Enclosure Design of Electronics Equipment
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Lecture - 59
Sheet Metal and Plastic common details

Let me continue with this session and then see; how to incorporate usual hardware items here likely to find in the market interior drawings most get packages. We will permit you to directly import DWGDXF are IGS formatted I am sorry, comity call files in the those formats if that is available, there is nothing like it, things will about nicely, but occasionally we will end up with this condition.

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If you have a look at the monitor, you will notice that you have this device with you and then you need to incorporate it your thing because you have to tried it.

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And then in general know, it seems to be suitable and then you have already tried it on your; what will this circuit.

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So, the way out or anything; how to do it is somehow we need to locate the either drawings or the actual device.

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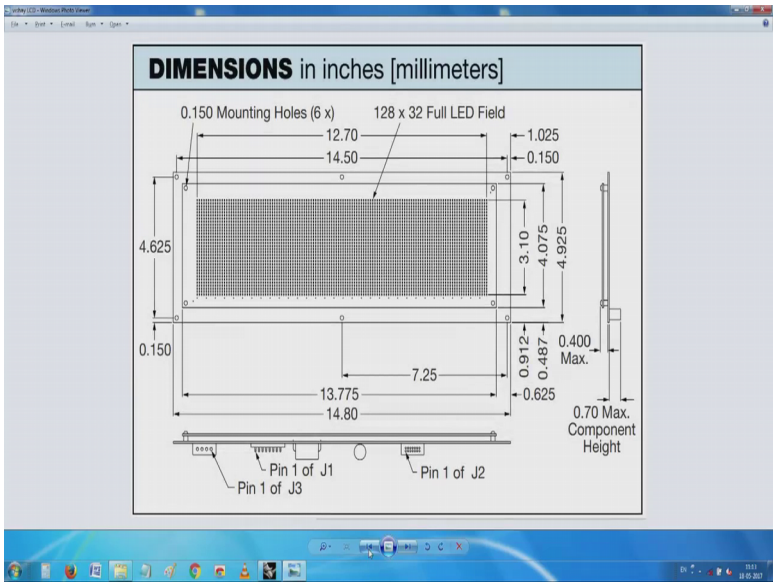

And so on there a little plus point and a little minus plus point also, we plus point of directly using the component is the component is with you and we are not very sure whether they; whatever is given in their dimensions was it is actually reflects.

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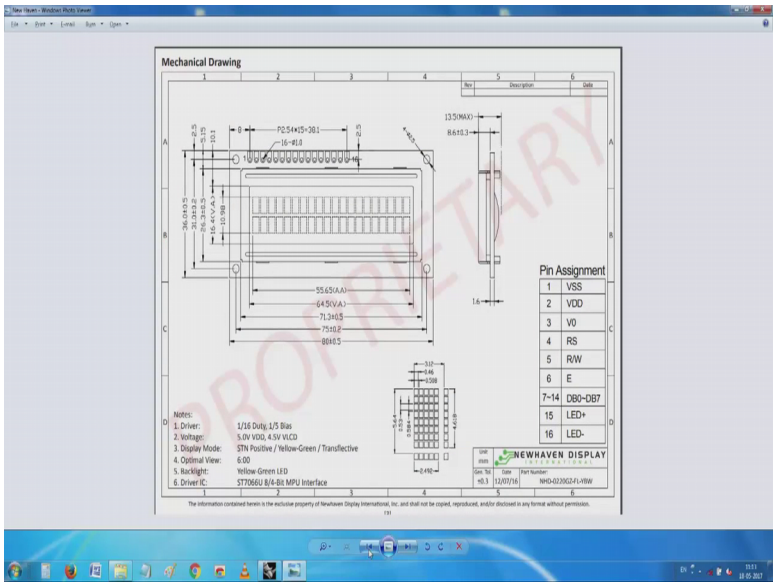

What is the error or not well at 1 level; it is very perfectly fine, another level; we have a little problem of not able to get a replacement which follows this thing. This can happen due to manufacturing limitations because always known that enoent and see errors and dominations and in all things can change anytime; all those things are valid, but in

general, if it is contracted in a batch better to locate the drawing and if you see one small problem let me here is this is not a drawing as such it is a PDF scan.

So, we have a problem with this. Now if you try to incorporate this thing into your designs, one of the first things you need to do is start with a clean slate and I said we have made in or things and so on. Now what we do here is usually they have this provision saying try to start with a way of its possible for us to trace the PDF file or any other thing, we have including; if you have a drawing of some sorts very rarely the PDF files, you know really show the actual dimensions because a chance of you know things getting stretched this where way or that way and so on, in spite of it, I would like it to show you saying; this is how a typically, I think we can start here and I will see how best I can see; what I have done is after measuring the various features in this, I have recreated the drawing using the dimensions which are here.

So, for the present I will tried to a noil height that reference nothing I have.

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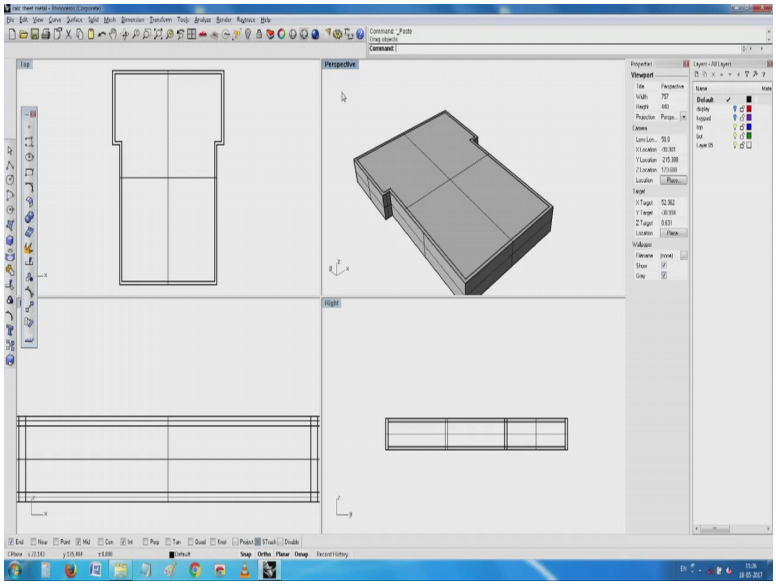

And then proceed with the; you see here, the reference for us is the 4 mounting holes and everything is tied with respect to the mounting holes because in the case of our any display or anything; what locates the display in the conclusion or the 4 mounting holes. So, I have just created a rectangle of the size that is described there put for openings there and from here, I am familiar, I am very comfortable with working with a central line and mirroring and both side because generally this things are things like this displays

and all part of it is symmetrical and it helps me in my what do you call workshop practice.

So, generally what we do we take a something if an into crate about after taking then I dimensions I put it on a surface plate; put a height gauge and mark. So, I mark something turn it over and mark here. So, that my setting is avoided and if the blank and all is calculated properly in this is in the best way of making something manually; however, if you have the; all the coordinates and all in they get format. So, ordinate dimensioning from one extreme is possible. So, kindly look back at my this monitor. So, in due course; what has been done is I will say put the central line and then try to make try to mirror things say that is the window that has been what you say given in the that dimension say drawing which are given.

So, starting with this window, I have now try to get the outline of the PCB, the outline PCB; outline is marked there, then I have removed all the unwanted features which are only destructing, it does not really help and then this point, I have try to create a little gap to the edge of the printed secured board the gap, I have there is in the normal; what you call in more by experience, I have discovered that if you leave around 4 millimeters from the edge of the printed circuit about to the inside that way sufficient for may took place other hardware typically for mounting this, if I have a screw here, I need to have a bus with sits on that.

Seen then so, the bus in those thing. So, a typically around 8 millimeters; 8 millimeters big, we can even put off with 4 millimeters, but I have got you is to this same. Now I live a little gap and then around that I have built the thickness also of the device. Now you see here, as I keep moving I see what I have done. I am sure you understand or you appreciate little of it; one of the first things are that it is probably much better if I have a single printed circuit board in which I tried to mount all the various items typically in this case it is a small display and then I have a keep end, so, if you see inside, I have made this almost about the same as this almost about the same hence you see that I followed those lines from here onwards. Now see what I have done; I have tried to develop the enclosure based on the insides.

Well, this part of it is very what you call conveniented nice. Now we come to the external part of the enclosure, you see one small what you call thing has trying to show

you is likely to happen in most of the places is that we have a display which is about this small and then I am trying to justify all my keys and all with respect to this, this is just an old practice which does not draughtsman have been doing in case; it does not fit generally what they do is they have make deckle or a sticker all around and then try to adjust it say; I was small thing here and now all around I try to make it a color something and see that things follow that line.

Say if you see here; so far it has been relatively easy you have seen this I have developed a beautiful; I have called top portion of it having done this. Now I need to decide whether; I make it in what you call hand assembled; hand fabricated plastic sheets or is it some other way of my making it. So, for the present again if you remember, I said let us make a; what you call this things here saying what is its where there several layers and all that logically this whole structure what I have given here or to go into a thing which I shall call display.

So, that at time, I can switch off these things, if I have switch it on, I have the display printed circuit board, I can switch it off also. Similarly if I have keypad or some printed circuit board or anything, I can now would see if I can make it into think saying keypad, see there I have a keypad, I have the what you call the display board. Now I see what best; I can do using this things; I know switch off these 2 things. So, that I have only little bit of a central line and these things just for the purposes of illustration allow me to start making a device with practically street no tapered and nothings I will tell you; why I am doing this.

So, what you do is now once again the other thing. Now I will make a thing called a top like what I have you shown you earlier and then I will call this as bottom. I will now see if I can extrude this whole thing and try to make it into a yeah seen this advantage for males starting from the construction in the beginning. Now I am able to make this without too much of; I will say do. Now the next level is; is there something else also I can do, I have the inner what call curve. Similarly I have the outer curve depending on what I want; I will take the dinner curve now and then see if I can like before try to make a small extrusion see how easy and convenient it has become, seen this I have a bottom half small, I am sorry, bottom point then I have a top point.

Let thing is going inside and a boxed ready for me and in this case the bottom and top being little a symmetrical, all I need to do is probably copy this again on top, take it up except that it does not look so good, you have seen that though the pieces are about the same edge is visible. Now should I keep the edge visible or what I should do? I do not like it. So, what I do is I will discuss because this is not my intention instead I will go back to the same point; take the outer curve and then once again try to make a solid. Now see here; now if you see this one; this is say this corner is overlaps here at this point this corner is overlapping here, it is inside on the other side.

So, I have a neat thing with a little bit of detailing which I try to do it just at this point, it just requires 2 more thing is small opening for the display another opening for the keyboard with all the keys and so on. So, I now see if I can switch on this things hide this probably I hide this turn it over.

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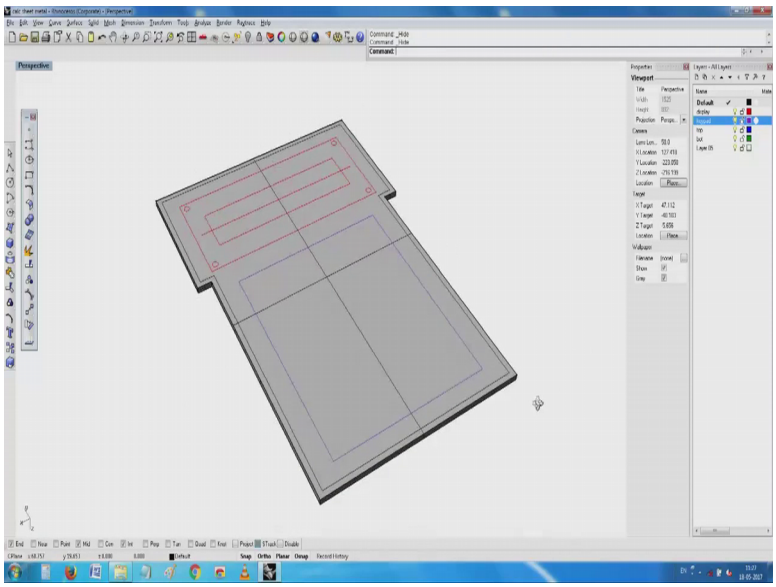

And see you can you see here on the other side I have all the detailing which I had started at that point. Now it is for may to decide; what next to do; one of the may you use here, I have a nice what you call cute what you call a small outline now do I make use of it to make a cutout; I have a curve there, one more curve here, one more curve here, I am this for curves using this I will see if I can create a small what you call one more solid.

Try to do a Boolean at this point; see here I have got a nice what you call an opening there, similarly at the bottom, I will see what best I can do here, I notice here is the

notice that this one know is what you call little rectangular and this mere may not be how the keyboard; we will look like just to sort of you know the play around with this; what I will do is I will just now start making this and then try to switch off the other things and see what best I can do with this; can you see here, I am back here and then to see my orientation I have X, oh, I am sorry, yeah, X, Y and Z in this place.

Now, I say what best I can do to make the keys at this point, it is on the keypad, this is the 4 lines now happened to be the on the keypad. So, I go back here and see if I have standard keys which I have taken from a catalogue. I can directly use the keys. So, I have generally we have to l mm, other half an inch keys and all that. So, in this case to how to tell; make things a little easier; I mean I meant faster, I will try to create a keypad which is seen here just a matter of division I just wanted to see whether I can make a 4 by 4 key and then I will offset this by so much; you have seen here one corner if a key I have try to created.

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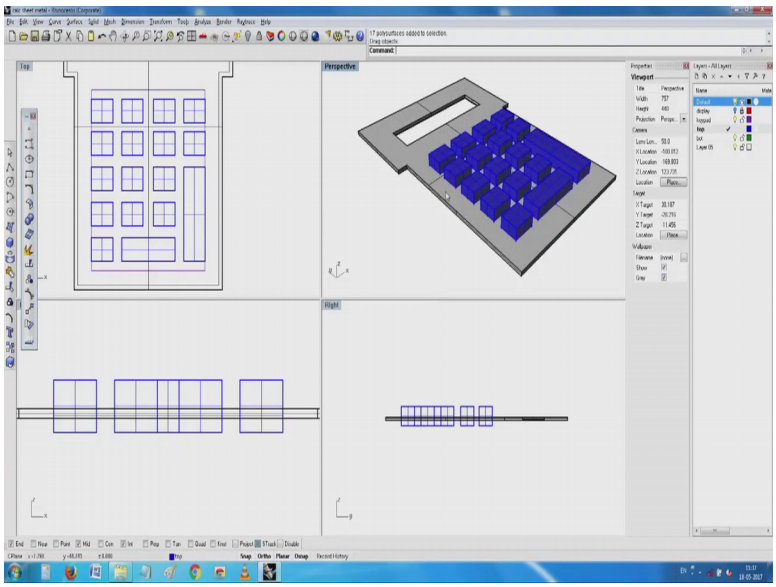

Now, you may appreciate; now why I keep insisting on a middle line; I will try to middle rate now and then further I am sorry; see by my; what I will say little bit of judicious creation, I have been able to make 4 keys which looks approximately you know; there all is best reasonably and all that with respect to this external line. So, at this point, if you remember, this is directly in line with the display now because I have started like this, it is otherwise; now it is very much possible for me to I will just join this things together

readjust the may looking and see how based; this is external things or to go here. Similarly this one needs to go here, now I see this gap now is not as you know comfortable now you say they appear not yet now they appear to be reasonably equally spaced.

You got what I was trying to say. So, we have here this 4 of these entities. Now I will say I one more time I copy this maintaining about the; so, I will lost much by thinking a little about it and occur this does not look very symmetrical now I will do the most things try to take it down. Now if you see, I have 4 come in matrix of 4 by 5 keys. Now I try to see what best I can the manage can I have one long key here and when these 2 joint together and so on, I can go around see if I can join this to and make a long key here not impossible, I have exploded the device, I have done something here something here and then made senior I have I have a long key which I have made here.

I will see if I can similarly know make a long key here is very easy in another way of doing it is I just delete this whole lot and then explored this and this remove this, remove this, remove this and then in another thing know, I try to fill it this to these are all about the same only I will now fill it. These things you see here; this long line at this point, I will try to hide you have seen this here. Now one of the things you will notice here. So, I have a nice what looks like a keypad and if I were to switch on this other layers which I have switched off you see here miraculously it fits. Now I go back to the top start working on the top and then go back to the default this things which are part of thing I will try to make it to the again top layer switch off and see what best I can do with the key board that I have created here.

What I do is convert this whole thing like before into keys which I can extrude do a Boolean operation, get rid of all the spaces which are there you see here eventually my thing is slightly to look like this. Now I try to make the solid difference, I have a nice top plate which has all the necessary keys or whatever it is; only thing is that it does not have the keys itself, this is the opening. Now when I what you call switch on the other things, I have a box with all the keys which are visible nicely and then I have this bottom cover also in this case this right.

Now I have not yet moved into the bottom into still in the other layer, I will put it into the bottom, you see this, I have a nice case here. Now all that I need to do is try to make

a printed circuit board based on the original dimensions and all I have taken and why I have made this flat and things are it is relatively easy for us to fabricate this things in either sheet metal as well as some plastic sheets. Traditionally if it just a dummy model people try to make it out of polystyrene sheets and you can even absorb them, but these days, I am sorry, you can even what you call later on join them and so on and change the materials by the basic concept drawing is still the same and based on this concept drawing and take this, we can come back to the old cardboard box which I have talking about.