Physical Modelling for Electronics Enclosures Using Rapid Prototyping

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Lecture - 32
Fastening Detail

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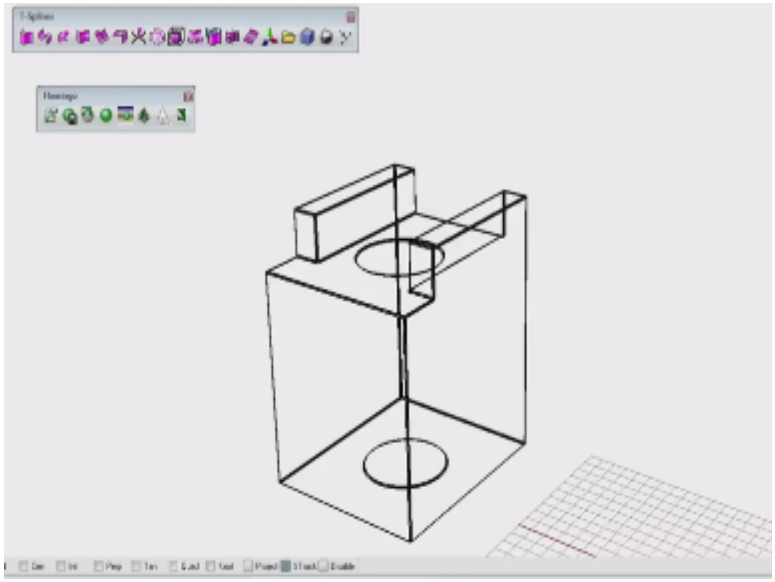

Typically, flat circular and your ring like things are there is no problem about the material. So I have a neat ring imagine you have this like our bangle or any of these things. When it is round if you make it flat you can build it and even if you have to make it here little bit of this material build up you can push it out, but if it is a thin long tube it does not work so well.

So whichever way you make it, you make the tube even if you have to make the tube in 2 halves you build here, support material comes here. You build it like this, support materials comes here. We cannot get over that problem except that maybe allow the what you call software to take charge, make a neat what you call whatever you want to create on that and then go ahead and make it.

So if you go to the internet things like watchbands, buttons okay and maybe ear decorations several other things are available as files that you can print. So spectacle frames and if you want to make gag spectacle frames, hexagon, circle and those things part of the novelty is the gag in it and you can add graphics to it or you can add a name to it. Professional machines are available which will make you really good quality thing.

But they still not as strong as the metal combinations which have, because materials have been developed. Slowly things are coming in place and I think we should try it. So as one of the assignments I thought you should try to create some object which is very useful. Let me have a go at the internet and see what we can have. I have just typed thing called an LED tree. Is it possible for us, this such objects are relatively easy to create in 3D printing.

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If you think a little about it, and you see carefully what have they done, this is probably a printed circuit board, can you see it and on the printed circuit board they have mounted these LEDs. While it makes sense there, similar thing you can easily create using your what you call 3D printing. We just need to create a flat tree and then make to interlocking parts, or in our case even you can make all 4 of them.

And then attach them together and if you provide proper openings and all that you can use wires and wire up all the LEDs. This is where little bit of our ingenuity will come instead of trying to make it absolutely like this you can in fact use probably green coloured wire and let the wire you know stick out like ringlets. Now once the wire sticks out like ringlets it is very much possible for you to create what are absolutely beautiful this thing.

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Very easy to create these things, you have seen this here, a part of it for example the lamp shade can probably made out of our 3D materials and remaining is using usual art you know materials like wire frame and maybe all sorts of you know shiny what you call this polyester films are available you can make this and beautifully you can have things which are very conveniently made like this.

So I suggest that you people, I mean that you folks can try this actually. It is very easy to print small thing like this is probably you can print it flat and you can make it into various shapes and use of a material even if it is translucent and if you just put it around an LED you have this beautiful objects which we can create absolutely. You see here it is very easy to create, not impossible to create.

And you being technical people probably wiring it is not at all an impossible thing, if you take a white LED typically most white LEDs work with around 3.8 to 3.94 volts like this. So if you use lithium what you call nickel metal hydrate or lithium ion battery a small cell these work well. So most of your mobile phones use either lithium polymer or lithium ion or other cells it will be flat.

So you can probably use it here, build it here and you do not need to play with full 230 volts. If you see little closer see what has been done, very easy to build these objects, so as one of your exercises know I suggest that you people try to build these things and you see here it is not one LED actually, they are large number of them they have built and if you make a cluster and you know light it up with a thing at the bottom any of these things you can make.

Now if you remember that old can you see reading light. So projects like this are in fact very convenient and easy to build with this.

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This whole thing can probably be built without any problem. See this, so there is a small reflector like thing and probably you can take it somewhere and then you see how neatly the whole thing has been, it is actually flat and afterwards they have bent it like this. So you can also do the same thing. You can probably print something and afterwards you know even things like this, reflector are easy to print.

And you can use some what you call any craft paint or if you are what do you call good enough take any decoration paper and then try to make a reflector out of this. Once you make a reflector now it is easy for you to make all these things about the easiest thing for you to make is these things.

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So and here you see what they have done, they have already included some cells here. So typically if you take coin cells or button cells, very easy for you to build things. Seen here. it has been bent over. In this case probably it is made out of a little hard plastic. You can also do it, after building it use a hair dryer. Hair dryer usually softens these materials and after softening it you can bend it around on a former.

So typically so many objects you will find in the what you call in your workshop and bending it over like this you can create objects without any problem at all, looks nice.

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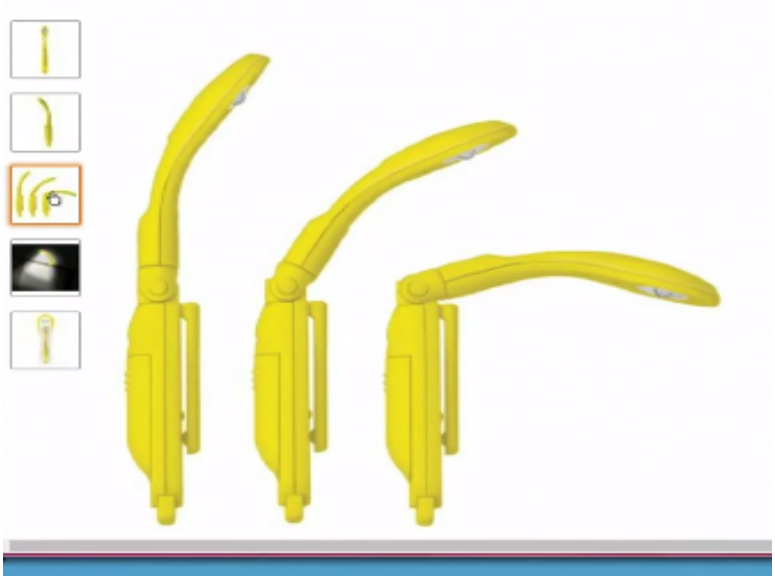

A pen what you call a pocket held what you call LED torch. You can keep it in the pocket, there is a pocket keep or you can keep it on top of a book and you can read it here. Making these things is life has become very, very easy.

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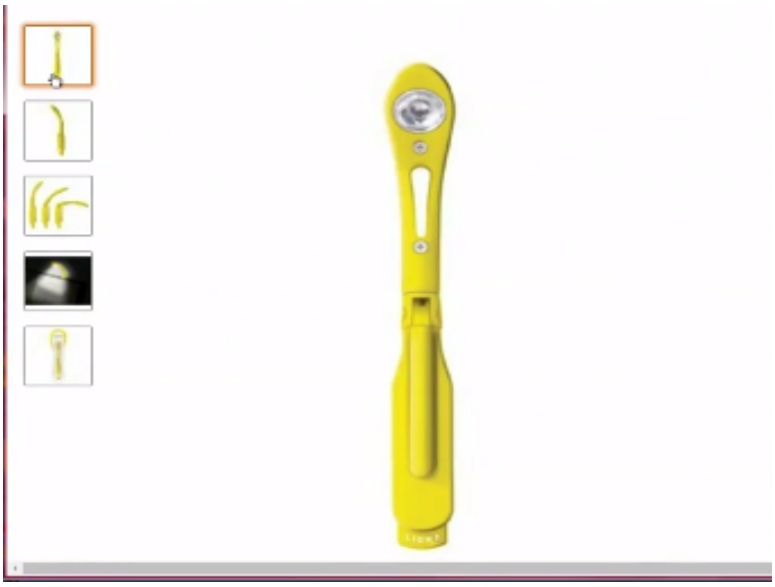

And in this case they have just put a small reflector also around it and for your project probably do not even need a reflector. You can go and get a silver or what do you call gold paint and you know neatly paint it and this whole thing conveniently you can print it and if you are smart enough you can probably print this hinge portion itself you have seen this know. These are very convenient for us to make in our projects.

So at the base you can continue to have the that what you call button or coin cells or in fact you can have a flat BL5C lithium polymer or lithium ion battery. The moment you have this your job is ready. So my suggestion is right now know you can start thinking about any of this projects. There are so many of them, very, very interesting and in fact I will try to give you, some of you may have seen any of these things. Never ending, seen this.

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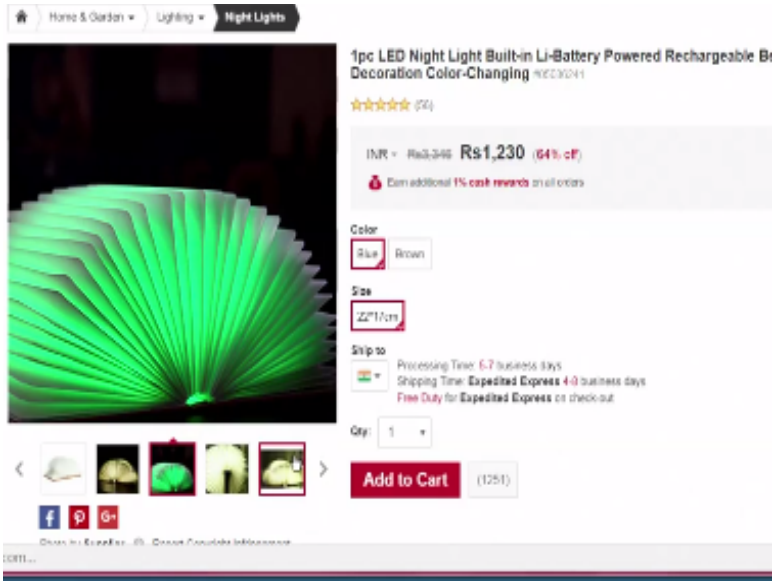

It is not just a matter of a gag or anything, these are things, which you can easily make and make it foldable. It just looks like a book, probably at the base here if you see here, probably here know there is a source and inside that for safety you can use LEDs. Alternatively, you can get long CFL lamps. So if you put a CFL lamp at the base you see here somewhere in the middle they have it.

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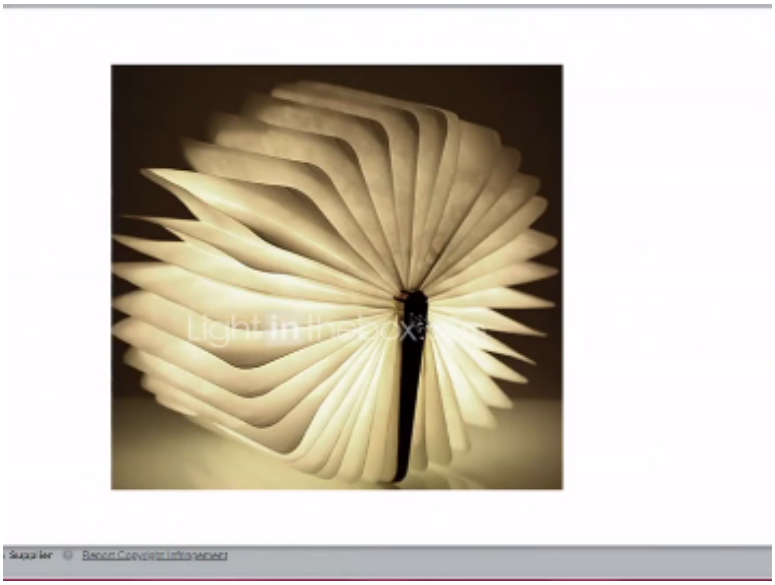

And then this is unfold and this thing at the center can easily be printed using 3D printing. See here very, very interesting projects, interesting objects. So nonstop. Things are getting more and more interesting.

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Can you see here it is a bookmark with timer built into it. Life can be very, very convenient absolutely. So maybe you can, if you are an electronics person alternatively you can just create this thin straps with thing and then as I told you that BL5C battery. BL5C battery is probably the cheapest available on this thing. So compared to all other will you believe 130 Indian Rupees is something like your 2 US Dollars.

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So you have all these you know nice things here and typically they are all available from 600 milli ampere hours to little more. So directly white LED chip works with it. You do not need to have the projecting LED at all and while LED chips you can you know dissemble one of the various things you have and most of them take the one word chips which work at 3 volts take around 250 to 300 milliamps.

So logically this last a minimum of 2 to 3 hours. Now all you need to do is make some arrangement to see where the contacts are here, you see here.

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We have a contact which are there on top, some way of you need to make a holder which will go and make contact here. So around your house I am sure you have seen various external charges for your mobile phone and so on. So if you see it is very much possible for you so you can make a cap like thing and if you examine the thing carefully you will now come across various other options.

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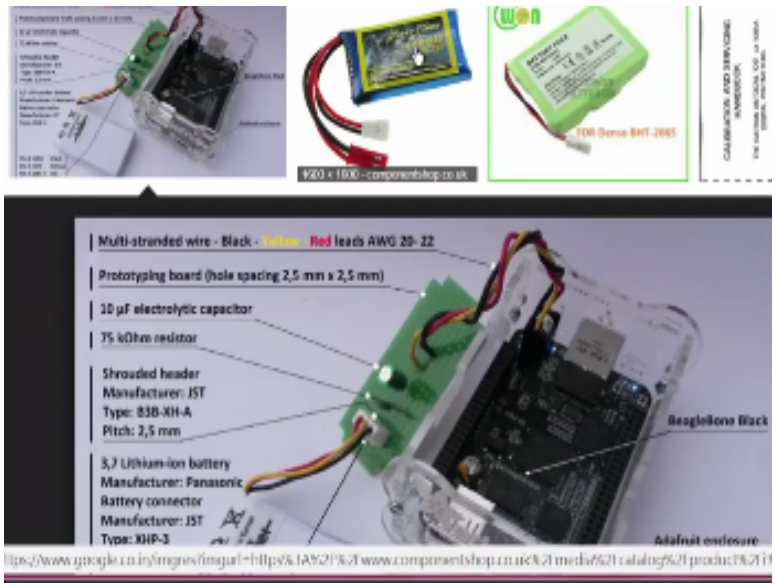

You see here somebody already sells you a BL5C battery holder and you know stuff like this is easily available and in the next session, I will try to talk to you about the other thing. Can you see here you see how BL5C battery comes already with a small wire and with a header

attached otherwise you can make this. You can make a small holder such that this thing sits inside comfortably and you can start making.

In the next session I will try to see how to make a small box like this using flat method of construction. So thank you, I will stop here and I will get back in the next session where in this rapid prototyping so far I have covered small objects which are basically 3 dimensional what will happen in case you have openings in orthogonal direction how to build it; you need to make it in 2 parts.

And if you want fastening, if you want a thread inside meaning the nut portion of it you must use a tiny nutsert like this. This is too tiny. You must use this nutserts, alternatively if you want to have a positive screw on it you need to use that also one of them. So there are so many options that are available and screws which are used for rather fasteners which are used for normal plastic including there are some which are self-threading fasteners for plastic parts can safely be used here.

But my thing is do not go below 2.5 millimeter if you go below 2.5 millimeter the you know it makes a little difficult to build. You can just go somewhere and to see the if you go anywhere here it is very much possible for you to go for self-threading. You have seen that. So we have all these which are things like this which are freely available depending on the type of material and so on.

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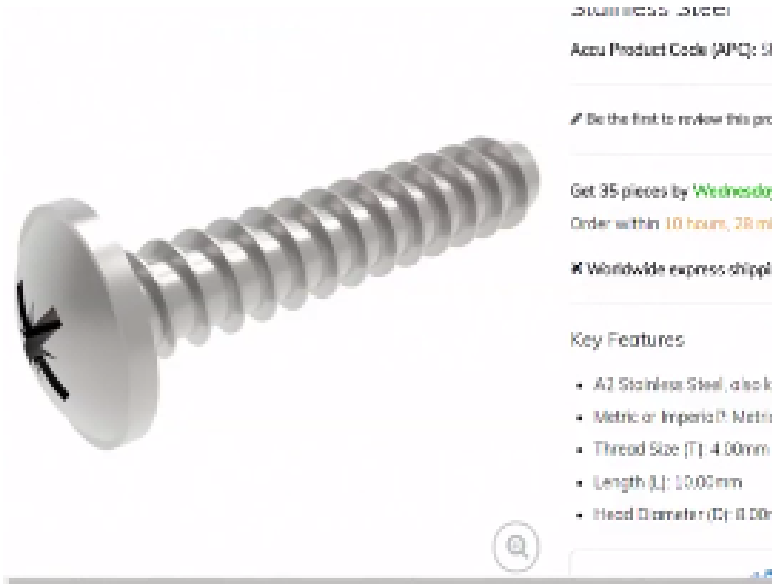

They are all available right from around 1 millimeter, see here this is made of stainless steel, but the idea being it happily goes into any plastic thing, okay. So these are available from very, very small I think from 1 millimeter diameter there are screws for plastic. If you see carefully these thread formations and what you call how the nut formation takes place and so on are all patent well designed things are available.

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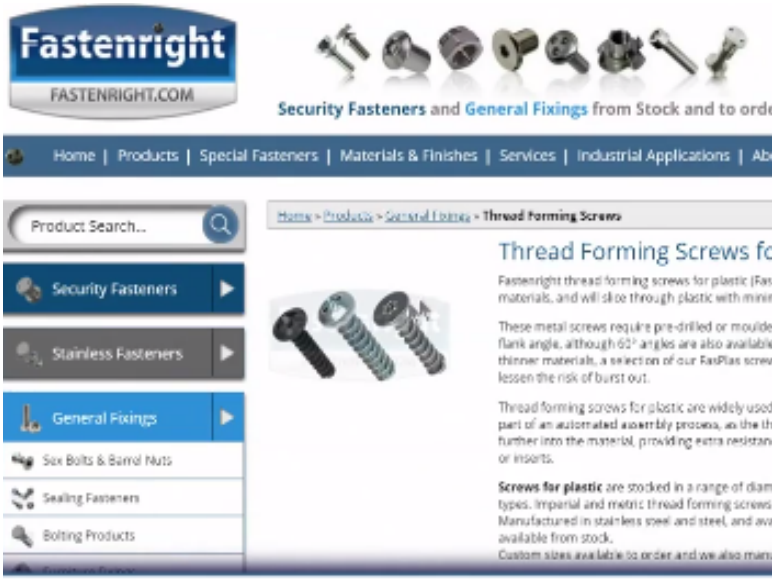

You see here sometimes if you are I mean normal hacker like me you would have seen all these things.

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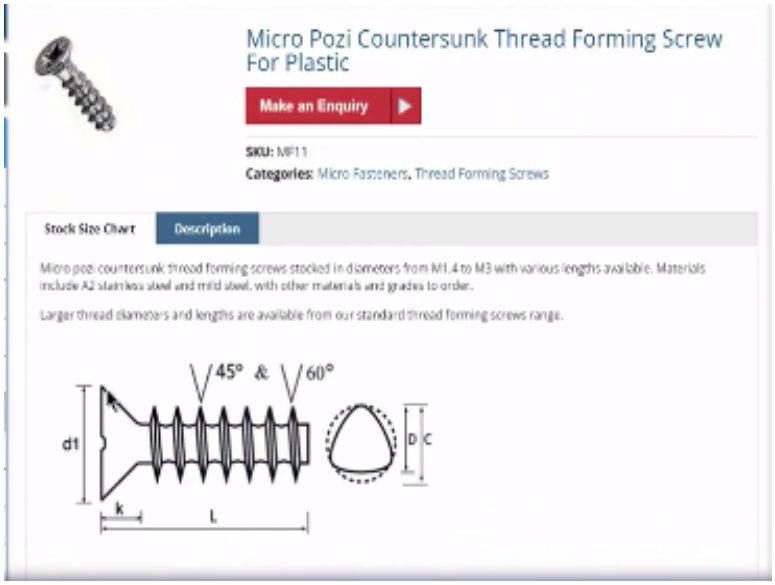

Seen this it says self-forming pozi probably stands for the original pozi force or pozi drive screws. Screws like this if you manufacture, I mean if you check the what you call manufacturers catalogue they will give you what should be the opening size and what should

be the drill size and all. So eventually you have this. You have seen this. Further there seems to be a peculiar.

I am not sure what it is here. So there is a huge things about. You see here this is what actually attracts me. Can you see here. They are available from 1.4 millimeter.

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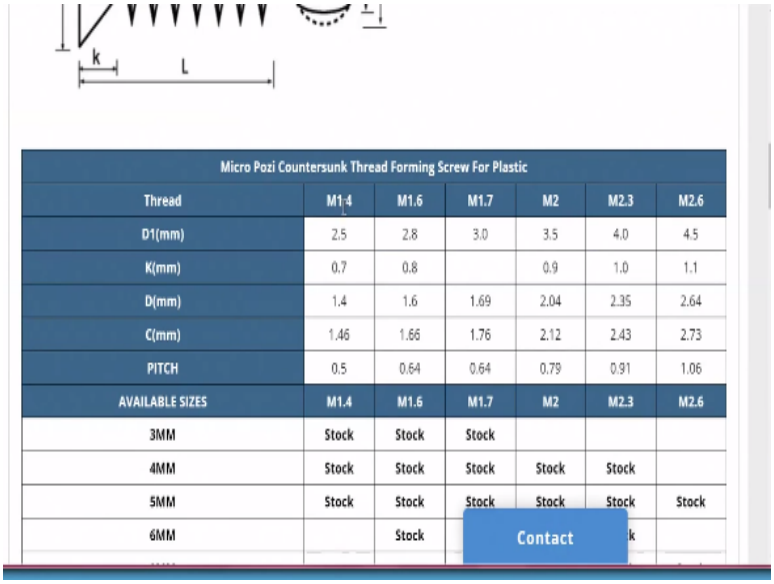

So nominal matrix 1.4 millimeter is available then we have 1.6, 1.7, 2, 2.3 and 2.6 which I am talking to you about and below if you see while this is about the what you all pilot hole and pitch and all that, the lengths are also mentioned here saying you get 3 millimeter to typically across like this know. So some of these can safely be used in our designs except the only thing is there are only, you can use it only once.

Frequently you cannot open it and so you have things like this. This one is a type of a cutting thread. Next you have self-thread rolling screws.

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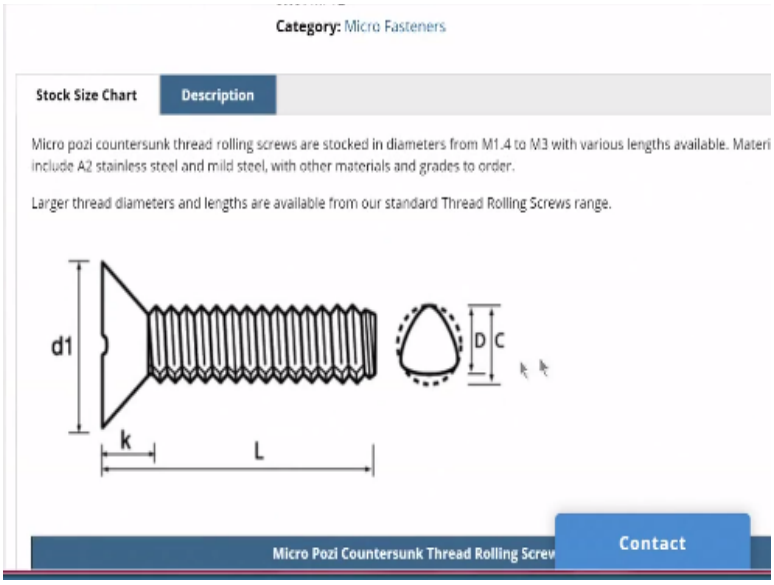

Seen this this formation know it is slightly different. So they are also available in small things like 1.4 and 1.5 and below the lengths and all are shown here. So you should go and you know check on the availability and make your design based on that. So thank you for this session. I will get back to you again next time. Next round I will try to see how to make a snap thing, can you make a box when parts snap inside. So bye.