Electronics Equipment Integration and Prototype Building

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Lecture – 08
Using a Print and Fabrication Video

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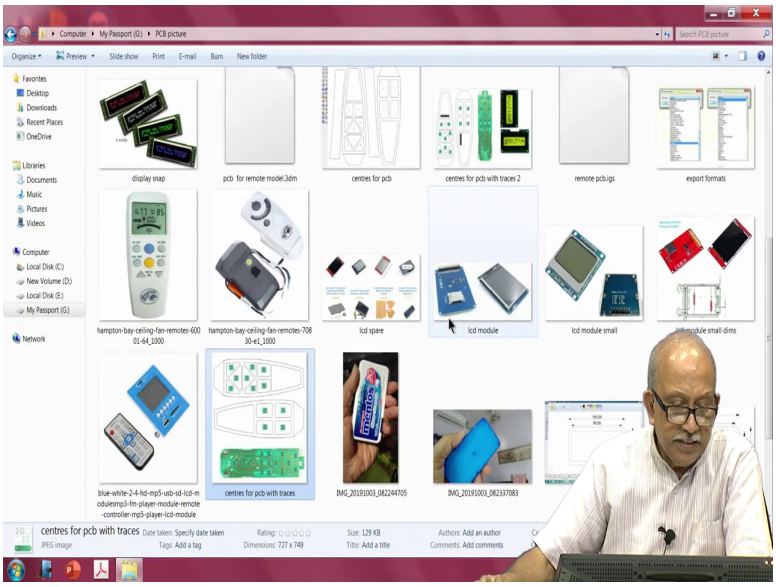

I will continue where I left off. After that it is quite easy. Sorry excuse me I mean there are no job which is not easy as such you know.

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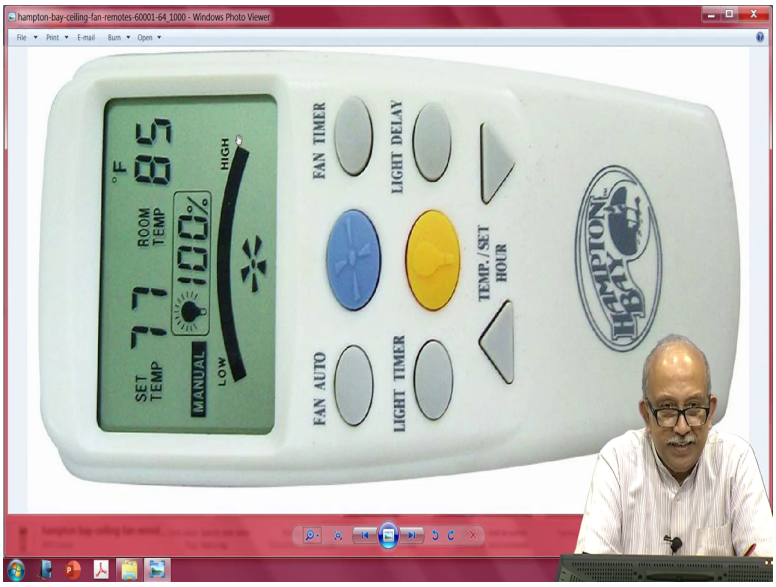

I thought I will show you this. Part of it look natural, part of it does not look so natural. So, we have you know something saying there is a light delay, light timer then there is a bulb here which probably I am sure no. It shows that we are controlling this and then there is that timer am sorry fan switch which shows a fan can be controlled. Now, come the other thing. How do you now relate all these things? Are they natural or how do they make sense? And I am not going to get into that saying is it something to do with language it has something or this that and all that.

What is useful is that if I can somehow make this and coming back to the earlier thing I do not even need to have a exact identical electronic circuit which fits here. All I need to do is probably make a cardboard or any other model. Copy all these things into a illustrated program and now make a test such that people will be able to see these things ok. You see this see if this things make sense to you. Some things are obvious you have seen no fan says low

and high that is very much obvious. Some things do not look that obvious room temperature 85 set temperature.

So, we know that at least if we have used it sometime you know what these things mean is there a slightly different way of organizing these things. This is low and high. Is it logical to have it left and right or is it logical to have it up and down high should be here low should be here again my opinion absolutely. You need to carry out this test with on a potential user then they will be able to tell how to make it out and all that.

And which we come to an old thing which I will repeat if you hand out a questionnaire and then ask people to respond I do not know whether that is the only way of making things. There are other ways saying you give it to people observe them how to do. There are a trained designers and people have learnt on the fly or on the job who seem to intuitively make things which are quite acceptable to everybody.

So, we have here all these beautiful. Would it make this saying low and high and why should be only in the long format? Is it possible like so many other games and all that no is it possible for it to make it into a different format? And we are hoping that this percent symbol need not be met because whenever that percent is there associated with 2 things.

One is tax collected by any trader another is tax collected by government. So, it is a very threatening symbol to me when somebody says percentage. Instead what why know and this bulb have say radiating lines which have maybe 3 3 things one is very dim maybe a medium and then things which are a little high and we are not going to look at it here and anyway adjust the lighting is it not that was not our idea.

We are not going to look at the display and adjust lighting. We are going to see how well it feels whether the ambient lighting is correct for me or not. So, we just need to have a very simple thing. Why not 2 buttons which shows no high and low of the bulb and fan I said why not have some other way of making it I live it again these things all relate to usability and experience issues right now the topic is not about it. So, you can go and try to see what else.

Now, the other thing which often which we ignore and we come to you saying what do you write here and what does auto fan mean? So, and most important is how close these things have to be here so, that this does not go and relate itself to the other item.

Is not it logical that it is it should come close here and a little more gap is required. These are all control panel layout exercises which I feel people can carry out separately I will take something else here you see here.

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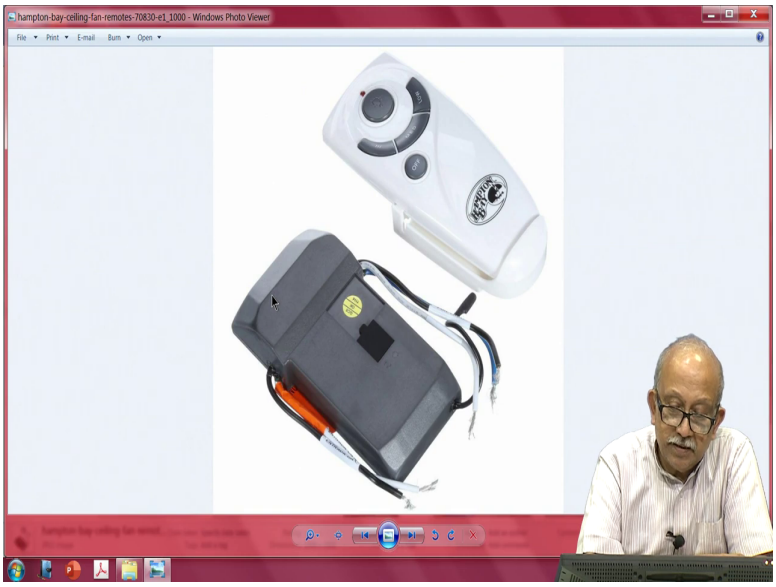

I do not even know what it is. It may go a little closer and see whether it makes sense huh. It does seem to make a little bit of sense suddenly. Probably this is where now I read it up and you see here what do we have here picture of a light bulb and you have something only 3 portions high, low and medium and then there is a equally good portion of their being an off. Why should there be an off? Again my opinion not real, what the customer wants is you know

what it is give it to somebody. Why not when you press it should go on and you press it again it should go off.

So, I am sure there is always a simpler better way of making a layout. Next what are all these wires and what is i?. I think now you know what it is. This and this are not these are not the front and back. There is the receiver which receives all the rf signals and this is the connections to the various loads that they have.

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So, if you look around you are likely to see so, many of these things here oh what do I have here again? I do not know whether I used to think a real player is a something you downloaded for the desktop. I do not know if it is still there. Now, you see here there is once again what I love to hate characters which I do not understand at all. I do not know what it

means or something which is written and all that no is it possible for us to make things which are easily understood and how things move.

So, at this point I have a sort of you know covered the points which I thought I will start with saying I need to make a layout make things inside and then go around searching.

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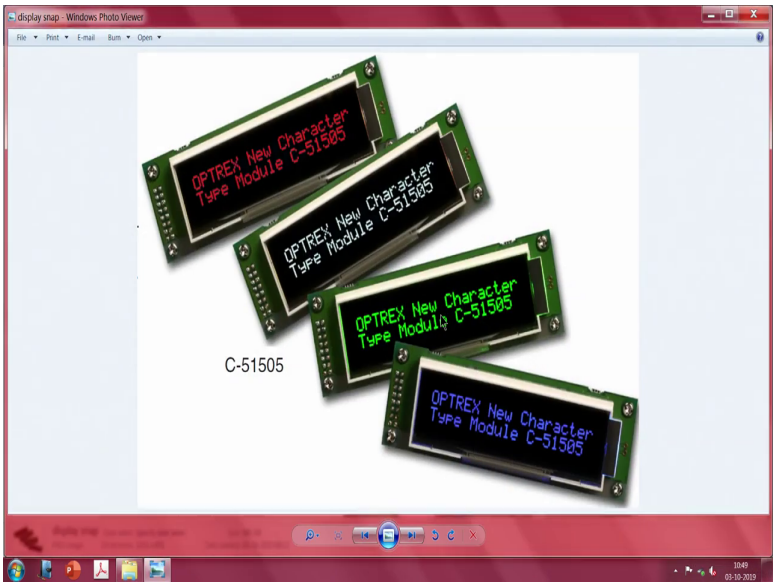

And then in case I am looking for a character, I can go into the web look at the say catalogs pick one of those things, make a template and then try to make a stick decal which can be used and in the end hopefully I will have beautifully working models.

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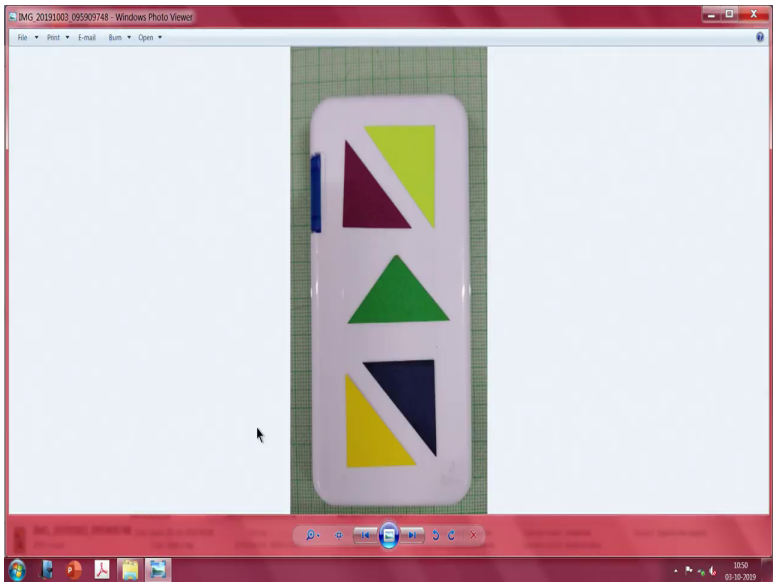

And so, allow me to stop here. I will try to continue in the next lecture saying how do we go about again using simple at home all that is required here is a color printer at home few cardboards you stick all these things and then transfer them and make your product ready.

So, thank you until the next class. I am trying to go in short steps a little bit of overlap from here and there a lot of information from the what you call web and things which are there. And then allow me to acknowledge that all the material that has been taken from the what you call from the internet, I have left the original labels on to show that I accept that that is you know the ones that have done. I have not made anything except a few things like here.

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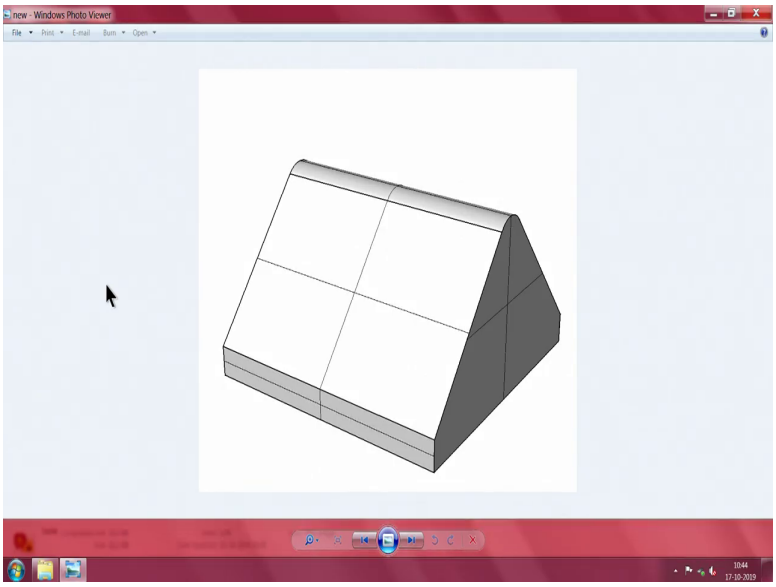

And this was about making the perhaps you remember that I had this concept of saying shall I make this timer.

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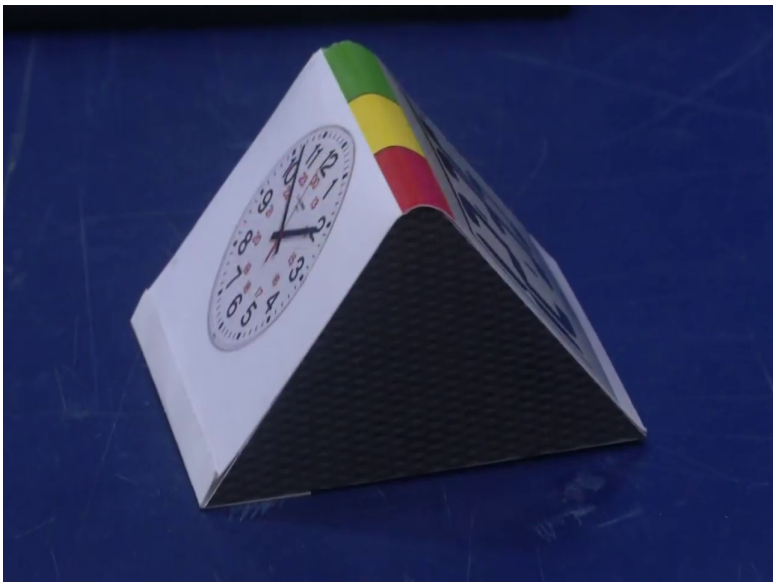

My name is Singh. I would like to demonstrate the sheetmetal fabrication of this timer without using height gauge or measuring tools. What I am doing here is I will take a drawing scale one is to one of a development drawing and then paste it on the sheet metal.

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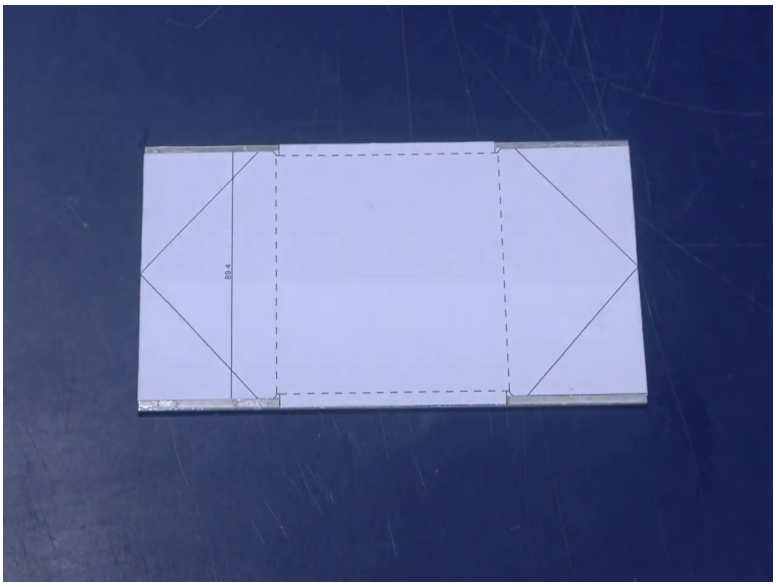

And then you can see that this is pasted on the aluminium sheet. Here we see that there are dotted lines and then we have to bend it.

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Now, we have to trim the un portion that has to be taken off. These are the 4 corners that we that has to be sheared off. So, I am using an angle tool notch to shear off. Now, all the 4 sides have to be aligned and then sheared. One side is over taking the other side you have to align to that notch there and then notch of that portion. Now, 2 sides are over the other 4 side 2 sides have to be sheared off. So, all the 4 sides have been sheared off. Now, we see this extra rectangular piece that has to be removed on the 4 sides that will notch now.

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So, now the 4 sides of notching has been done. Now, for bending the limb actually we have to give a relief there are the 4 sides we have to give relief there. So, that it bits inside when we bend the sides. So, it will be plane there.

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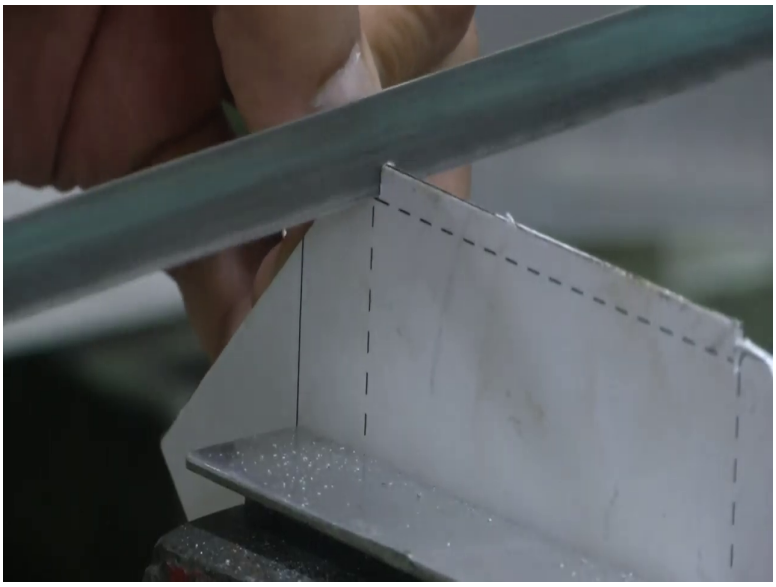

Now, I will just give a relief there that is one thickness inside it goes. So, that when you bend the sides it will be flush with the sides. So, this all the 4 sides I have to give relief. Now I have given this one ok.

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Now, we see that that is the bending line the dotted line. This is the folding machine where we have to adjust for various thicknesses adjustment has been made. Now, we have to keep the dotted line straight on to the fingers and then bend it. We can see that this is exactly 90 degrees bend. We can even measure this one.

So, first we are bending the sides 2 sides and then the lips. The lips will be bent inside so that the folding fingers will be inside and then bent. So, this is the second side we have bent you see that it is not 90 degrees. So, that little more bending has to be done yeah. Now, it is 90 degrees, now 2 side bending is over. Now the limb has to be bent that is one thickness inside it has to be bent. Now, we see that this is in line with the side sheets there, so the second side also I am bending it.

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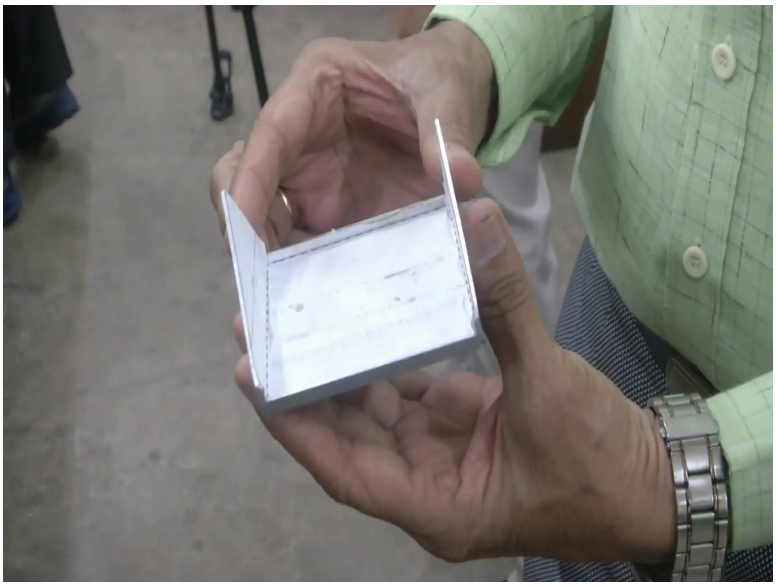

Now, bending is over without using height gauge or measuring tools and then we see that with that development drawing itself we have made the piece. Now, we have to make a cover for this one which we have to measure this one and then I make one more development drawing and then test it and then the same similar way thing can be done.

Here we can see that it is bent exactly 6 mm that is it the height of that limb is 6 mm. You can see that it 6 we measure on the other side also that is also exactly 6 mm. We will measure the sides now which is 50 mm. So, this is exactly 50 mm. Now, after this we have to make a radius on the top corner. So, that that 0.5 radius has to be done and then a cover has to be made yeah.

Thank you.

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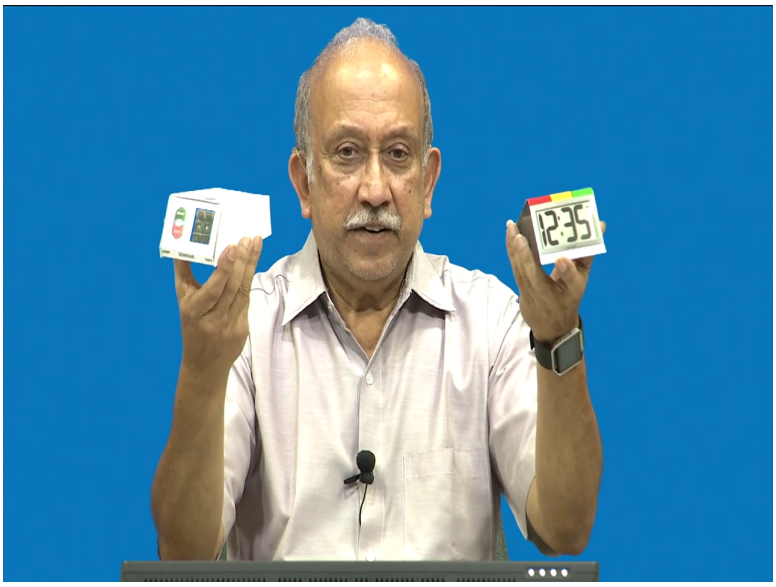

You have seen this I left you here yesterday saying this shows you towards the chair who is conducting the session and this shows you towards the speaker or presenter who is supposed to see it. And then there are some lights which look a little like the police lights which we see which is actually the issue is not about the lights it is about saying how do we present it to a group because this invariably is a group project.

And you need not already launch a prototype. If you launch a formal prototype, it is expensive and you have already committed because at that point changing is a problem, but right now let the concept stage a concept has been converted into a what looks like a physical model.

It is a little like those if you go to a mobile shop they will give you a set of mobile especially the front top is a sticker and probably the plastic is real and inside there is a weight there would not be much in it. But first thing people do is just check whether things are ok. Maybe

it is a little like a kick the tire syndrome we used to have long ago maybe forty years back, right now kick tires only out of frustration that apart moment to present such a thing on a table it makes sense.

For example if you have to compare this to I ran the test on one of my colleagues ok. I just asked him what you say about it I have 2 things. One of the first thing he has commented it sir this is meant for pure audio as such it as good if I have an alarm time it is sufficient I do not need anything more than this and this it may be a little distracting because you are a you expect the presenter to keep track of the time that has shown there. It is very distracting often people will keep on looking here and there and is it not logical to have this directly on the screen means if you in case you have a smart board it should be on the smart board.

So, first point of the feedback what I have got it is there is a small hitch. Now, can I improve on it saying can I have some device here which directly projects it onto the screen. Maybe a laser maybe it is something one of the laser writing things which projects on the screen and, but not distracting visually it should not be distracting first feedback I have got.

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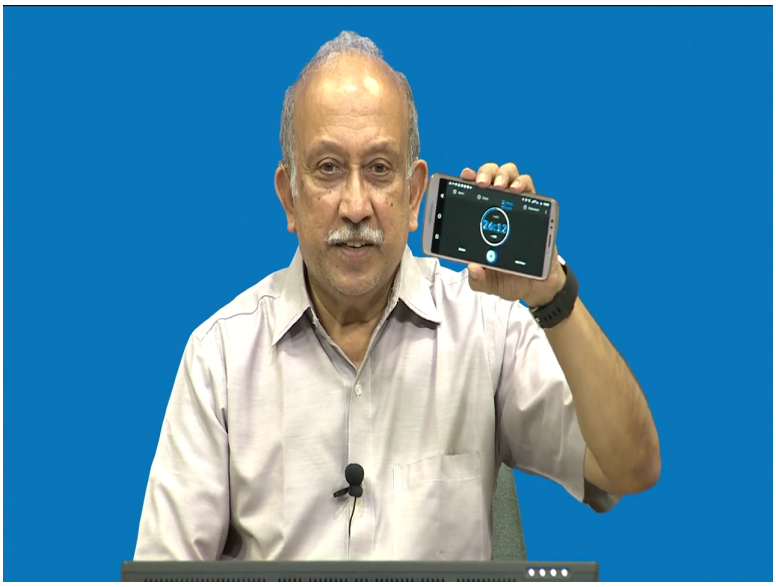

Secondly, is it worth all the trouble, then that person told me sir these days not many people are interested in yours because like you have been doing they all have their own mobile they just keep the mobile and then they keep it in the pocket they get a feedback and with Bluetooth. So, many other things are possible. So, maybe your product does not have a place in all situations.

Some situations it has a place for example, in our case we do not allow normally people to keep carry their mobiles in. So, we have to request them kindly put it in a aircraft mode and so on. So, well if this makes sense is there a place for my product here. It is just a concept, but concept wise it is just really worth it.

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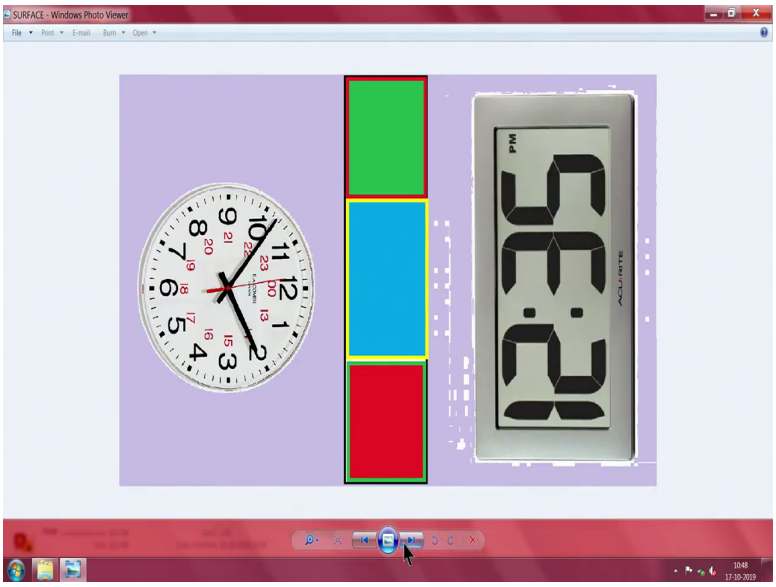

Now, looking back at my concept you see this here. I have this beautiful you know I am very very impressive looking box which as I said this is what we have made about and that is what you have seen there.

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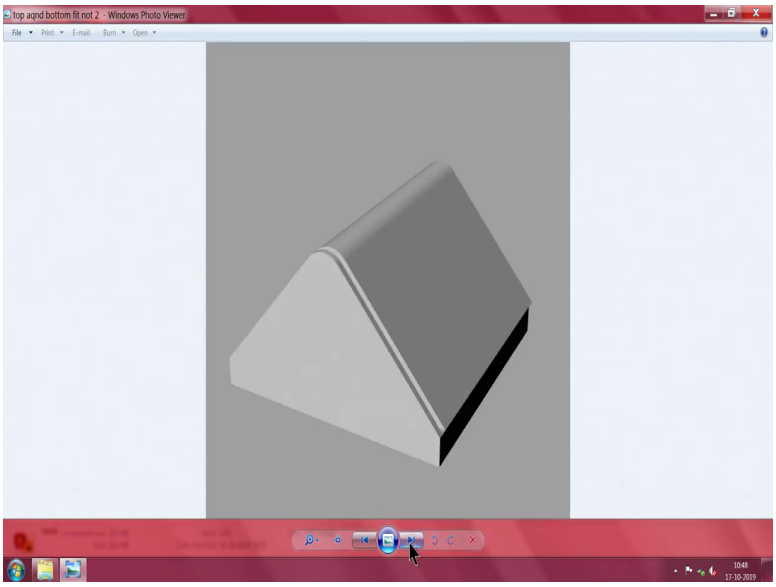

Now, I tried to see whether I can make something out of it.

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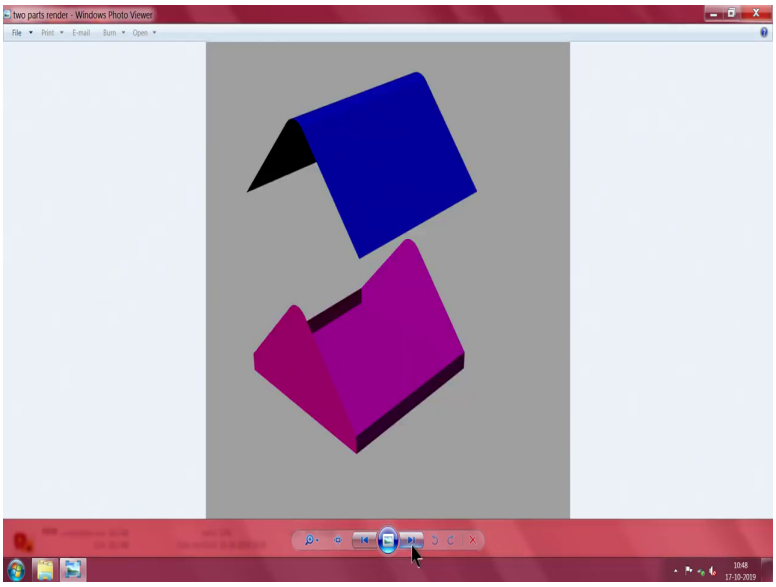

When I started the 3d modeling for this one of the first thing I have done it is can I know convert it directly into a fabricatable thing. And in our case as I have told you earlier if you have any of the inclined planes they do not print well on a any of these 3d printers they do not print well and you cannot afford to have everything milled out of a solid. I know it is a I mean very poor joke and the same thing happens with this inclined surfaces, here also can you see here it would not print well if I attempt to print it.

So, next thing is I end up with saying can we make it out of a laser cutter. Now, how do you cut this out of a laser cutter? You understand the laser cutter when only done flat sheets. So, I may have to this easy to cut. I cut it and what you call use some engineering adhesive and put them together or in case it is something which is based on acrylic are some things like

chloroform directly can be used as adhesives or we have for everything we have the superglue.

So, while it does make sense superglue has the thing, but then what about the small curved portion, this can be a flat sheet, that can be a flat sheet. Now, what to do with the curved portion? So, end up with having to really work on this things a little at this point that is where I have showed you what I had wanted to show you.

Now, in spite of it I went ahead saying let me see if I can convert it in to a solid because the solid can be used by sheetmetal. This is where I feel appropriate automation meaning you do not ask for everything to be made in a 3D environment especially I will get back to that one.

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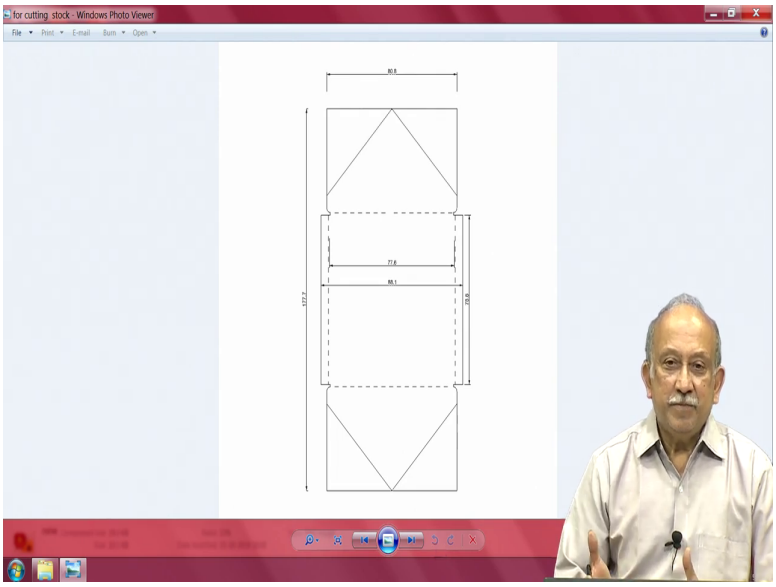

See here when you want to make it out of a sheetmetal would not bit logical that I make a development drawing. Seen this and this can be printed in my what you call desktop printer or whatever printer is accessible. Now, transfer the whole thing to a sheet and then no necessity of using very accurate marking and measurement metrology items.

All we need to do is something which is approximately upto the order of you know say plus or minus 0.1 or 0.2 it is consistent. If I maintain the direction of printing sometimes it is around 0.1 millimeters larger then I can just go ahead and live with it you have seen this. This is a printout which is made based on the concept that has been made here.

So, this sheet has been I mean this what you call a flat surface has been made flat this side, this flat surface, this side, this side and that that side when I make it and then I make it I have this beautiful device.

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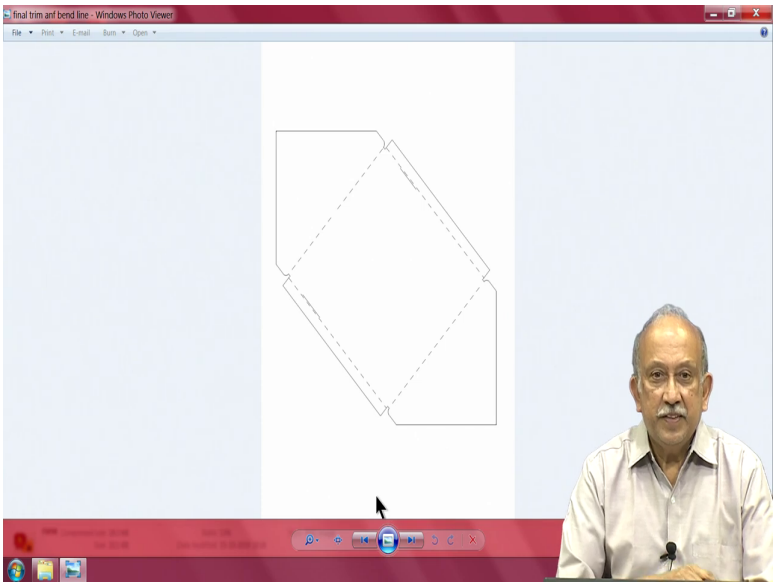

One small thing I have noticed this the actual sheet that probably this is the devil of blank which I need to make, but then after consulting with the people in the what you call our sheetmetal shop, one of the first thing is I have noticed is I need to give them approximately the size of the material that is required. So, if I see here I need a blank is 88 millimeters wide and something which is 177.7 that small 0.7 comes because of.

See here we have a radius and that radius has been approximated to a sharp angle. Having done this I have a nice sheet now which I just need to go and procure this material and start making it and the important thing is as part of the process this has been made into a equivalent rectangle because that is how we cut. We do not start with cutting with this things in the first go.

Finally, after making that blank we end up with small other details. See the detail here. This is the line along which the bend or the fold will need to come. We have a finger holding folding machine which in the next video you will see something clamps the what we call blank and there is a one device which you know does the bending and then you get bent sheets.

So, a little more about it later and when we come into this corner we end up with a very very nice arrangement. One of the nice arrangements is something has to go inside that this limb has to go inside this thickness seen this. This limb which has depending on the sheet has to go into the thickness. So, that limb will come here and there is already this portion that is a circular this thing it has to go inside. To accommodate this one thickness relief has to be given. This is done by a usual hacksaw or something I mean we do have a formal machine.

Now, we see here what started as a good concept I noticed that there may have been a small problem with it. It looks good, it is a matter of taking that whatever a surface model I have prepared and then extruding the surfaces and we have 2 pieces which look good enough seen this.

Here slowly we are ending up with a small problem is actually interfering with the other one. Now, I have 2 options; one of the option is I make a very peculiar cut in this here. That is after I do the bending then that notching and all assumed is wrong notching should not have been there if a notching is there something else is there or do something and then make this bigger and better. You have seen the same problem here that corner somehow no there is a small inconsistency in my logic I wanted to follow. It does it does not seem to follow as well as I want, there is a little problem here.

So, I need to now work on it and see how well I can settle this problem. Same thing here I have assumed some radius here the radius does not seem to match here. This after showing my renderings to the shop people I get back and then I try to make the best use of whatever can be done here. It started well now I have this blank eventually you know expect that this blanks have to be fabricated.

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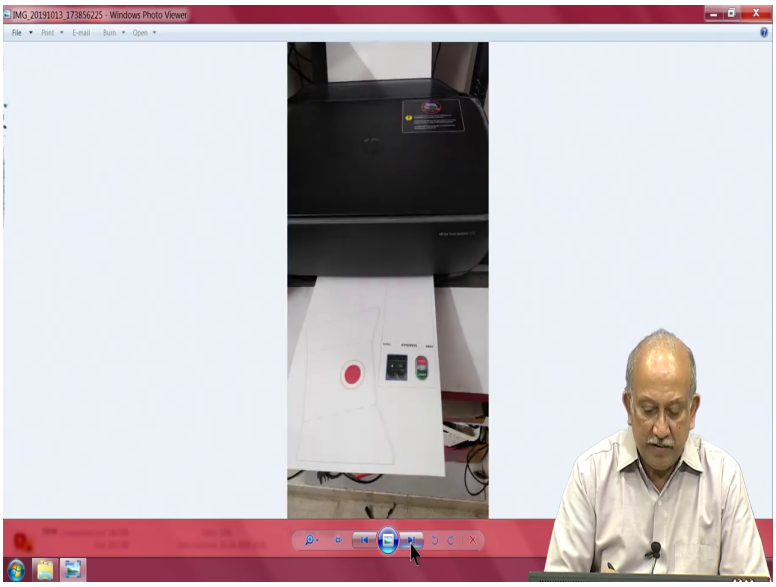

And this is the thing which has come out of the printer, I will see the video plays. This is the one that has been done on the screen which I showed you already.

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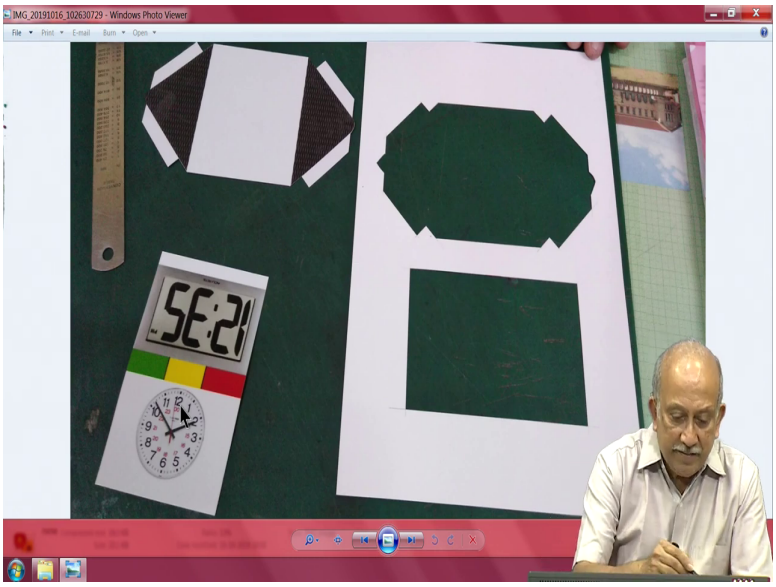

After having done the print I showed you earlier, but then I could not get that. Now, I am trying to show you this after having done this print this has been transferred to a little thicker cardboard and my colleague managed to cut it extremely well here. Seen that this is from here, this piece is from here. Then finally, after vertical assembling everything we have this beautiful piece.

I thought I will show you this before. It looks nice. It is a little bigger than because of the scale, can you see here? It just this thing the thing advantage being that without too much of measurement or anything we have a beautiful working piece. I will see the video just plays. Can you say last part of it being ejected from an ordinary printer?

I could just get that much and finally, when you do the printing we have this nice thing all assembled together with the minimum amount of effort I have this working here. I just wanted

to show you this. Seen this no with the minimum amount of effort that whatever has come there it has been assembled together I have a box. Now, I have enough time to show both of these things to my colleagues.

As I said somebody was quite happy with this saying you just need an audio thing and then we do not need running time. If you make a running time it is going to be a distraction. And this does give a little thing, but then probably the only thing that is useful is probably the one that is facing the chair session chair and the one that is presenters it is a little distraction, but at least first time first time when it beeps at least that person can look at it here saying I still have only one and a half minutes to go around 90 seconds to go. Later on finally when it starts flashing he knows how much is over the time.

So, it does have an effect meaning, do not glance at it all the time at least when the first time you get the indication look at it like this is how I would like to justify those things. So, next short let me move on to the this is all the various things which. If you remember long ago when I started I started with all these things we have all this and finally, we have a product.

I would like to next take you to the our fabrication shop and show you something which will be very educative, useful and so on. This apart I myself just depend on this timer which I have here. You understand it is ticking I just have only 13 more minutes in which I have to catch the video also for this session. So, thank you. We will meet again in the workshop afterwards. So, I will stop here.

Thank you.