Enclosure Design of Electronics Equipment
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Lecture - 11
Alternate Designs in an everyday item

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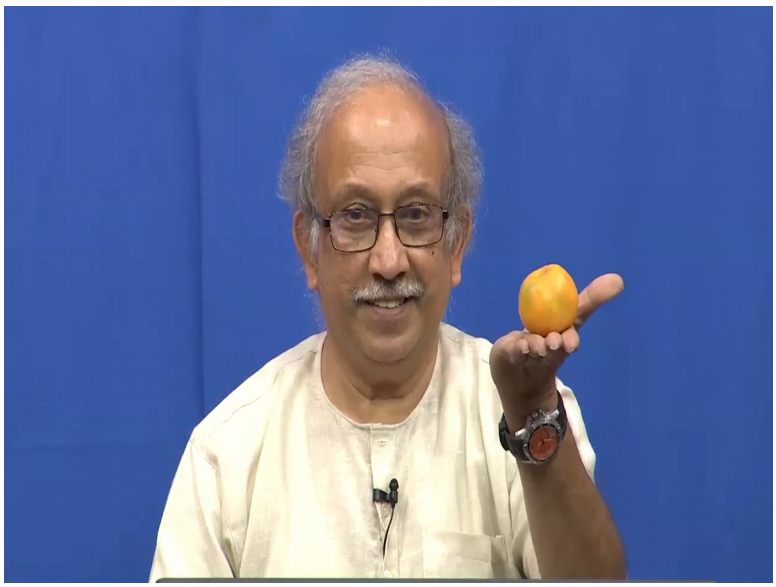

I thought, let me have an orange good know an orange is good (Refer Time: 00:22). So, I thought, next thing I will try to start with can I make juice it is a very routine thing, you know that except that it is made of metal.

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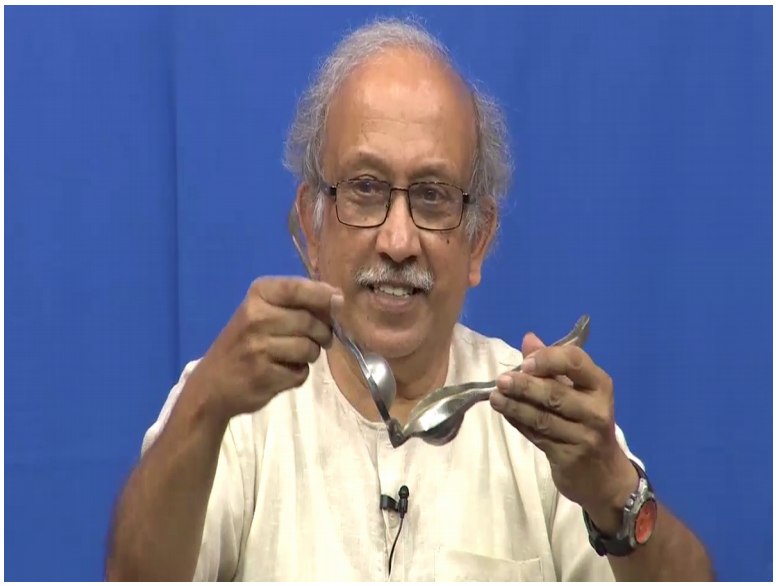

And then I have even a better thing I have a real lemon squeezer, not only just a lemon squeezer it also has a lemon in it, we call this a lime or a lemon or anything and then you see here.

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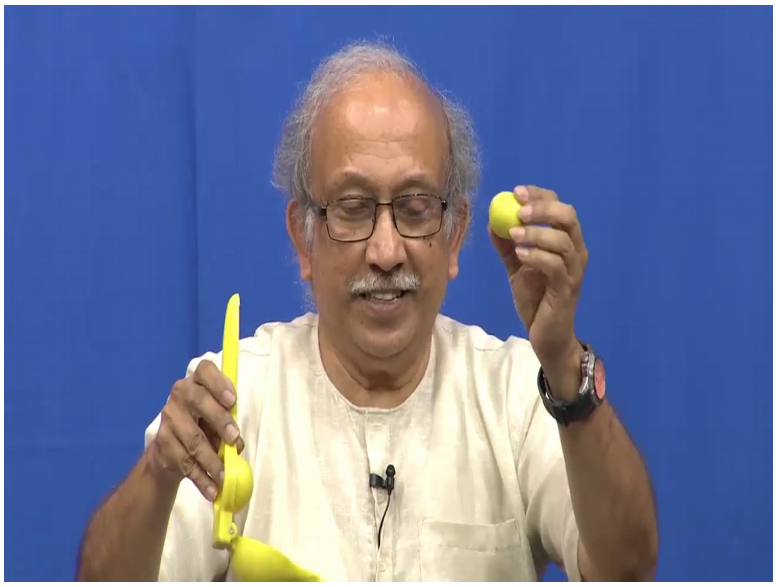

There is some good points in this one of them is that it has a leverage and all then there is a bad point about it saying you cannot take a lemon and just you know make a half and squeeze it, it does not work out very well you still need the 2 or 3 operations.

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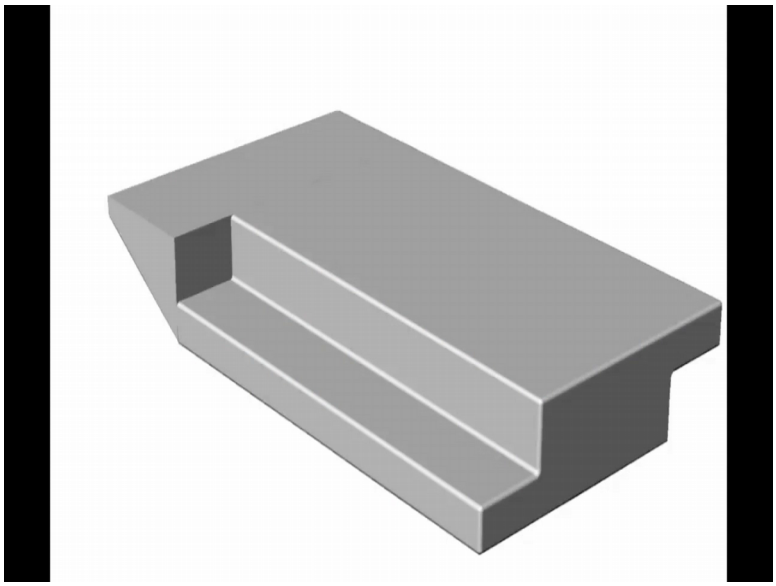

I leave it here and I will get back to I wanted to show.

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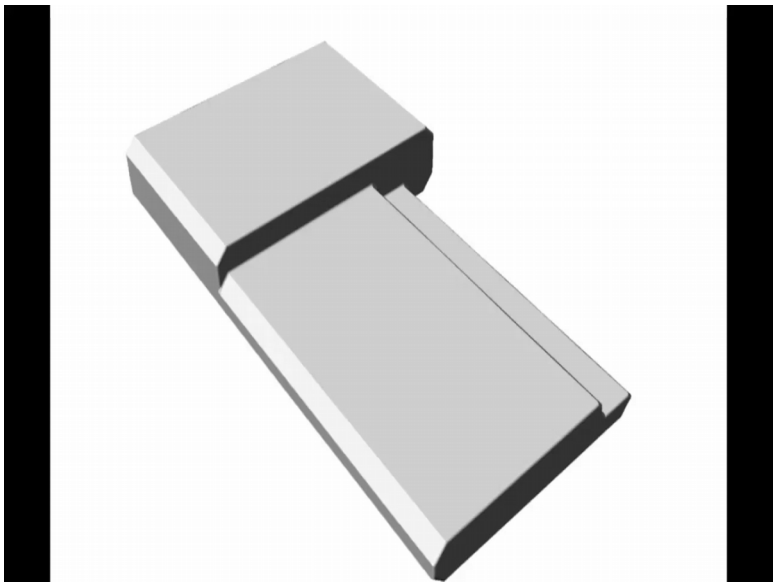

This to you in the last class saying we have a cardboard the module it is possible the for us to make all these modules in cardboard looks easy is it not this particular one, it is about making something flat we have three views if you make this engineering views it is slightly difficult to understand. Only thing is easy to dimension them, that is where the engineering viewers know there is a two sideways and the flat planner will help.

But if you are to go for the in this view we can clearly understand what is a relative position and this here. Here in this case we can see the width, probably in one of these drawings I can mention the width and then I can measure you know the other dimensions and then you see we have a very critical I have a small step here. I can give the height of this and height of this and in another view at this point, I can probably dimension this properly. If you remember in that sketching exercise I was talking to you about catching the highlights, is actually an object which is attached by folded cardboard.

So, I have one here which you know this cardboard has been folded into the shape up to here and then another cardboard has been folded into a shape here, there is a box that is made and then this box is attached to it these highlights are provided. So, that it is easy and visible to you. So, this is one way what I thought now could be a multi meter, if you remember I was talking to about we may or may not be able to hold a device conveniently in the hand because our width is limited. I said this way it sits well it does not sit so well this way it is much wider than anything.

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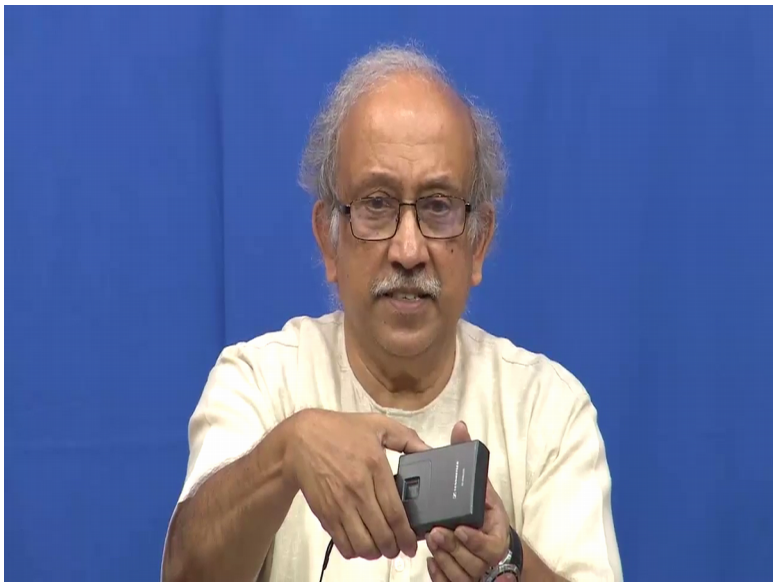

So, we have a display there which is probably as wide as this, but then the handle portion which is only wide as this. So, these have to be in and are have been attached together and we have got the beautiful object here. We have something else here again another cardboard exercise, you see here there is no highlight here why a highlight has not been provided is because it is an actually change any one to any two surfaces meet you have

an edge and edge just catch highlights. At the bottom there is a highlight somehow it is not coming through.

So, you see here it looks I mean like a useful object only thing being this can be a display here is gives something flat.

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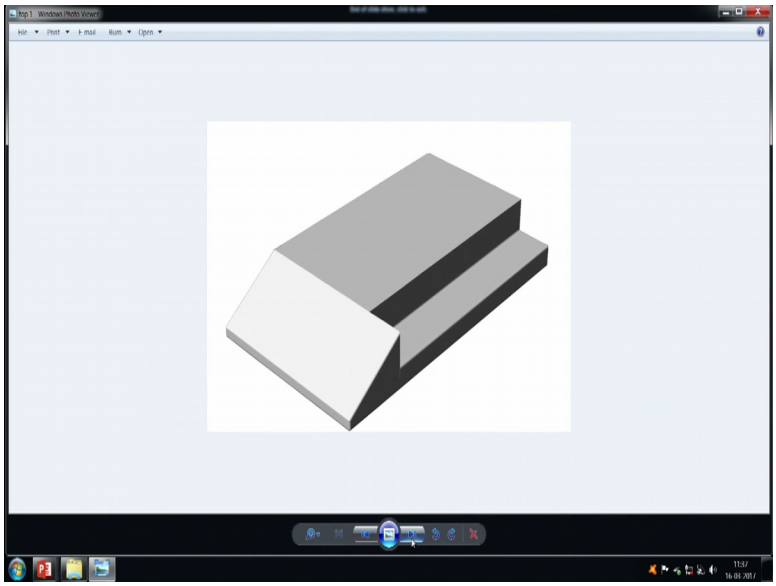

And that can be used for storing your probes. So, this could be any handled device probably you can where it.

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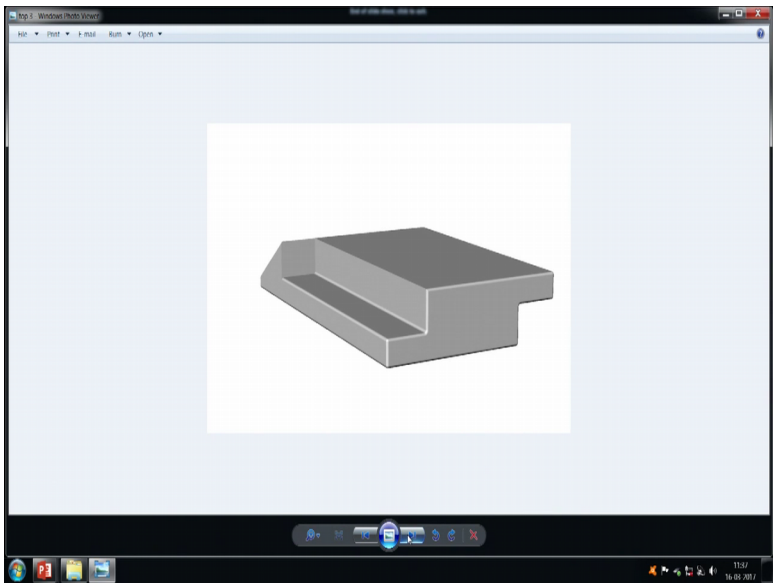

And then I can still see the edge, I can keep it on the ground I can on the flat surface and do it and this place I can put two probes or it is possible for me I can put one of the probes here and one of the probes here. One of them can be another thing probe looks nice is not it and the when it is in the flat condition.

Now, let us say I make it vertical, make it hang around here still I can see the display there is no issue about the display there. Underneath how it looks no probably you will appreciate that origami which that other I will call him a designer I will stop calling them students because all of them have passed, this one made around 15 years I think 2003 or 2004 these things have been made. So, they have made around saying it is very easy for us to make this whole even final product using, polystyrene or polycarbonate or acrylic sheets cut them and join them together and make this beautiful surfaces.

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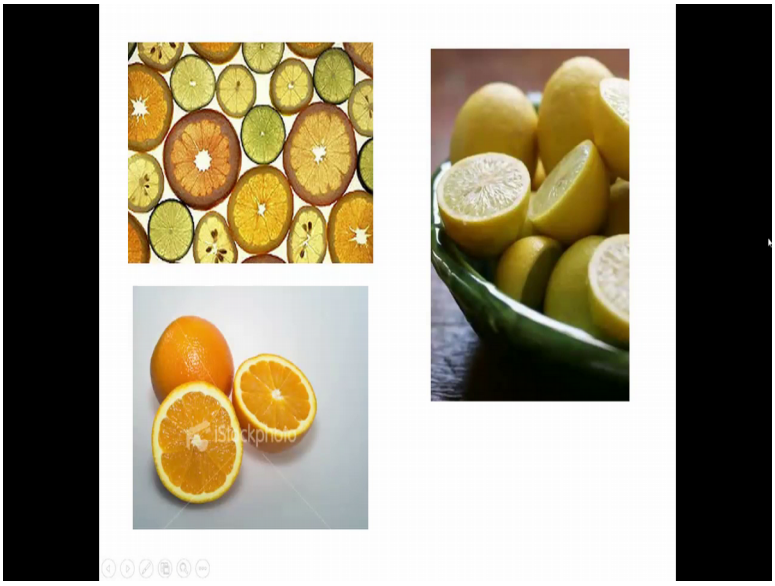

So, I will just go through this is going to be one of your future exercises, I will take you back to the break. So, I would like to acknowledge various sources from which I have taken these pictures, in case you know the original originator of these what a call stock photos. So, there is here now it says it is one of the stock photos taken from the internet. But because this is a learning process they will also get an advantage I have taken them freely from the internet because some of these cannot be easily produced for example, this cross section; obviously, it is very tough to make.

This particular presentation from here on is about a very routine thing saying how do we get the juice sort of a lemon. So, you must have also come across the joke saying there will be a big what I call a strong gun person, who goes in affair saying I have a lemon I have squeezed it anybody who can get another drop out of it I will give you so much and all that. So, one thin wiry what do you call skeleton of a man comes and he squeezes it and gets the drop and people are shocked. Then he gets three more drops out of it people ask him sir what do you do for a living he says I am a tax collector.

There is no laugh track here; the thing is we have two or three issues about when we take a thing like squeezing an ordinary lime where in this case the skin is also almost a part of it is not easy to remove it. And in the case of these are the things it is a type of an orange the advantage of an orange is the skin is peal able. It is not part of the skin I mean it is not attached to the remaining thing inside in both the cases we do not want the bad taste, but we want the good juice out of it.

So, the next lecture is going to be about how to go around trying to make a very routine object in this case lemon or lime squeezer, I am still confused they will call it a citron squeezer, there is so many of the things there apologies in case I term it wrongly.

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So, we have this you have seen this this one is typically a lime this thing and then we keep it here there is the juice we have and this I think no well I do not promote what you call other thing. So, a lime slice or a lemon slice and probably it is a mint leaf and there

is some drink in this, I will say there good people at drink only water in the correct quantities too much of also is bad.

So, we have here this has several properties of one of them as the skin also has those all factory are all your resins which contribute to what we call the flavor of it.

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It will take a very very old squeezer, looks quite old and if you see carefully various elements of it in this is that on the top, you have this dome we have this beautiful dome which can take fruits of a in a little medium size rather medium large all the way to a little small thing.

And then other elements if you see here first of all it is a handle. So, there is easy for you to hold it and then there is something which catches the seeds, and then you have something which pours. So, we have a spout we have a seed I will call it I want call it a mesh, at least the seeds portion it does and then you can pour it. So, we have a handle it to pour it to handle it and so on and make sure that our fingers do not touch the thing

But the disadvantage the main advantage of it is glass is clean, clean, clean, clean you can sanitize it saying you can autoclave it you can you know clean it in boiling water, and maybe you can use a infrared lamp or anything sterilizing glass is easy, only bad luck or bad point is if you drop it is gone.

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So, there is a good and bad of it. The bad has you can buy a new one I am sorry the good there is I can always buy a new and better one the bad is it is not a loss of glass, it is about the splinters that are likely to injure other. So, people have tried to work on this and see how to improve it. Say all the elements which are there in the other are also copied here. In fact, to make it a little more easier they have put two handles, and then there is a beautiful I will just call it a conical squeezer like thing and once for all know we have here a proper strainer of the correct diameter of holes and we have a spout also here.

So, as you squeeze it all the juice goes inside and probably you can maybe put a little bit of sugar or whatever they can do. So, we have a beautiful stainless steel device here. Only problem is it slightly expensive, and this can has all the other things, but it is a little expensive and getting something fabricated like this is not easy.

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And once you remove the strainer in top you can probably put a cover on top of it and then carried, but then in this thing know it is not very very good. So, somebody has come out which what that thought know is a fantastic improvement on that. It has all the elements what we want like this beautiful what you call seed catcher is there then we have this cup on top and then you have to do everything and then there is one more thing also know everything.

And then you see this handle looks good, but as I keep mentioning this is exactly the handle and they form which we also use for a mug, and where I live we use water I do not use tissue. So, it looks little like the mugs which you use for the other thing not very aesthetically pleasant. As long as you do not look at it is still convenient and then another important thing is it is stackable one know where the other know you stack them a lot. In this case they are independently stackable, you have a cup at the bottom which can be stacked separately and the tops can be stacked, because in a sense it is a thin sheet well it has all the elements that is why it has been kept like this, you can keep it or you can keep it on a rack can do various things as I told you the association with something which is used in a what a call as a mug it is not very good.

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Slowly we are coming in to beautiful things saying a few things which are taken from nature. This again I do not know where it comes so obviously, it could be what you call eastern Europe are absolutely the far east or probably it is there, it is a ceramic bowl like thing in which now you take a lemon squeeze it and then it has a small opening and then you sprinkle it wherever you want. So, if it is very very good and then the back if you see the (Refer Time: 13:26) or the cue is that it is it looks a little like a natural object, maybe it even you know goes out of a tree, sometimes if you take a fruit and then remove all the pulp what you remain what remains is probably something like this.

So, all the elements have been included into it saying, it is a much more aesthetic and acceptable object on the a thing and then once it is glazed it is probably more acid resistant than any other material including stainless steel. Stainless steel also does not stain, but it gets a text by acids.

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But then if we see this fired concentrate ceramic puts it is thing forever.

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We have we are getting into very very beautiful thing no jokes, but there are it looks a little like the people I know who wear a pointed hat and then you have this beautiful eyes and then the way the picture has been taken, the reflection of this shows that that is a smile normal and then probably if you turn it over probably it has this inside. I do not know if it is the same or it is as you see here.

So, it is a cover, it looks a little like what you call fruit punch and I will call it a mock tail the big other place other thing no it rather avoid it not to have mock tails and all that they need a cover. So, you have beautiful thing here have a look at this. It is nothing, but a standard beaker it looks like a beautiful picture a glass picture, which you can hold and then you keep this thing on top there variant. So, you can have a glass thing here and then now you see here, you this is this one.

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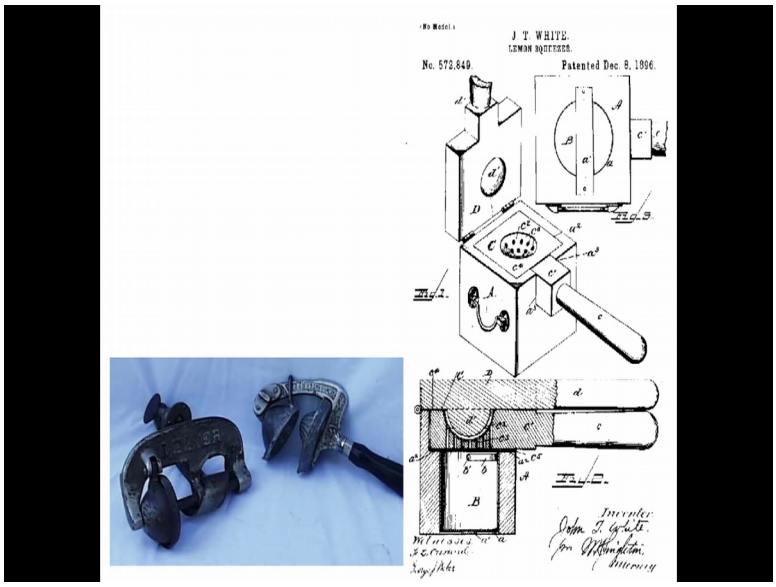

And then these things you pour you can collect juice parts of the world where orange juice is a standard thing, I have seen this it is really really pretty. Except that a small thing is you have to be careful unless you hold it and squeeze it, does not you know squeeze easily, but still it is a beautiful object beautiful object it is old.

The part which I am showing will you believe this thing has been patented very recently only in 1900. Quite old it is and we do not know maybe it was developed ten years earlier and finally, we have this beautiful wooden squeezer. You see them occasionally if you go out and the reveal search on the net you have it and then you see here this is probably know a medieval times, but then there is some elements in this is that it is strong and then if you see here probably you know there is something with which you can squeeze this thing. These are all vintage devices you can apply the pressure and squeeze it I do not know how it works we have this vintage devices this is the one I try to show it you just now.

This is the one I try to show it you a little there is some positive advantage is saying this weighing if it is a hump shape and you squeeze it, but how do you put it do you have the cup facing this side or do you put it upside down. And then by the time you finish it should curl up and come out it looks still not a big deal. In fact, I do it the other way saying I pushed one half of it here. So, that the other half the cutoff is here I put it hard and then I let it come and then I use this side for pouring it.

Before the advent of plastics we had these things same rule, there is a bit of leverage and then this being sheet metal there, I would avoid I mean they have provided these (Refer Time: 17:24) here we have something and probably you know usually people use two rounds of it after squeezing it in the normal way, they turn it upside down and squeeze it again then you can get most of the juice out of it.

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Now, coming back to my slides here, you see it is being shown as a two what you call two hand device probably yes probably not and then we need to think about it. This is one way we put it now does it really squeeze well, you have to say this is where know the human engineering part comes.

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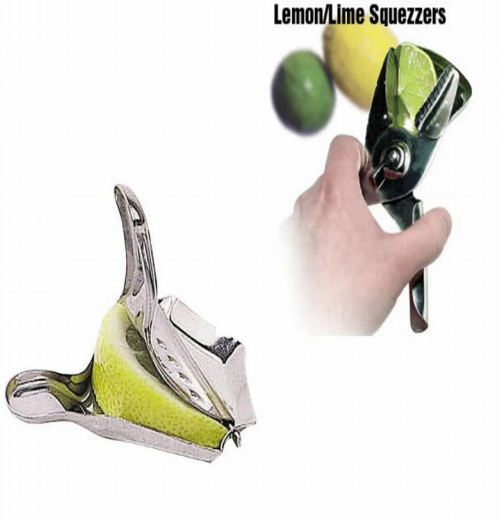

This is probably one of the better designs I have seen. In this case it is squeezed sideways which is a little like what you would do you will also hold things and squeeze it sideways and then we have a lemon slice here. They put the lemon slice and squeeze it you see here juice comes handed in places like this know probably the outside skin in the licenses would not come you see this here and this you see what they have done they waited even better I like it.

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It is made to look a little like a bird. So, when you find it on a table it will not it will go well with the other things, well there is a novelty element in it the reality is that you have a squeezing device which squeezes here and it also makes sense will make people desire this product.

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We come back to the good old things. So, somebody one designers know has gone about saying why do not we find out actually how people use these devices.

So, they went about looking at the way people wanted. So, you have a fruit mock tail being prepared after everything is over here. So, using the power of his this palm and the four fingers, pressing it down and squeezing it which is probably inevitable in the case you are making a milkshake or I am sorry something which needs to be blended, we just need to squeeze a little hard and then the juice comes out here you see here is a strainer here.

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Somebody is squeezing all the lemons here, cant we play around and make a product out of it you see what they have done, it is an open cup made out of now new materials are available.

It does not smell of rubber, this is the beautiful flexible plastic; wrongly a people you know call it what it called silicon silicon it is not silicon it is silicone.

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So, you have a silicon rubber you push the what a call thing inside open the bottom and squeeze it and nicely just comes out of it. Why not play around the original. So, you have

an open funnel like thing you keep these device inside and you squeeze them, you have a beautiful product. Improved you have a funnel and then you have a squeezing device I asked you which way does it work here you should not if you go back to this original you see your hand is likely to get in contact with these things which is not good, both for the hand and for the thing being prepared.

Instead this avoids that there is no hand contact; here still a little bit of it is that, but you see here the actual called the citrus which is being squeezed, does not come into contact with the hand absolutely. So, there is no mix up between two things you may enjoy a lime flavor and you may be one of those people who hate the other flavors. Typically a lot of people do not like that what I call we call it a [FL] that one onion type device or even we can take onion, if your hand is contaminated with onion you want that to be contaminate to this. So, we have a device which is absolutely closed the word came to me garlic.

So, if your hands are smelling of garlic they should smell of garlic. So, this things also being used to dress a salad on the top of the salad they are trying to.

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Now, put all these drops lemon drops, things are getting better you would have seen this occasionally in fairs you have a small screw like.

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The next slide shows you that you pour it put into this, there is a cup here which use do something squeeze it or in this case there is a small see here, I just have a what a call knife which I poke inside as squeeze hard and then beautifully all the juice comes out.

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And this one and avoid in a competition in stainless steel e knocks. When only e knocks have not when of course, the give it to various products for novelty part of it, it is nothing, but a stainless steel what to call a strip which is wound know by which you know you send it into a any of the citrus things and then probably remove that small rind

like thing by turning and afterwards when you squeeze, it neatly pours out. And to prevent hands from being cut and all that you see the way know very very carefully various things happened in this part of it is smooth, that part of it is where you have the cutting handle.

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This is a very old traditional thing you do not see people using it still, it still has it is way. So, if you see here what people do is they take off fruit they cut it after they sliced fruit imagine this is one of those things, they keep this and then they keep rotating it here. After they keep rotating they have full control of making sure that they only just is extracted from it.

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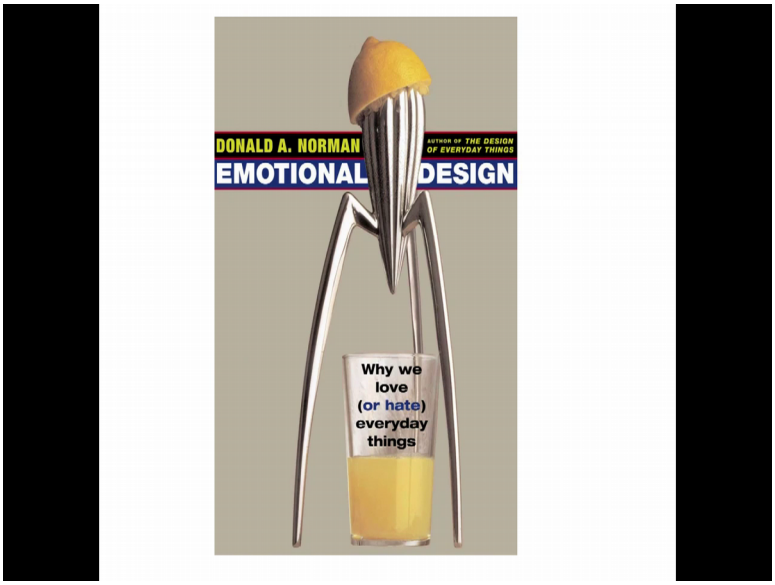

This I think I showed you yesterday is what looks; obviously, like a alien is nothing, but a juice are made by that normal.

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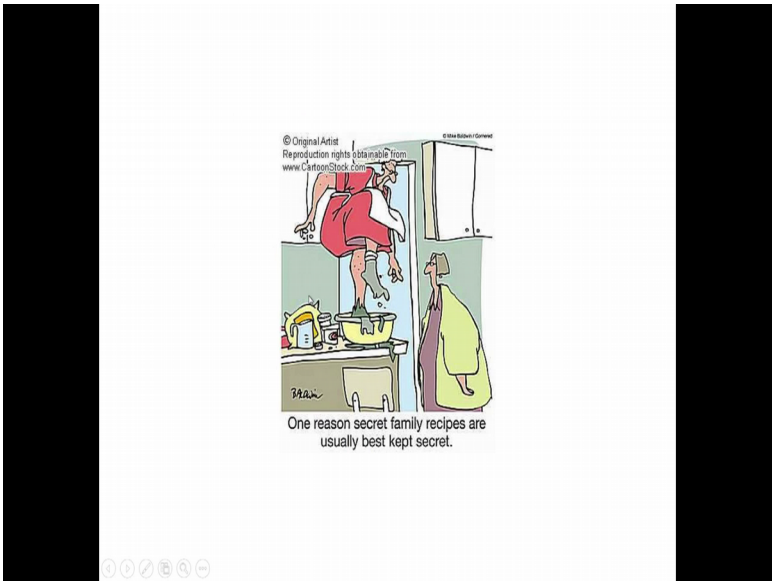

Is just a what you call I will call it a relief and read it yourself not true, but what is true is that the amount the way you squeeze and the way you get the juice out is clear, but in semi.

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What do you say commercial meaning home are little in larger quantities, several of these new devices take care of the problems which are inherent in those small handheld devices.

See here we have a rack, we have a handle which rotates it in the case it is plastic same thing here in the case of it is a metal and then you have a cup in which they have a strainer come sting and then you keep a half a lemon on it and then you push it down. So, the advantage of being like I told you are pushing the outside onto the inside, which is very critical which is not easy thus not it does not work so well in these things. Because you are not squeezing it anyway you do the holes are on the wrong place. Logically the holes if the holes were here and then they would made it, this action know would have been better and a little similar to these juice process which we have here.

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Seen this it is all inverted and then we have power juicers, it is instantly very large number of these things are made.

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So, you have part centrifugal part scraping, mechanized this you would have seen in several places in malls and various things.

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I suggest you go to the YouTube and then talk up just look for these orange slicers. If you keep these devices very clean and all that, they have beautiful options here you see here what does is the oranges are filled and the orange comes here.

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Something is held and there is a knife here which slits it nicely after that they are squeezed and then after is squeezing one after where the juice they are in the falls of the other side the juice comes into this, you have the two ranges two halves of the range there and so on. So, we have this all over the place mechanized.

Advantage of mechanization being first of all there is a little bit of standardization, we ensure that the amount of squeezing the type of what a call hygiene and or a standardized, something also a little related to this is that through put total amount of. They juice collected versus disposal of the thing can be in full control you can see it open here you see here there is a one of these what you call orange juice falls in this after that both of them join together here then it cuts it one part of the rain falls here another point falls here and then you have the juice coming out here. And then the through put is so high. So, even if there were a cue and then within a short time, you can easily make use of it.

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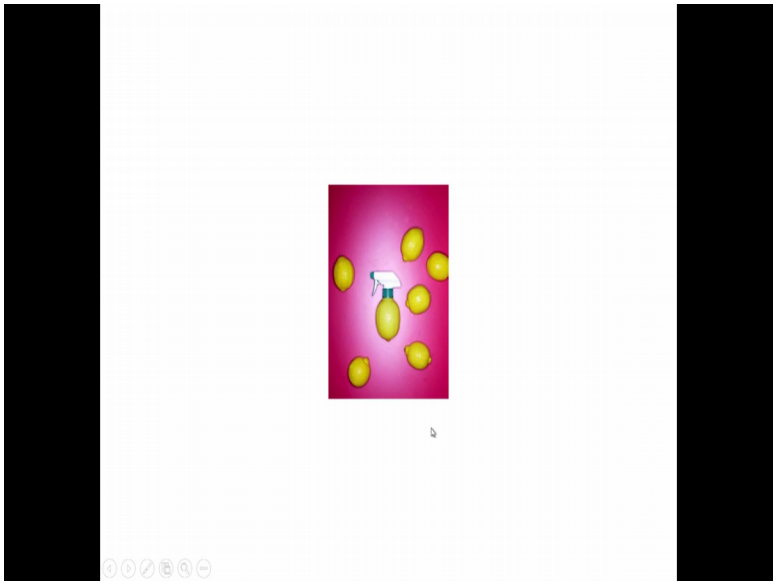

So, even you have you get a chance you read about this about the emotional designs by Norman, why we love or hate everyday things. And that is the reason it something for us know if you do not like something you can always go and make it better.

I have come to the end of this saying is this a real product or not these where we have a little problem these days. Problem there is several cleaners including no tile cleaners and then even the detergent we use are all lemon scented not flavored it does not taste like thing.

So, now what do we do is this a is the squeezer for washing tiles or is it is just a something which is playing around. Here I would like to point out the mistake here is to making it make this part look like something which belongs to a cleaning bottle. If you

were to adapt this properly variants of these are available in the market which people use for spraying lemon only thing is the top not looks slightly different. So, that you can spray the lemon onto various other things are it is a very common thing.

So, after the end of this I would like to give you a small exercise, I hope I have been able to. So, we have this exercise I will let right; I posted that too many of them and I have already shown you something earlier, one of the first thing is practice your sketching ok.

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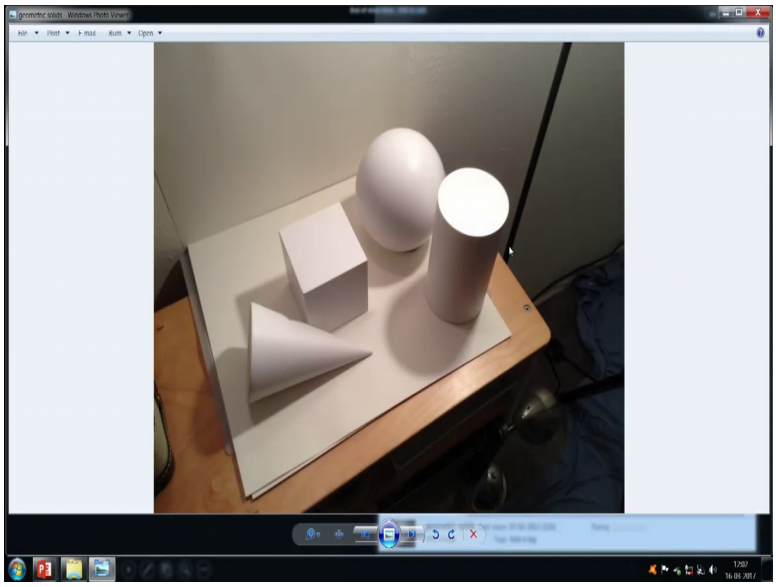

Practice sketching and then take objects around in this case it is a what you call we have the primitive objects, you have a extremely you know complicated as probably as fear then we have a cube which is relatively easy to draw, and then we have a cylinder because it has one of them now one of them has a circular face and then you have flat faces and then you have something again circular, but not the way you would think it is.

It is still a practice one of these things and then something which is probably.

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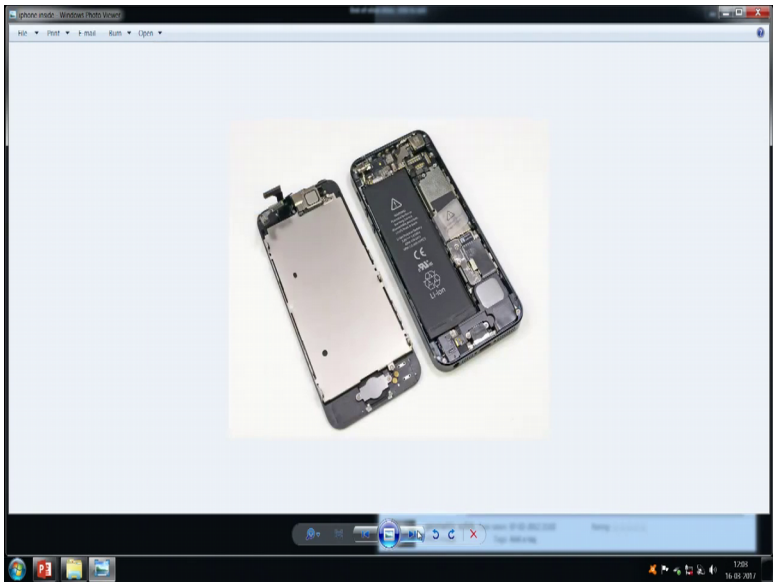

I thought I will show this and then what you call end the lecture.

This is inside of I do not know one of these any of the new mobile phones.

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I am not able to identify it and this is typically the sheet metal enclosures you find for industrial equipment. It is full of holes too many holes, but then we have all this this is what is called a IP 0 0 or IP 1 0 type of an equipment made of sheet metal.

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This comes to the height of professional design expensive, but not impossible for you it is very easy for you to at probably by the end of the course and if you are one of these people in the professional field, I expect that you will be able to make decisions about it saying how does this things need to look like and fortunately for us if you are to work for marine equipment, they have their own standards about the form the shape and dimensions. If you are in the aircraft they have their own and then they have a large number of connectors here, and then you have earthing lugs and then something which we love and hate just like we love and hate things here, cooling seems to be a serious issue about it can be cool something or not.

So, where you like it or not we end up with this heat dissipaters. Now can you make a heat dissipater also as part of the enclosure is a very important thing. In the case of very very critical applications what they do is they do not just put a somewhat you call printed wiring board or some other thing directly and then put a box on that put a cover on that. They start with the concept and most likely what looks like a simple heat spreader here is actually a device which is very very carefully made.

I have a filling this part of it could be a standard extrusion, the top is definitely an extrusion with various what I call the features that are added to that in this front this could be probably something which is part of are the base, and then we have a provision

here for all these connectors, and if you see that there are slots here there are slots here, but there is no slot here where they are thing lug is mounted.

Similarly, there is no slot here where these two connectors are mounted and most likely one of these faces said at the top face, the top face is probably it has devices or plates which on which you mount the what you call heat producing components, and the opposite face this bottom probably is flat. So, because by itself is attached to a cold plate. So, this one is part of a drive if you see here now it is a motor drive. 40 volt dc, some 6 amps and all so obviously, their dimension is small.

Advantage of this is we have one phase which is a machined heat sink. So, you have to attach it a cold plate on the other side it could be water cold or just simply there is in part of a body and all that. So, you have a professional equipment which you will be able to make it, but one level below these boxes and all are still very much popular. So, nothing what you call unusual about it except, that this confirms to certain dimensions what are called rack and sub rack and what is called the 19 inch rack iec 5 to 9, and then it uses connectors and then something which we do not like all along is these openings everywhere.

But the day is saved because this goes into an bigger enclosure called the actual rack. Is only a sub rack something a unit to fixed the rack only thing that fixed is the width of the they call that front panel is 19 inches, 400 in 82.4 or 0.6 and then we have a 440 mm depth we can do, and then heights are adjusted in terms of use. So, you is this this is a particular thing I think it is 30 it is a one and a quarter inch plus half an inch. So, I think it is 41 point something.

So, in terms of these use these things are adjusted and then they the whole rack is usually sealed and it is a secondary are cooling. So, making an equipment which is you know what you call I will use the word porous or otherwise no fully open, or what is called a basic open just safe equipment is still safe, because it is going to be put into a more professionally designed communication or drive rack.

So, we have all these beautiful things in due course while this is professional. So, again what you call reiterating what you want to do impair your sketching skills. You can go to the internet lot of YouTube things are there very critical thing about it is saying first of all how to make a pictorial or a perspective view, saying there is this how things what you

call converge. So, you have this left hand and right hand vanishing points or in reality wherever you are look you have a vanishing point.

So, in the case of buildings and all know if you are looking from top vanishing point down if you are looking it up vanishing point up. So, they four know saying north south and then we have the what you call left and right, we have these vanishing points. So, improve on your sketching. Something which are related to sketching is line weight. So, you have to say how to make edges those edges which form shadows need to be black and otherwise suggest you look up the internet otherwise if you go back to the sketching the previous lecture I have acknowledged where I have taken those things from.

So, one is about the sketching. Secondly, somehow in your mind you need to go and look for a small product which you can improve not easy. And again something related today is how do you make modules simple as a cardboard module one of the exercises I suggested you make is a multi meter. So, just the previous few slides I have showed you how to make a multi meter using flat there all flat surfaces.

Hopefully I have one video in which one of the persons instructor is cutting all the piece and joining them. So, the most what you call easiest thing for you have to try is probably a multi meter. Sketch a multi meter or any other geometric forms I have shown you three geometric forms here extremely difficult or tough is a sphere extremely easy is a cube and anything in between, but still you see there all flat surfaces there not organic.

Then something related to these two know cardboard module making, and then third point is after having shown you all the alternatives with which we come about some creative solutions. So, looks these are all just lying about the house, this I said is a what you candle holder.

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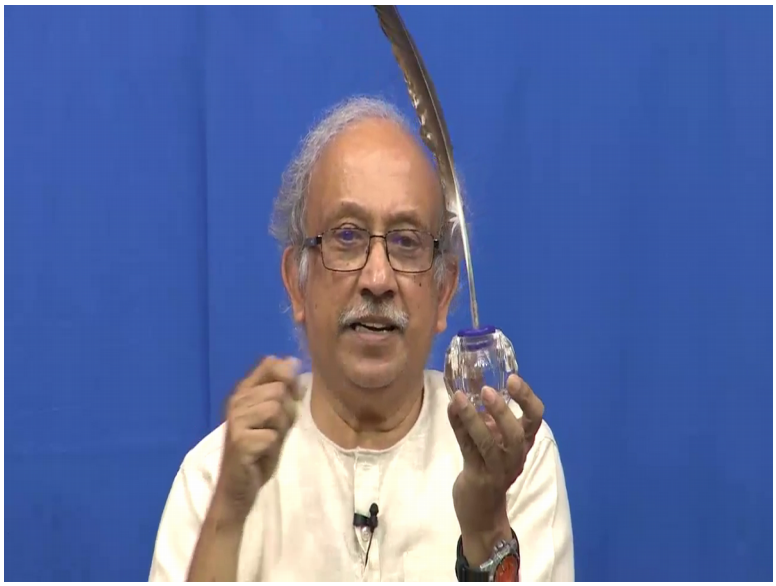

So, I have added all this from another thing makes it look a little like a tea pot. Any time it is much better than this tea pot I am sorry this ink pot sorry I got confused it any time it is better than this though it does have a few elements and makes it look good this adds value to it.

And in the rare case that you do not want to use this you can always put an ordinary pen or anything, are still better you can use it like the a scented candle pull it out and put the candle inside and then continue to use it the beauty is it adds value. So, I can now sell this as a candle holder I can also sell this along with a complimentary pen. and you will be happy.

So, thank you I have covered almost an hour and I will get back to you again in the next lecture. So, take a look around improve all your things.

Thank you.