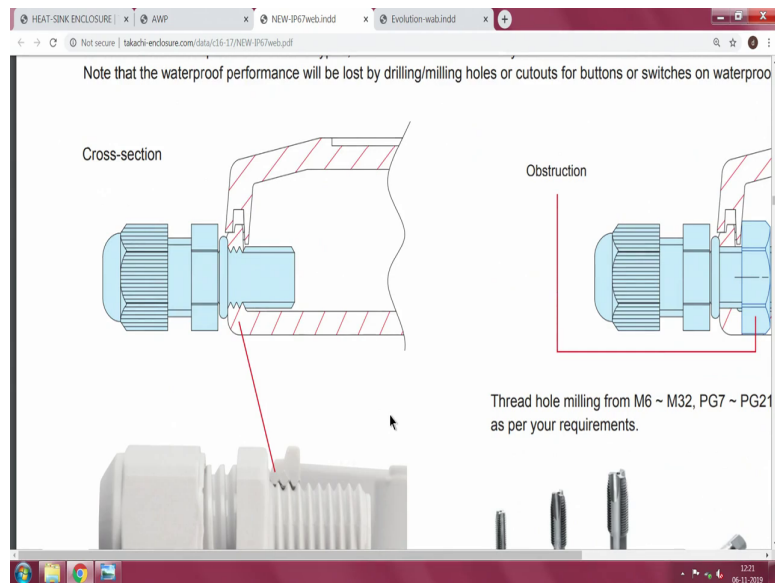
I really do not know what it is.

(Refer Slide Time: 31:08)



But, you can see that without having too much of without you are having to spending too much about it anything you want is already available.

(Refer Slide Time: 31:10)




(Refer Slide Time: 31:11)

HEAT-SINK ENCLOSURE x AWP x NEW-IP67web.indd x Evolution-web.indd x


Not secure | talachy-enclosure.com/data/c16-17/NEW-IP67web.pdf

# WP SERIES APPLICATION E



**LoRa Gateway**  
※LoRa = Long Range Transmission

Product by EASEL Inc. (Japan)  
Website : [nishimu.co.jp/index-e.html](http://nishimu.co.jp/index-e.html)

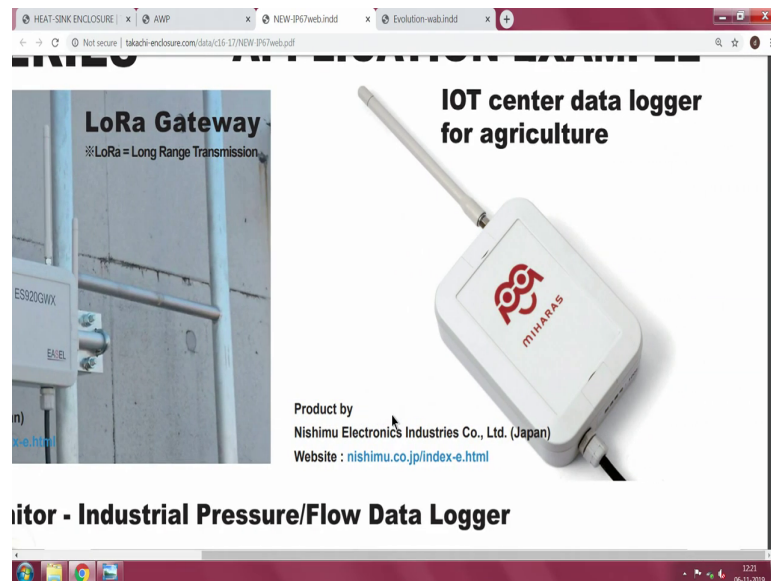


**IOT cen  
for agri**

Product by  
Nishimu Electronics Industries Co., Ltd. (Ja  
Website : [nishimu.co.jp/index-e.html](http://nishimu.co.jp/index-e.html)

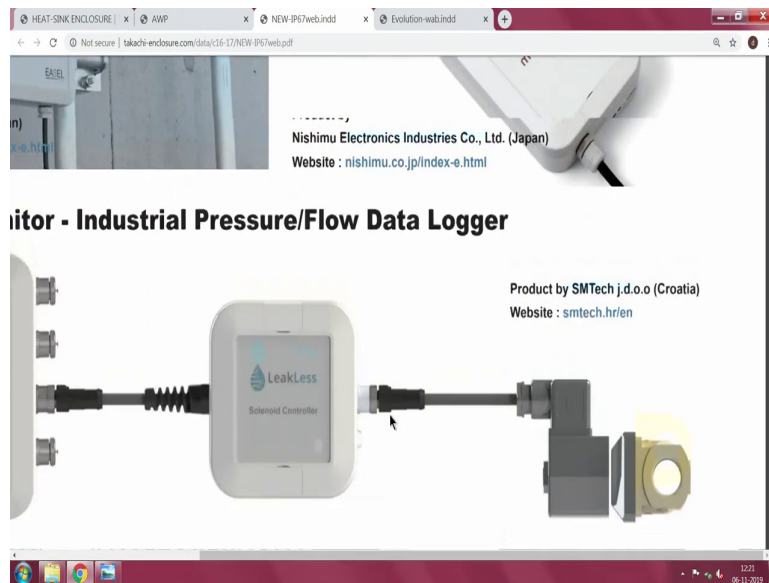
1221  
06-11-2019

(Refer Slide Time: 31:19)



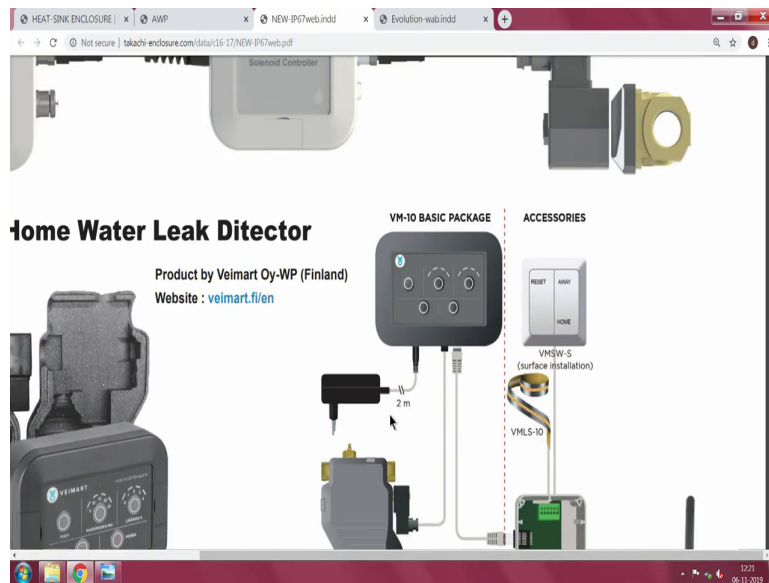
All you need to do is put a sticker IOT probably and you can sell your products better; IOT central data logger for agriculture.

(Refer Slide Time: 31:32)



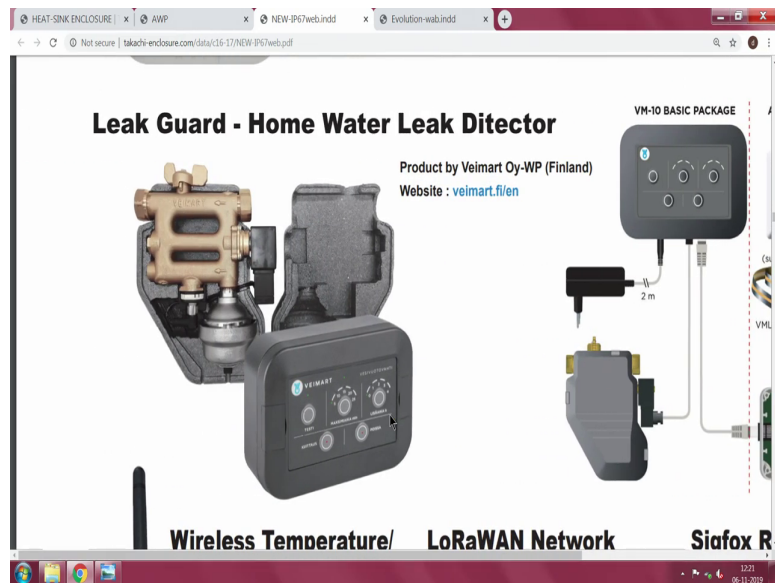


(Refer Slide Time: 31:32)



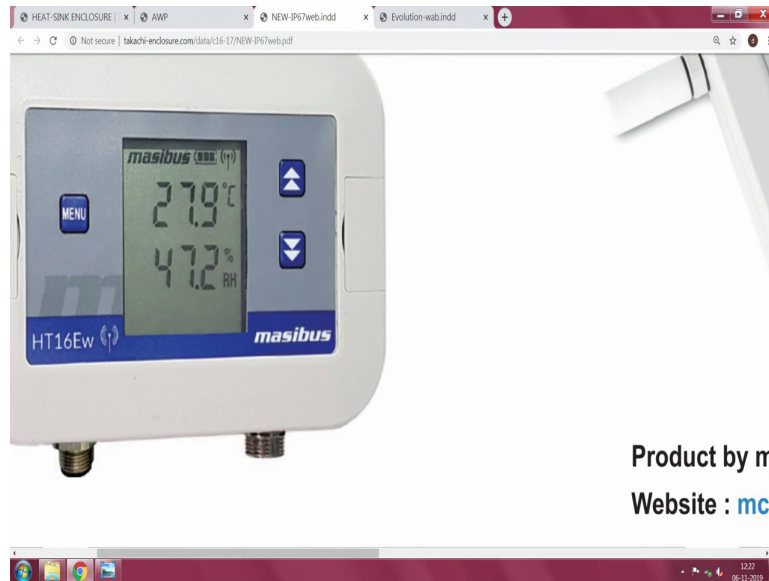
Now, you see here.

(Refer Slide Time: 31:37)

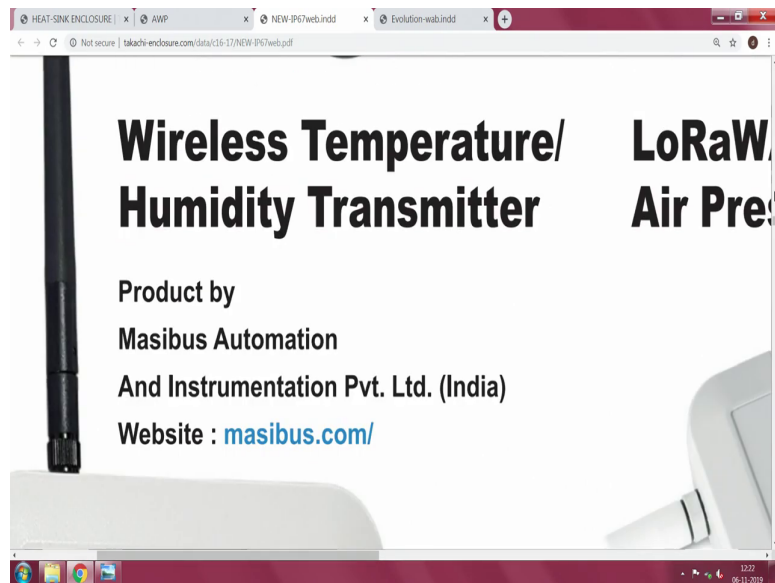


If you see this box, we have all the things already there. It is a question of what will you.

(Refer Slide Time: 32:14)



(Refer Slide Time: 32:15)



(Refer Slide Time: 32:16)



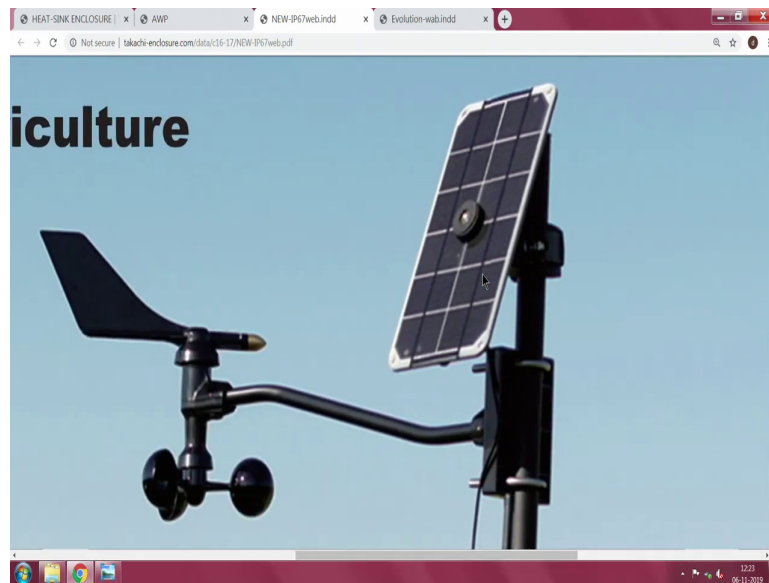
See here something has been added to that by which we have some settings and basically it is waterproof. All you need to do is design what you want and this here I feel know is where you will be able to probably deal with your group and decide which is better and there is a place and there is a niche market for these products. All it requires a little bit of our imagination here. You have seen this?

(Refer Slide Time: 32:57)

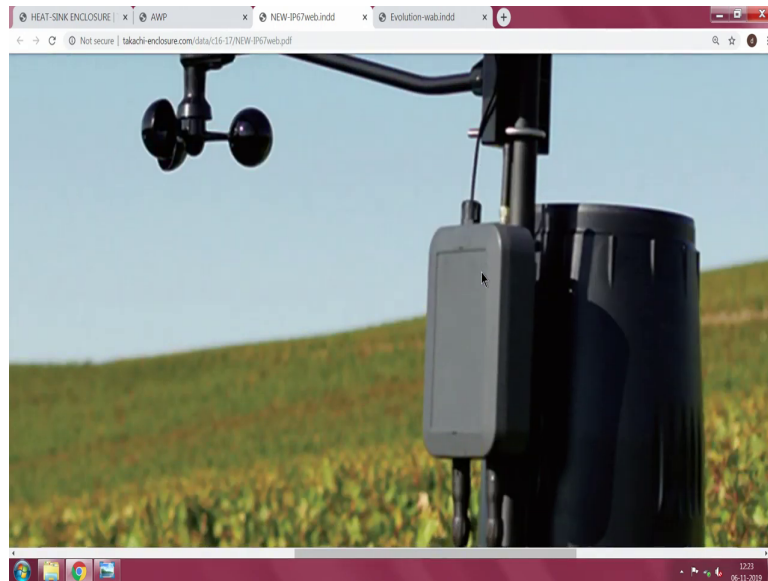


These are all fantastic amount of this products are available.

(Refer Slide Time: 33:07)



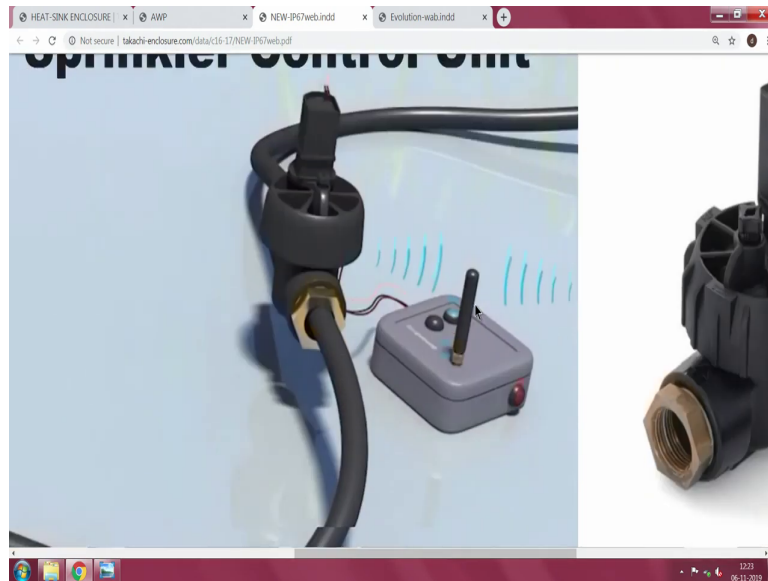
(Refer Slide Time: 33:12)



See here my interest is this. It is easy.

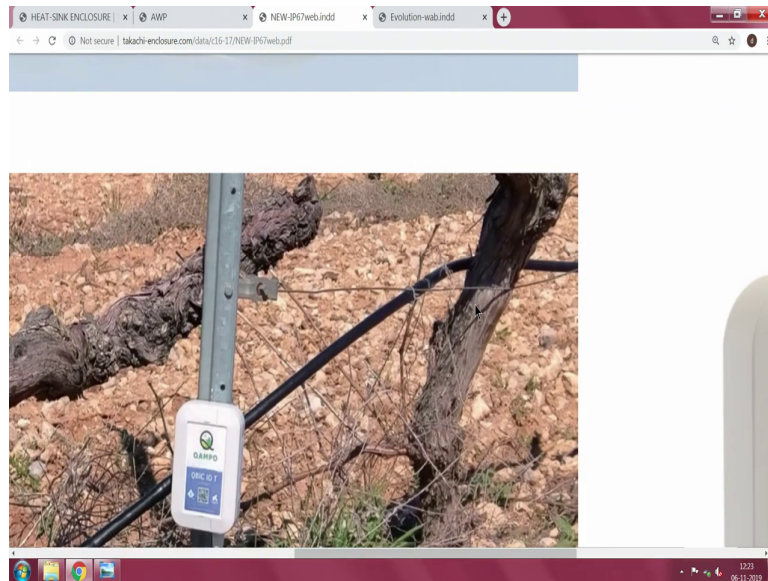


(Refer Slide Time: 33:18)



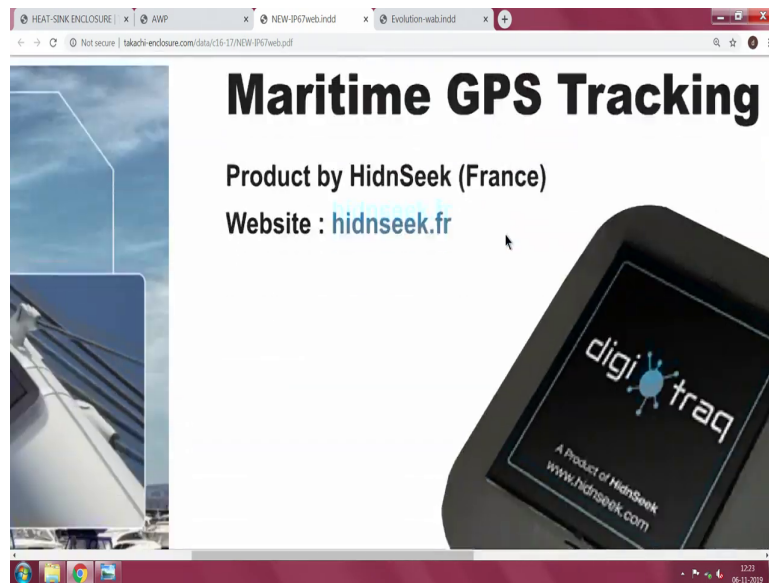
Any of you in fact, all of us, you and I know all of us can easily get these things into the field.

(Refer Slide Time: 33:22)



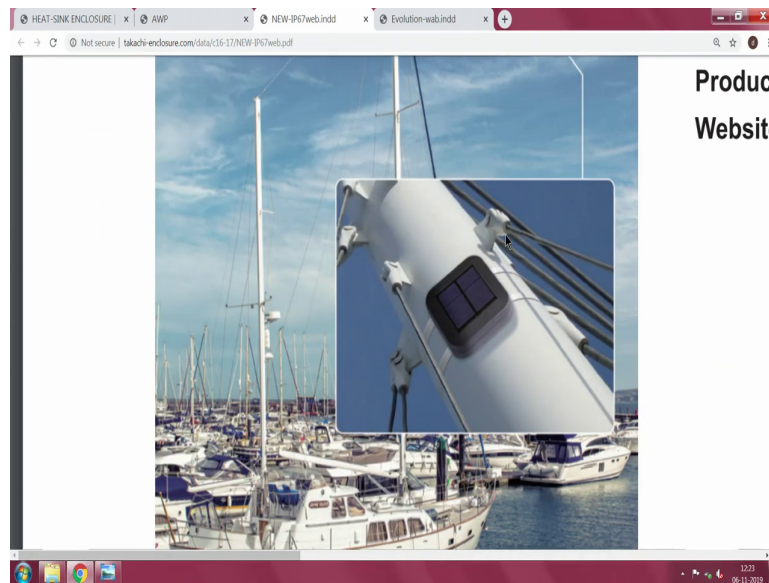
Now, maybe you will appreciate the small temperature device which I was trying to show you that one is a normal kitchen thermometer and these are all the next level of agricultural things which very easy for us to do.

(Refer Slide Time: 33:52)



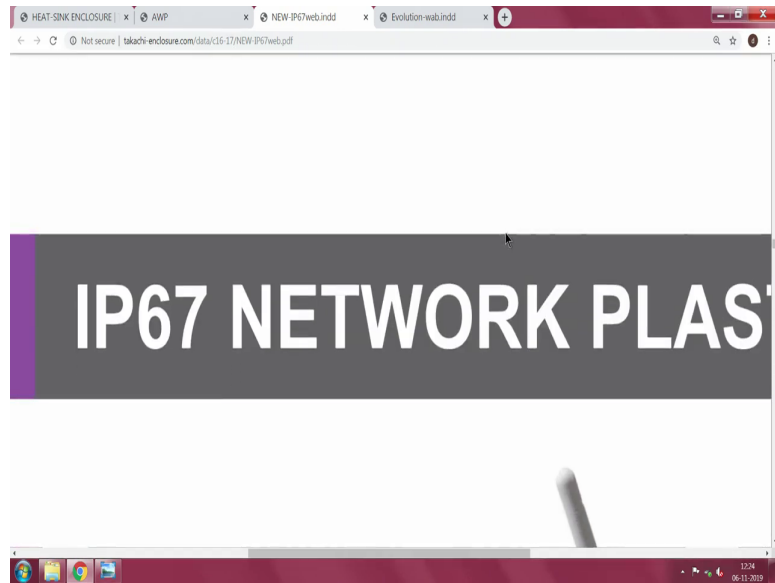
Can you see?

(Refer Slide Time: 33:55)



So, many of these things are unbelievably very good devices. All these things it requires a little bit of your imagination.

(Refer Slide Time: 34:07)



(Refer Slide Time: 34:08)



And, anything you want is here ok.

(Refer Slide Time: 34:10)



See here I still do not know what it is it says some leakage detector by some Takatronix and it show you the amount of what you call the various types of things that you know can be taken up and so on.

(Refer Slide Time: 34:36)



So,.

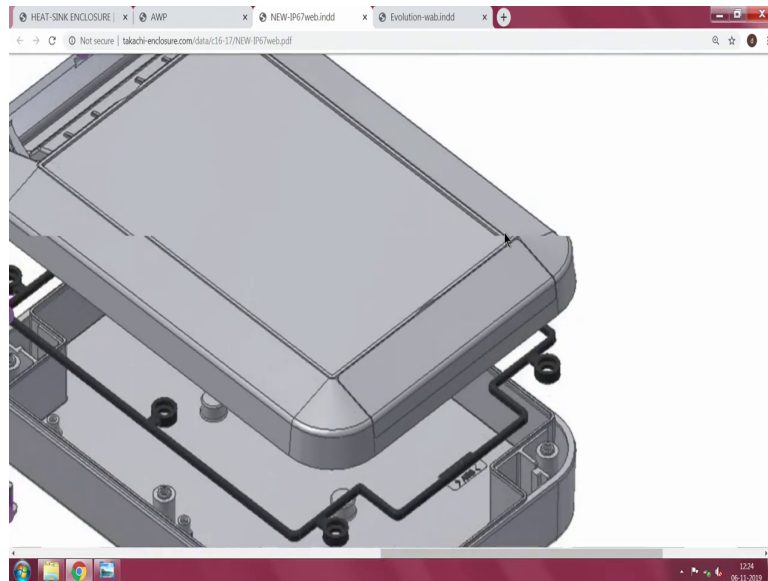


(Refer Slide Time: 34:37)



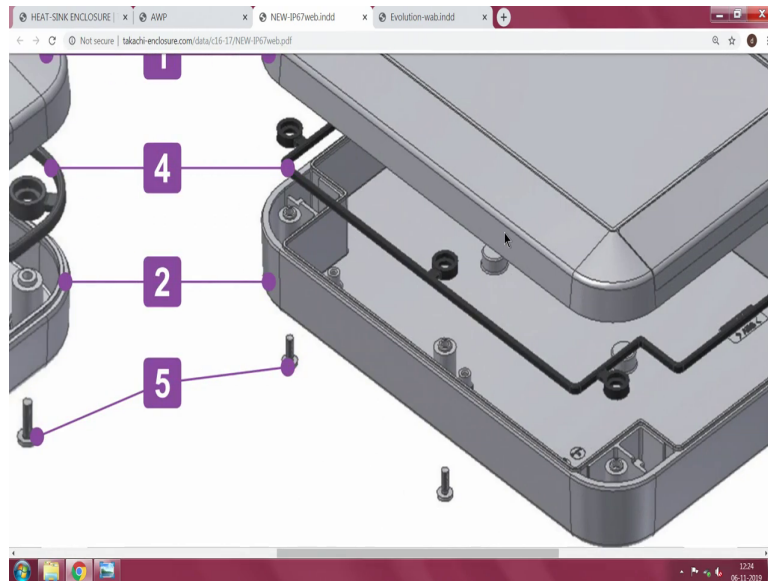
There is a gateway.

(Refer Slide Time: 34:41)

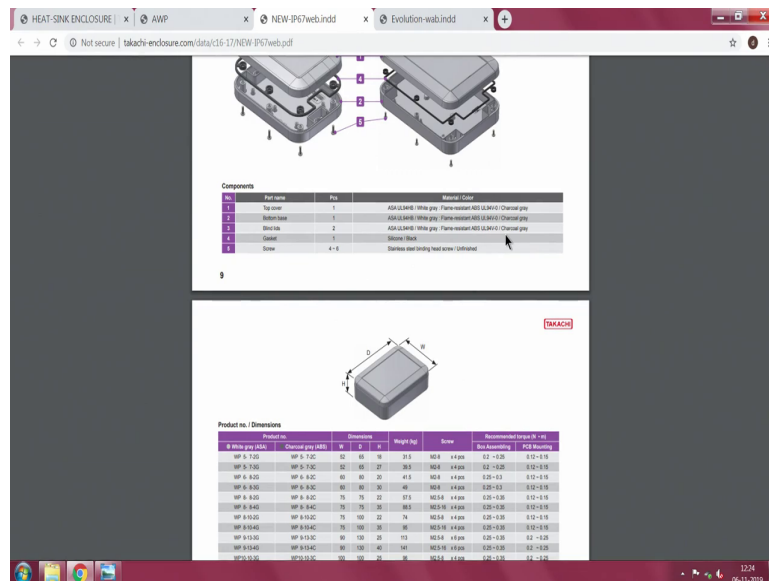


All these products they are very I feel know relatively easy for you.

(Refer Slide Time: 34:43)



(Refer Slide Time: 34:46)




Now, at the bottom huge selection of sizes is given there.

(Refer Slide Time: 34:50)

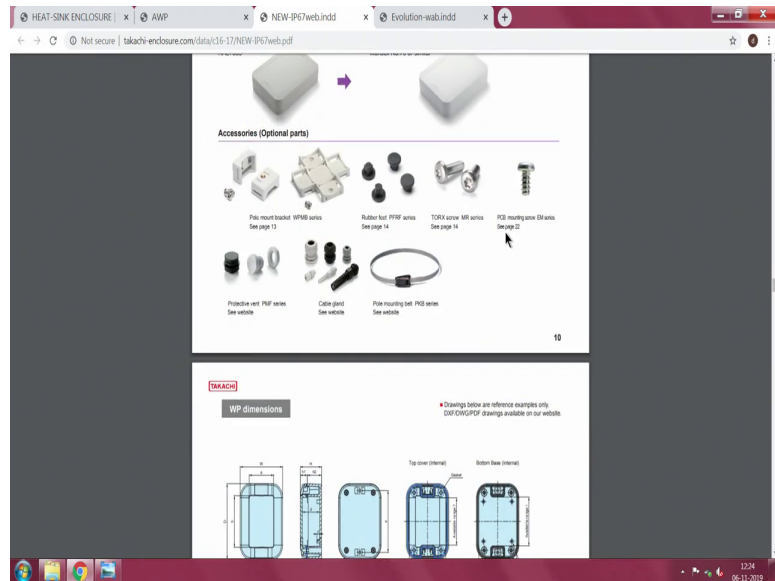
HEAT-SINK ENCLOSURE x AWP x NEW-IP67web.indd x Evolution-wab.indd x

Not secure | talachi-enclosure.com/data/c16-17/NEW-IP67web.pdf



**Product no. / Dimensions**

Product no.	Channel gap (mm)	W	L	H	Weight (kg)	Screw	Recommended torque (N·m)	IP Rating
WP 5-100	WP 5-100	52	85	18	31.5	M2.5	4.0-5.0	IP20-IP66
WP 5-150	WP 5-150	52	85	27	39.5	M2.5	4.0-5.0	IP20-IP66
WP 5-200	WP 5-200	52	85	36	47.5	M2.5	4.0-5.0	IP20-IP66
WP 5-300	WP 5-300	52	85	54	71.5	M2.5	4.0-5.0	IP20-IP66
WP 5-400	WP 5-400	52	85	72	89.5	M2.5	4.0-5.0	IP20-IP66
WP 5-500	WP 5-500	52	85	90	107.5	M2.5	4.0-5.0	IP20-IP66
WP 5-600	WP 5-600	52	85	108	125.5	M2.5	4.0-5.0	IP20-IP66
WP 5-700	WP 5-700	52	85	126	143.5	M2.5	4.0-5.0	IP20-IP66
WP 5-800	WP 5-800	52	85	144	161.5	M2.5	4.0-5.0	IP20-IP66
WP 5-900	WP 5-900	52	85	162	179.5	M2.5	4.0-5.0	IP20-IP66
WP 5-1000	WP 5-1000	52	85	180	197.5	M2.5	4.0-5.0	IP20-IP66
WP 5-1200	WP 5-1200	52	85	216	235.5	M2.5	4.0-5.0	IP20-IP66
WP 5-1500	WP 5-1500	52	85	270	293.5	M2.5	4.0-5.0	IP20-IP66
WP 5-2000	WP 5-2000	52	85	360	387.5	M2.5	4.0-5.0	IP20-IP66
WP 5-2500	WP 5-2500	52	85	450	481.5	M2.5	4.0-5.0	IP20-IP66
WP 5-3000	WP 5-3000	52	85	540	575.5	M2.5	4.0-5.0	IP20-IP66
WP 5-4000	WP 5-4000	52	85	720	759.5	M2.5	4.0-5.0	IP20-IP66
WP 5-5000	WP 5-5000	52	85	900	943.5	M2.5	4.0-5.0	IP20-IP66
WP 5-6000	WP 5-6000	52	85	1080	1127.5	M2.5	4.0-5.0	IP20-IP66
WP 5-7000	WP 5-7000	52	85	1260	1311.5	M2.5	4.0-5.0	IP20-IP66
WP 5-8000	WP 5-8000	52	85	1440	1495.5	M2.5	4.0-5.0	IP20-IP66
WP 5-9000	WP 5-9000	52	85	1620	1679.5	M2.5	4.0-5.0	IP20-IP66
WP 5-10000	WP 5-10000	52	85	1800	1863.5	M2.5	4.0-5.0	IP20-IP66
WP 5-12000	WP 5-12000	52	85	2160	2243.5	M2.5	4.0-5.0	IP20-IP66
WP 5-15000	WP 5-15000	52	85	2700	2923.5	M2.5	4.0-5.0	IP20-IP66
WP 5-20000	WP 5-20000	52	85	3600	3863.5	M2.5	4.0-5.0	IP20-IP66
WP 5-25000	WP 5-25000	52	85	4500	4803.5	M2.5	4.0-5.0	IP20-IP66
WP 5-30000	WP 5-30000	52	85	5400	5743.5	M2.5	4.0-5.0	IP20-IP66
WP 5-40000	WP 5-40000	52	85	7200	7583.5	M2.5	4.0-5.0	IP20-IP66
WP 5-50000	WP 5-50000	52	85	9000	9423.5	M2.5	4.0-5.0	IP20-IP66
WP 5-60000	WP 5-60000	52	85	10800	11263.5	M2.5	4.0-5.0	IP20-IP66
WP 5-70000	WP 5-70000	52	85	12600	13103.5	M2.5	4.0-5.0	IP20-IP66
WP 5-80000	WP 5-80000	52	85	14400	14943.5	M2.5	4.0-5.0	IP20-IP66
WP 5-90000	WP 5-90000	52	85	16200	16783.5	M2.5	4.0-5.0	IP20-IP66
WP 5-100000	WP 5-100000	52	85	18000	18623.5	M2.5	4.0-5.0	IP20-IP66
WP 5-120000	WP 5-120000	52	85	21600	22423.5	M2.5	4.0-5.0	IP20-IP66
WP 5-150000	WP 5-150000	52	85	27000	29223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-200000	WP 5-200000	52	85	36000	38623.5	M2.5	4.0-5.0	IP20-IP66
WP 5-250000	WP 5-250000	52	85	45000	48023.5	M2.5	4.0-5.0	IP20-IP66
WP 5-300000	WP 5-300000	52	85	54000	57423.5	M2.5	4.0-5.0	IP20-IP66
WP 5-400000	WP 5-400000	52	85	72000	75823.5	M2.5	4.0-5.0	IP20-IP66
WP 5-500000	WP 5-500000	52	85	90000	94223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-600000	WP 5-600000	52	85	108000	112623.5	M2.5	4.0-5.0	IP20-IP66
WP 5-700000	WP 5-700000	52	85	126000	131023.5	M2.5	4.0-5.0	IP20-IP66
WP 5-800000	WP 5-800000	52	85	144000	149423.5	M2.5	4.0-5.0	IP20-IP66
WP 5-900000	WP 5-900000	52	85	162000	167823.5	M2.5	4.0-5.0	IP20-IP66
WP 5-1000000	WP 5-1000000	52	85	180000	186223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-1200000	WP 5-1200000	52	85	216000	224223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-1500000	WP 5-1500000	52	85	270000	292223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-2000000	WP 5-2000000	52	85	360000	386223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-2500000	WP 5-2500000	52	85	450000	480223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-3000000	WP 5-3000000	52	85	540000	574223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-4000000	WP 5-4000000	52	85	720000	758223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-5000000	WP 5-5000000	52	85	900000	942223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-6000000	WP 5-6000000	52	85	1080000	1126223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-7000000	WP 5-7000000	52	85	1260000	1310223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-8000000	WP 5-8000000	52	85	1440000	1494223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-9000000	WP 5-9000000	52	85	1620000	1678223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-10000000	WP 5-10000000	52	85	1800000	1862223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-12000000	WP 5-12000000	52	85	2160000	2242223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-15000000	WP 5-15000000	52	85	2700000	2922223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-20000000	WP 5-20000000	52	85	3600000	3862223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-25000000	WP 5-25000000	52	85	4500000	4802223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-30000000	WP 5-30000000	52	85	5400000	5742223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-40000000	WP 5-40000000	52	85	7200000	7582223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-50000000	WP 5-50000000	52	85	9000000	9422223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-60000000	WP 5-60000000	52	85	10800000	11262223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-70000000	WP 5-70000000	52	85	12600000	13102223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-80000000	WP 5-80000000	52	85	14400000	14942223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-90000000	WP 5-90000000	52	85	16200000	16782223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-100000000	WP 5-100000000	52	85	18000000	18622223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-120000000	WP 5-120000000	52	85	21600000	22422223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-150000000	WP 5-150000000	52	85	27000000	29222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-200000000	WP 5-200000000	52	85	36000000	38622223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-250000000	WP 5-250000000	52	85	45000000	48022223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-300000000	WP 5-300000000	52	85	54000000	57422223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-400000000	WP 5-400000000	52	85	72000000	75822223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-500000000	WP 5-500000000	52	85	90000000	94222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-600000000	WP 5-600000000	52	85	108000000	112622223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-700000000	WP 5-700000000	52	85	126000000	131022223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-800000000	WP 5-800000000	52	85	144000000	149422223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-900000000	WP 5-900000000	52	85	162000000	167822223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-1000000000	WP 5-1000000000	52	85	180000000	186222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-1200000000	WP 5-1200000000	52	85	216000000	224222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-1500000000	WP 5-1500000000	52	85	270000000	292222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-2000000000	WP 5-2000000000	52	85	360000000	386222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-2500000000	WP 5-2500000000	52	85	450000000	480222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-3000000000	WP 5-3000000000	52	85	540000000	574222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-4000000000	WP 5-4000000000	52	85	720000000	758222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-5000000000	WP 5-5000000000	52	85	900000000	942222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-6000000000	WP 5-6000000000	52	85	1080000000	1126222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-7000000000	WP 5-7000000000	52	85	1260000000	1310222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-8000000000	WP 5-8000000000	52	85	1440000000	1494222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-9000000000	WP 5-9000000000	52	85	1620000000	1678222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-10000000000	WP 5-10000000000	52	85	1800000000	1862222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-12000000000	WP 5-12000000000	52	85	2160000000	2242222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-15000000000	WP 5-15000000000	52	85	2700000000	2922222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-20000000000	WP 5-20000000000	52	85	3600000000	3862222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-25000000000	WP 5-25000000000	52	85	4500000000	4802222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-30000000000	WP 5-30000000000	52	85	5400000000	5742222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-40000000000	WP 5-40000000000	52	85	7200000000	7582222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-50000000000	WP 5-50000000000	52	85	9000000000	9422222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-60000000000	WP 5-60000000000	52	85	10800000000	11262222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-70000000000	WP 5-70000000000	52	85	12600000000	13102222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-80000000000	WP 5-80000000000	52	85	14400000000	14942222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-90000000000	WP 5-90000000000	52	85	16200000000	16782222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-100000000000	WP 5-100000000000	52	85	18000000000	18622222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-120000000000	WP 5-120000000000	52	85	21600000000	22422222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-150000000000	WP 5-150000000000	52	85	27000000000	29222222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-200000000000	WP 5-200000000000	52	85	36000000000	38622222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-250000000000	WP 5-250000000000	52	85	45000000000	48022222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-300000000000	WP 5-300000000000	52	85	54000000000	57422222223.5	M2.5	4.0-5.0	IP20-IP66
WP 5-4000000000								



And, the hardware.

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Product no.	W	D	H	W1	D1	H1	W2	D2	H2	W3	D3	H3	W4	D4	H4	W5	D5	H5
NP 5-12	52	45	18	10	8	25.5	58.1	4	13	10.8	34.5	42.5	37	48	182			
NP 5-13	52	54	24	10	11	26.5	58.1	4	13	10.8	34.5	42.5	37	48	182			
NP 5-12	65	60	20	10	10	34.5	53.1	4	14.7	10.8	30	31.5	31	53	182			
NP 5-13	65	60	20	10	10	34.5	53.1	4	14.7	10.8	30	31.5	31	53	182			
NP 5-12	75	75	25	10	11	45.1	45.1	4	15.4	10.8	44	44	42	67	182			
NP 5-13	75	75	25	10	10	45.1	45.1	4	15.4	10.8	44	44	42	67	182			
NP 5-12	75	100	22	10	12	46	71	4	16	10.8	68	68	57	57	182			
NP 5-13	75	100	22	10	12	46	71	4	16	10.8	68	68	57	57	182			
NP10-13	100	100	30	12	13	63.1	63.7	4.5	18	11.2	68	68	61	61	182.3			
NP10-14	100	100	40	12	13	63.1	63.7	4.5	18	11.2	68	68	61	61	182.3			

Product no.	W	D	H	W1	D1	H1	W2	D2	H2	W3	D3	H3	W4	D4	H4	W5	D5	H5
NP 5-12	52	45	18	10	8	25.5	58.1	4	13	10.8	34.5	42.5	37	48	182			
NP 5-13	52	54	24	10	11	26.5	58.1	4	13	10.8	34.5	42.5	37	48	182			
NP11-13	100	100	22	12	13	72.7	115.5	4.5	20	12.2	110	68	102	100	182.3			
NP11-14	100	100	40	12	13	72.7	115.5	4.5	20	12.2	110	68	102	100	182.3			
NP13-13	125	125	30	12	16	63.1	138.1	4.5	23	12.2	138	120	120	120	182.3			
NP13-14	125	125	40	12	16	63.1	138.1	4.5	23	12.2	138	120	120	120	182.3			

11

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I will not what you call I suggest you know look up these things at your leisure.

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VPMB-M42 VPMB-M42-2

- This mount bracket made from weather resistant ASA material.
- Hole drilling is not required when installing the mount bracket, thus allowing the enclosure to maintain its IP67 protection.
- VPMB-M42 can be used both for vertical and horizontal installation.
- Together with VPMB series, the PMB series mounting bolt enables the unit to be mounted onto a pole.

• DWG/DWGPDF drawings available on our website.

VPMB-M42 VPMB-M42-2

Color Type

Color

VPMB-M42 VPMB-M42-2

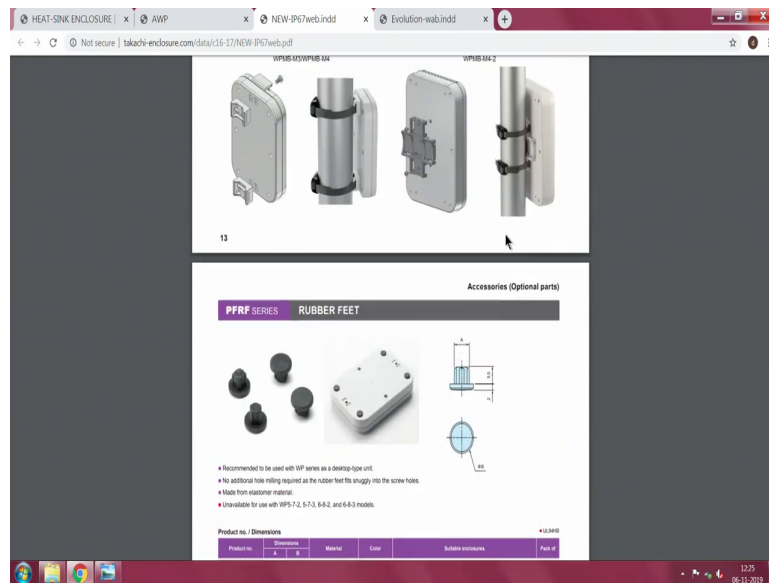
Product no.	Dimensions	Material / Finish	Mount	Mounting dimensions	Recommended torque / Weight	Page 4
VPMB-M42	16 14 5.5 10	ASA/LSMPS	Standard steel M4 x 2 pcs	UP1.2-1.2.4-4.8.1-5.8.1-6.8.1- 8.8-9-9.2-9-9.4	0.4-1.4N 2 2 gpm	
VPMB-M42	16 16 12 13	ASA/LSMPS	Standard steel M4 x 2 pcs	UP1.2-1.2.4-4.8.1-5.8.1-6.8.1- 8.8-9-9.2-9-9.4	0.4-1.4N 10 2 gpm	
VPMB-M42	16 16 12 13	ASA/LSMPS	Standard steel M4 x 2 pcs	UP1.2-1.2.4-4.8.1-5.8.1-6.8.1- 8.8-9-9.2-9-9.4	0.4-1.4N 24 1	

• Recommended torque listed is for reference only, actual may differ. Insultion after testing torque.

So, anything you want is probably available.

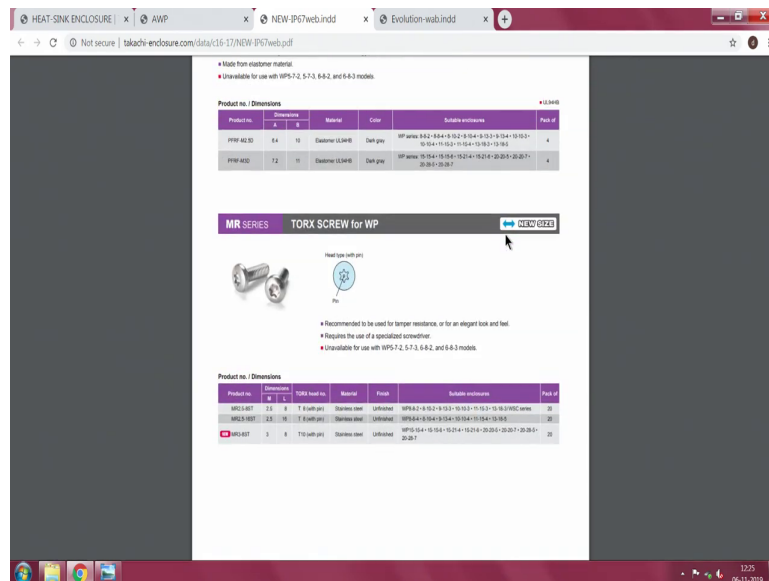


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All you need to do is conceive of a product.

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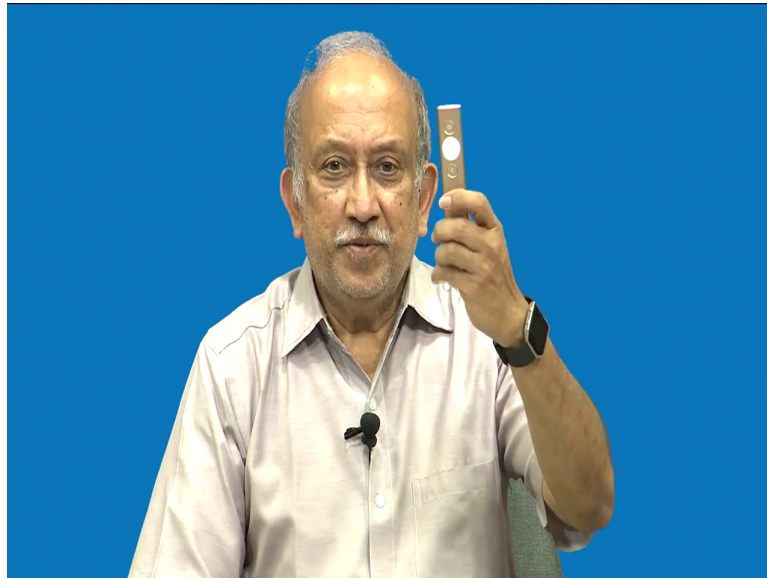


And, even waterproof series are there. So, all you need to do is design the product, make a proper sticker which was my what you call thing if you see these examples here you will appreciate.

So, I will continue this in the next session. You see here that there are any amount of possibilities by which only thing that you need to do is try to arrange the components and make it into a scale some scale. And, go to a catalogue pick the corresponding product that you know is likely to be you know case renewers. Design a I will call it a interface panel; it could be front back sides or anything and just paste it on top of it and a perfect product is ready.

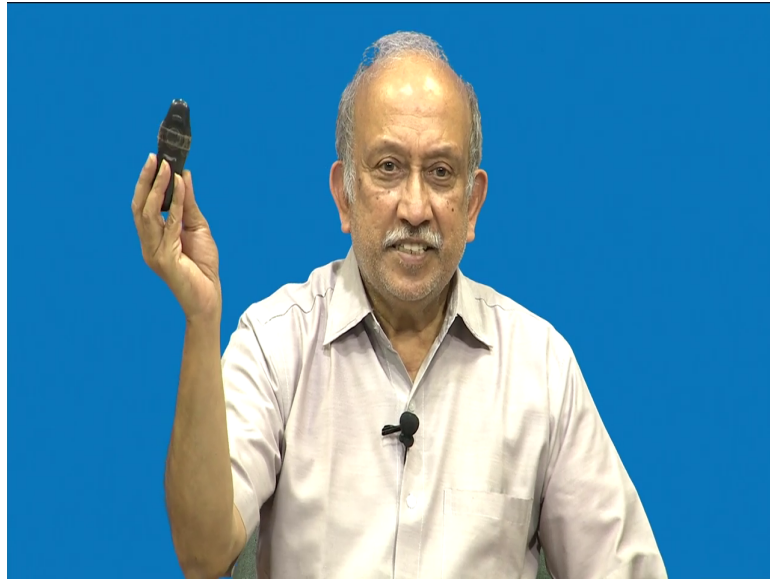
So, I am wishing you the best that you make one of these very interesting things. At the moment I thought I will show you these things.

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This is a new pointer for the power point.

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This was an existing old thing. I am sure some of you have seen it let me peel this what you call a tape it is old must be at least some 10 years old. It is all falling apart, but works very well. So, in this if you see I have keys, then I have a centre key, then I have something and if I am lucky and if I switch it on it is dead now. So, this is an earlier version of it. Now, they have sleek fantastic devices. All these you can easily make in your own what you call on the desktop and so on.

So, I will stop here thank you. Let us meet again in the next session.

Thank you.