Electronics Equipment Integration and Prototype Building

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Lecture - 11
Mass production in sheet metal

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See this particular video shows you typically all the operations that can be carried out on Sheet Metal.

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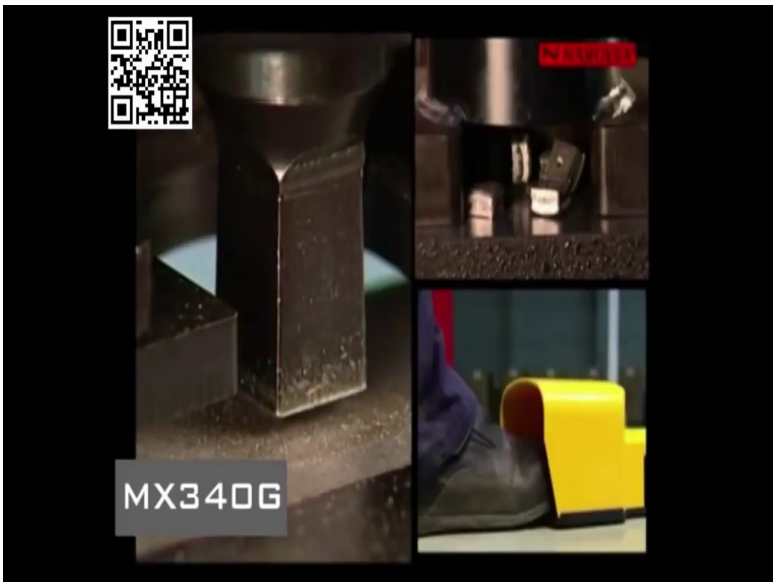

And you notice here that this has been done of course in slow motion and what you see there is a simple handheld punch.

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And the beauty of maybe I should stop it here and go back a little and show you. Here shown a punch and to maintain uniform pitch, see what has to be observed here is a stopper that is there.

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So, in the case of regular production what is done is things are made repetitive by using proper jigs and fixtures. One of them in this case is a simple stopper, to maintain pitch, it is fed to the stop. In the process sheet it is read know, using fed to stop. After it is fed to the stop the punch is operated, so you can see here next operation progression takes place, next operation takes place.

Now, with this advantage is that repetitive things are done in a very good way. But what do you do in the case of a this thing? Now, you see here, you see this stopper is used by the first punch. It is fed to the corner and continuously you have this coming out. But what do you do about the first time?

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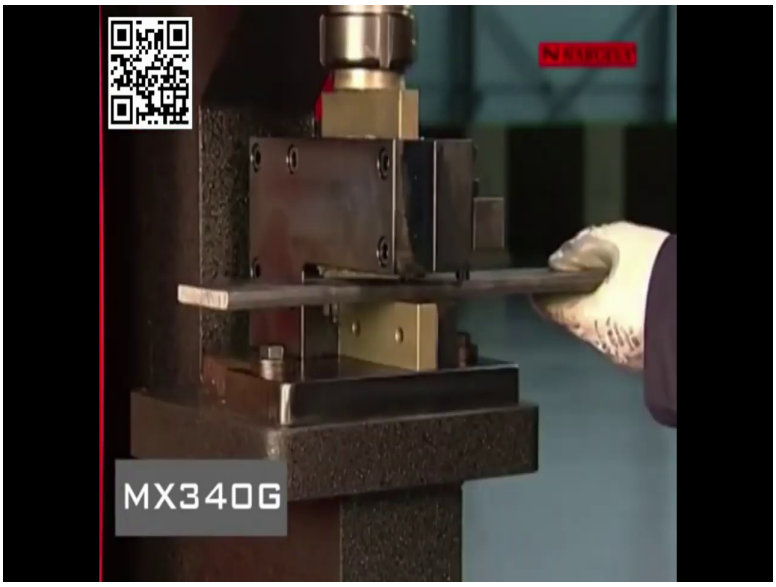

When you want to do the first time, you have no choice. You see here even something better. This is a shear and you will notice that when the shearing takes place and this is a notch.

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The magic is for all this things because their repetitive and multiple operations, usually we will have a stopper or some kind. Can you see, there at the back?

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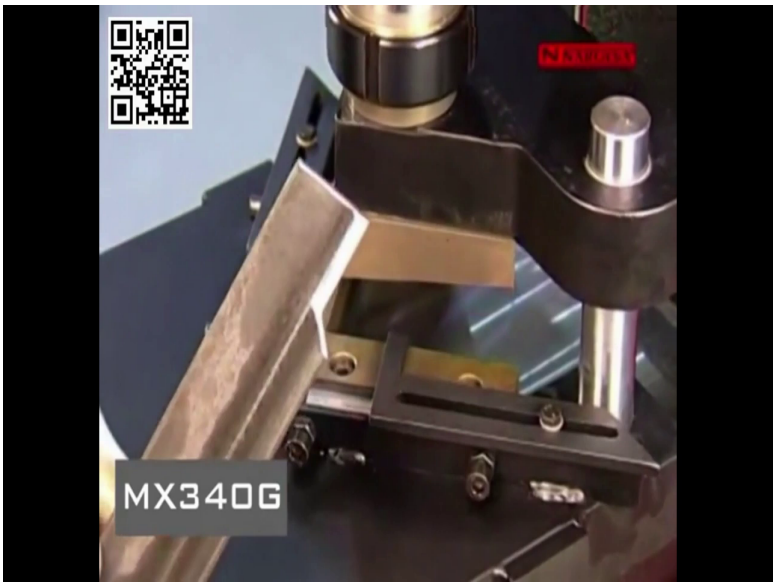

It is fed to the stopper, after that they what you call punch operates and you get a perfect notch in one corner, minus one radius in this case. Can you see here? Here, it is trying to go as close to the radius as possible, so that you can get this 90 degree relief. Advantage of a 90 degree release, afterwards this is a very important thing which I need to show you.

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This is typically air bending, unlike the bending which I showed you earlier. The, what you call bend allowance has to be distributed both sides equally because you have the top RAM coming and pushing this here and when I see slowly two things have you noticed? There is a small spring back. So, though it is started with 90 and though it started with 90 and you have a radius and all that, well I will not call it a what you call trial and error or hit and miss, it is highly empirical. So, the people who design this machines, people who design this punches and all that, they know a lot about this thing. So, what they do? They make compensations and this is typically one way of making an air bend.

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This is that same angle where a 45 degree was made. Can you see here how neatly it sits. I will go back. Now, here comes the thing, where what happen to this spring back, does it have a spring back here? There is no spring back or sit get this thing that is fortunately not a big issue for us. So, we have a beautiful angle there.

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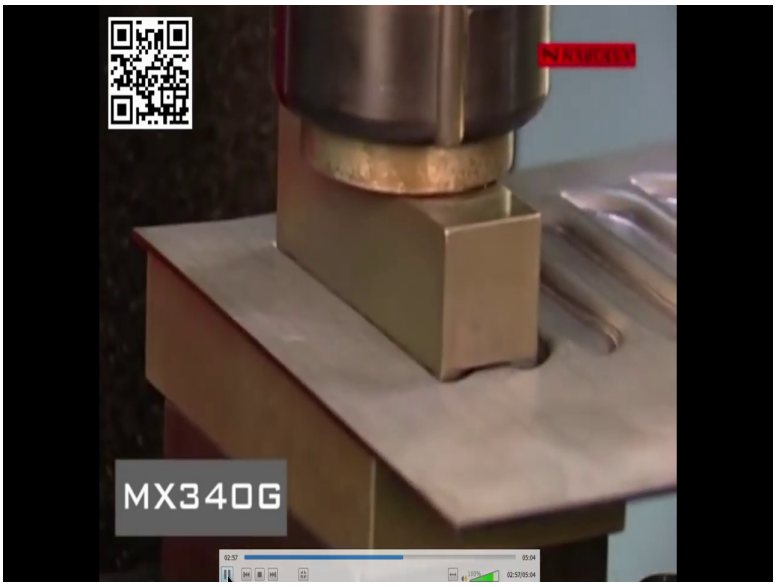

And you see what is happening here. This is a something to make lowers. You would have seen them at the side of cabinets or behind anywhere, you need a little bit of air cooling.

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So, this is basically things which you see here. This you see here, there is a tube that is being flattened and being made into a, I do not know what exactly it is.

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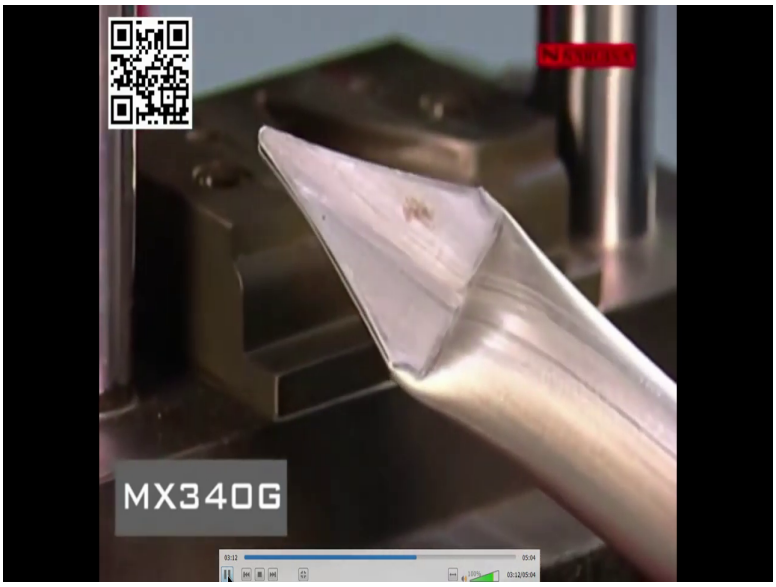

Probably, it is sheared; probably it is the ends are made circular.

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These are occasionally used for as some normal joints or it can be used for other things.

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Now, you see here this sheet. May be they are decorative because we do not at least we do not you know do pieces, there can you see here how something is been done, so that this tube goes and sits in another tube perfectly.

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And you see the angle also, you can make it 90 or any other things and then you see the corners.

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This, all the sheet metal while it comes to a repetitive this thing they are done well, first time you need to probably make a template.

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Make sure that all this things you know follow that simple what you call paper template and then you can always take the help of your colleagues in the machine shop or in the case of this what you call fabrication shop will give you all the necessary inputs for you such that all this things can be done, unequal thickness.

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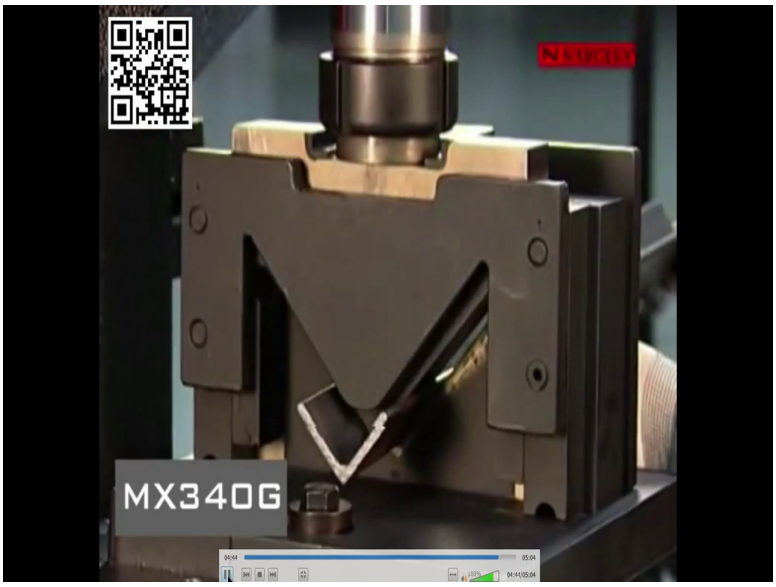

The once you make that first cad drawing and you have tried it based on a template which we had and we just used it for the or first round making a prototype, the same thing can be used in subsequent operation.

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So, if you look at it, this is probably one of the way all your anything you can think of in sheet metal is done using a turret press. So, there several turret press manufacturers, but I came into contact this, I do not know how do you pronounce this; probably it is called the Wiedemann. So, you see here how this operates.

The sheet is tramped here, this is the moving thing. The punch and die are constant. This job holder moves things inside and outside and at the end of the thing the actual job is getting punched there, and once the job comes out, what all you wanted to, wherever you wanted are already made and ready. In this case, this is just a what you call step and repeat type of things. So, if you admit the drawing and all the details, and if you feed the necessary things to the machine, we have this nice things which are coming out. But if you want to make one piece of it marking each of them is a must. You can avoid marking each of them by special again,

special marking devices or use the paper template which have a stoking about. So, this is typically I will just what you call advance it a little.

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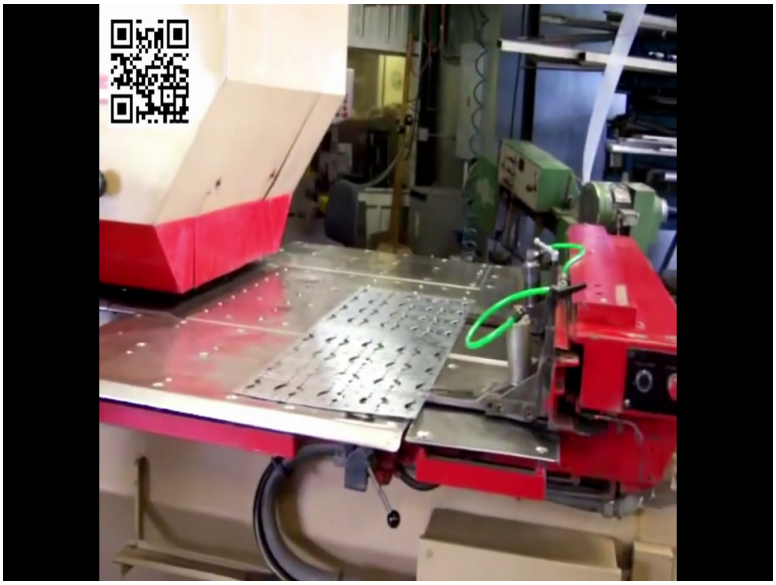

See there, we have a beautiful job which has come out and every detail is there. It is just a promotional thing. So, I think we can skip it.

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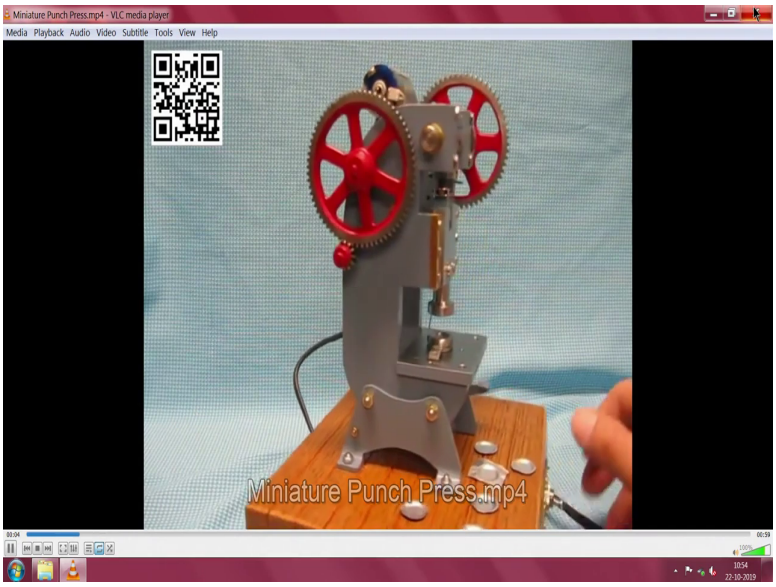

This just a what you call model makers a thing, not of any not too much of consequence. What I wanted to show is probably I will just give you a preview of what we had.

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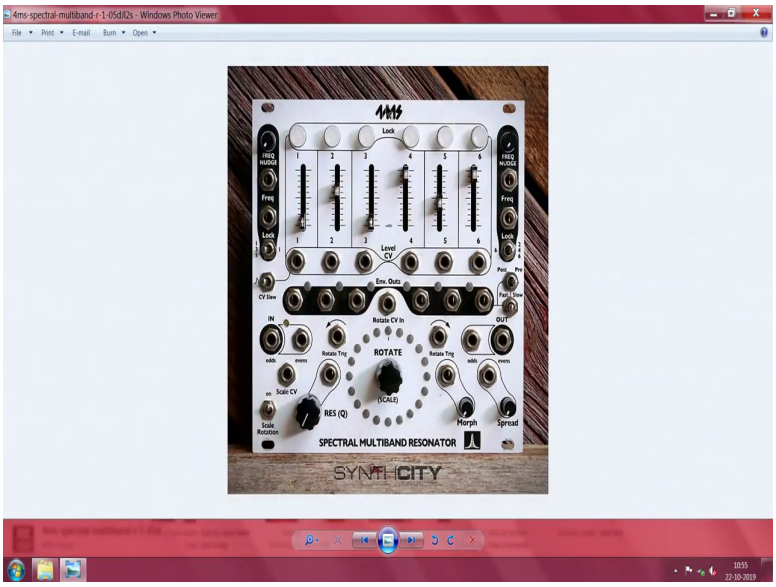

When you are to make a front panel like this, see here, so I am not very sure actually it is just a retro style or this is a current style. What you will notice the front panel has so many things which I have to accurately match with, something which is already mounted on a printed circuit board or something which is already, I mean up front we need to design it. You will notice that location of this things and spacing between them these are all issues for a user experience, and traditionally the stereo type I will not call the thing, the advantage is certain connections and all are assumed some place, certain the things you know are all assumed in one place.

So, now if I go out there are enough people who manufacture this front panels and send it to you directly. It is a beautiful software which does all these things for you.

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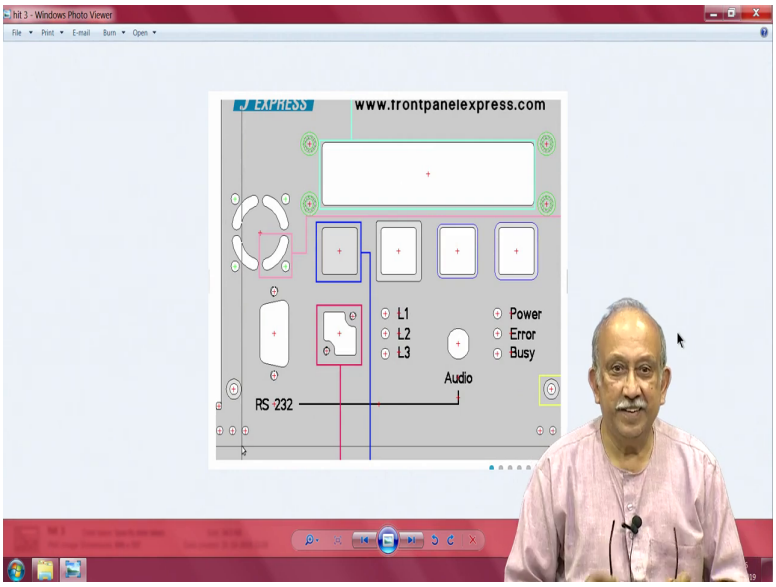

So, this is a just like in the case of printed circuit board you have a component layout and you have a inter connection diagram and then placement equivalent things are available also for the sheet metal work. One has to probably make a drawing and to make a drawing, the concept should be clear in my mind, and then to get the concepts we need to make mock up models and very simple card board models are sufficient.

Once you make it and if they the moment that device is ready, our models are ready we present it to our group and then as I said all these are generally group efforts. If somebody says I have done it, it is good, he has taken the help of people and then he really cannot be a real expert.

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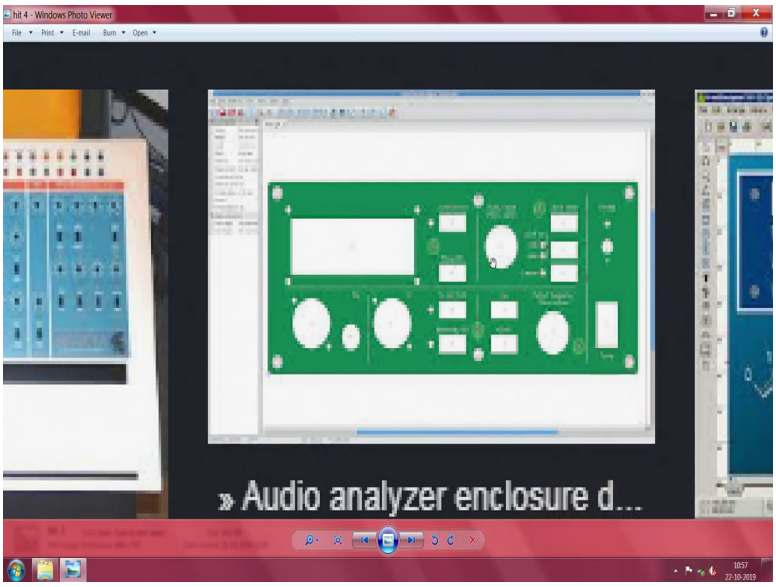

Looks a lot like a printed circuit board. Is it a printed circuit board or is it a, this thing the software is a little similar to what you have.

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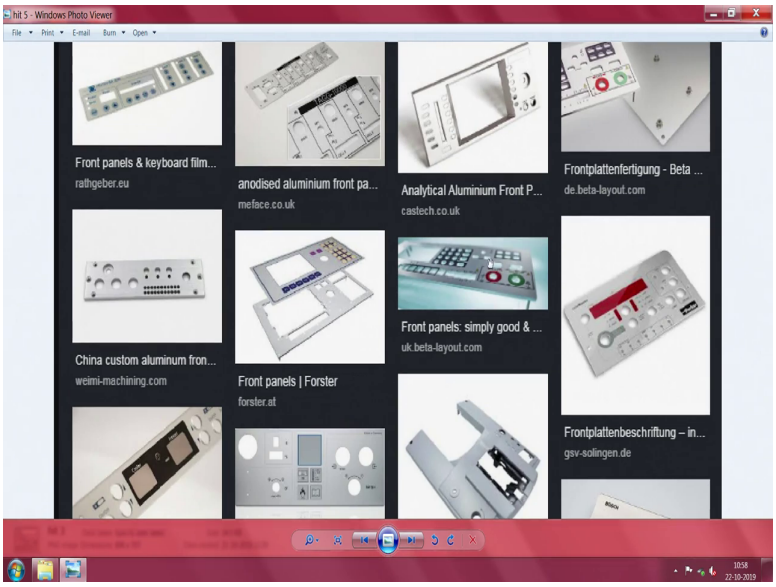

Same here. If you just go and give me search on the any this thing you get these things. You have noticed here something is very critical about it saying and the top there is a facia or a some device which is what is visible to you. At the back you have the plate on which the components are mounted, probably underneath you have the printed circuit board which supports all these things. So, it is true you have front panels and first time you need to make them yourselves. See, otherwise you should not end up with surprises, you have a surprise and everything you know is moved by a millimeter this way and that way, you are in a, it does not make a good impression. So, you have several front panel layout software also.

So, probably you can look at different panel software most of them are free and eventually if you need to concentrate on your part of the work, probably you can order this panel separately, but initially all you need to do is take their layout and all that make a template

make a cardboard model and if possible probably you can make the whole thing in whatever material is available with you.

So, I will stop here. I will continue with similar on the same theme next time.

So, thank you.