Glass Processing Overview
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Lecture – 35
Glass Processing Overview_Part II

Let us move on to Insulated Glass Unit. Basically people call double glazed unit. Yes. Of course, it is nothing, but the there are 2 pane or hermetically sealed, with help of silicone, with space or gap which allow us to you know give a space in the aluminium channel has a desiccant, which will have a vital which will play a vital role in terms of you know providing the transparency and less conductions let us go through that.

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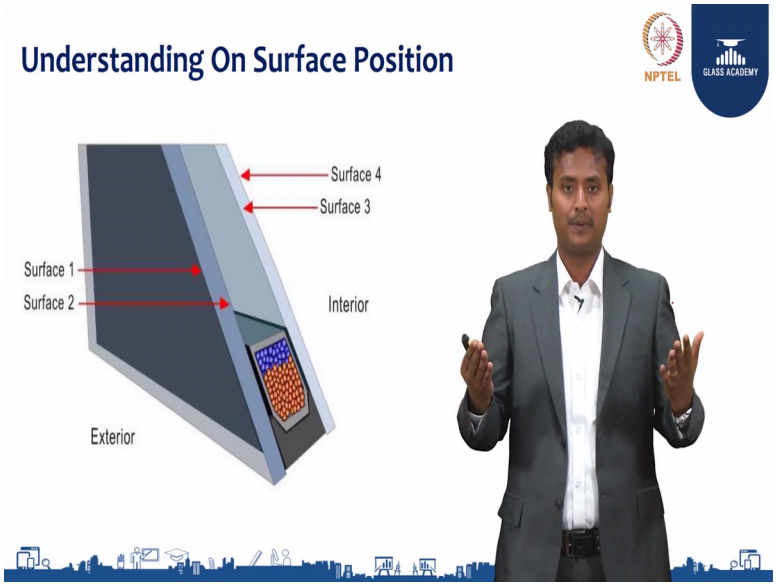

So, understanding on surfaces of glass positions, basically if you want to process that is double glazed unit. So, you will have to very careful to in terms of understanding of surface of glasses.

So, glass has a normal plane glass. For example, 6 mm glass we take it when the when the at the time of manufacturing, we have a 2 phases. One first phase and bottom I mean top and bottom phases. Top base is called as a air surfaces, bottom surfaces which we called as tin surfaces. Because, when the float manufacturing from process and the glass fed which is passing from one place to other place which is you know kept over on the tin medium which is transmitting one place to other place. So, the tin is with the helping

from you know glass to not to fall touch any other material surfaces. So, this tin which is helping to you know transport from one place to another place.

So, wherever that portion of the bottom surface which is touching tin surface which is called tin side opposite side, which is called, which is top side which is called air side. So, how this is you know will help here? So, whenever you look at the (Refer Time: 02:08) So, for example, when you are look at it outside from the building basically exterior of the building, what is a the first pane is a surface is called phase 1. The same glass has a phase 2 that is called phase 2 and air gap and third glass has a I mean which is a third glass which supposed to be located from the insided may be that portions is called the surface 3 and surface 4 I hope you understand.

So, when you will look at it from the exterior of the building, what phase you are looking that is a phase 1, phase 2, phase 3, phase 4. So, you will have to keep in mind. So, if you understand this. So, you can read the specification of the glass compositions where the coating phase going to be solar control (Refer Time: 02:58) you know coating is going to be glazed. So, generally in nature, in India the surface like coated surfaces like offline coated surfaces would be on phase 2 you can identify here.

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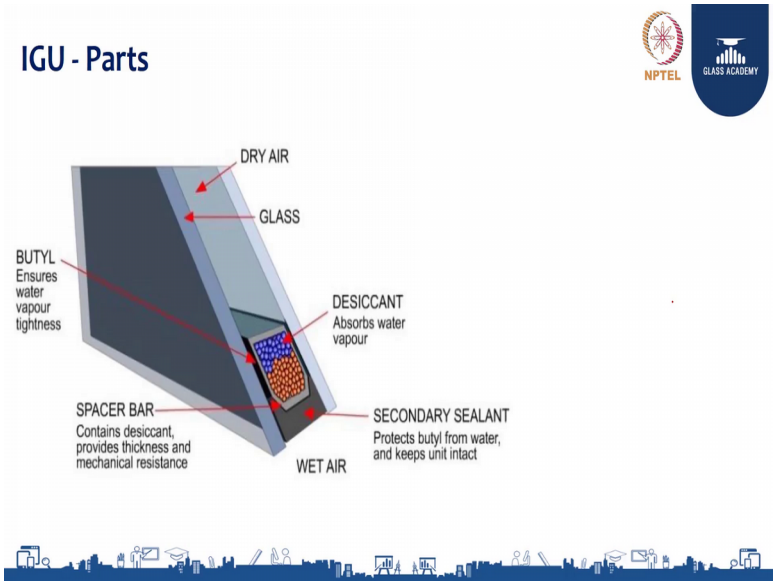

So, let us move on this I G U part. So, having said that so, D G U playing a vital role in terms of no aquastic, and less condensation aesthetic you know energy conservation so on performances.

How it is helps thus application wise, how it helps? Each part has playing a major essential vital role in terms of I G U process. Glass always has a superior for I G U process, but even other substance like other parts are even more essential for I G U process. So, which means glass you have you take a 2 classes hermetically sealed with help of primary and secondary silicone. And, you have a aluminium spacer which will give a space of like a 6 mm 12 mm air gap or 16 mm gap or 6 mm glass.

So, basically will give a like it is a double glazed unit it is glazed between the 2 panels. And, either you can apply dry air or inert gas like argon, xenon, krypton, gases can be you know high thermal performances gases can be inserted inside the D G U at the time of processing you can do that.

And aluminium channel has a it is a hollow element channel has a desiccant. So, this desiccant will have you know loss give of a performance to the class. If the desiccant failure your D G U is going to complete going to be failure in a over period of it is a very you know period of time. For example, it is going to be a condensation like a refrigeration system, whatever you say nowadays you know all the shopping complex like all the (Refer Time: 05:02) system. What you inside, you can go through there used a glass pane and inside there is a refrigeration. So, outside the temperature I mean like 35 30 degree centigrade inside will be a like minus 20 degree centigrade or less than that.

So, we will have a condensation effect in order to avoid the condensation effect. This desiccant will help us to view the I mean view the product, what is inside? So, this will absorb the water moisture at any point of time.

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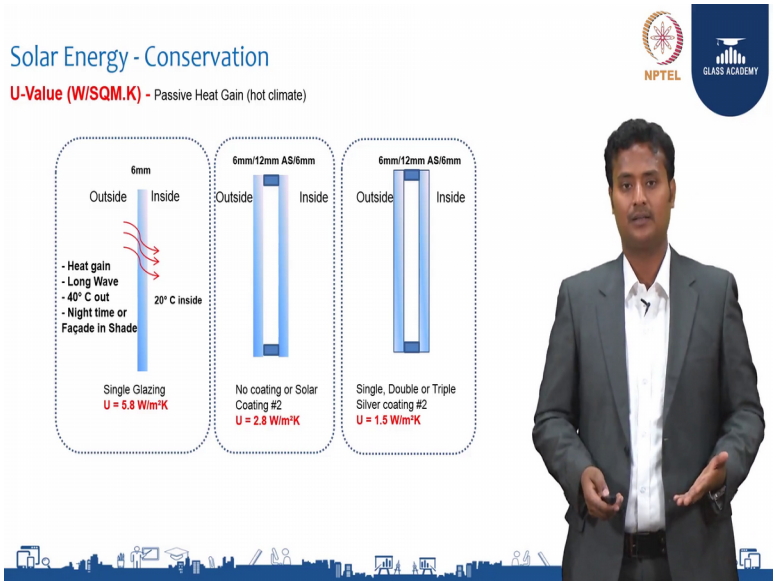

This was single glazing for evaluate 5.8 watts per meter square Kelvin. Whereas, if you use double glazed unit like 6 mm 12 mm air gap at 6 mm you will get a U value at 2.8. Even you can be reduced with the help solar reflecting aquatic glasses, we use it further more U value reduction you can get it. And for example, if you use any triple silver or double silver coated glasses you can further more can be reductions u value reduction you can get.

So, the more reduction of u value which is 1.4 watts per meter squares kelvin. So, you will have a more performance of the glass. So, the single pane has a 5.8 watts watts per meter square Kelvin double silver. For example, if you can take the U-value of the double glazed units going to be 1.5 watts per meter square Kelvin so, thereby you have a the huge the profound energy saving you can get it.

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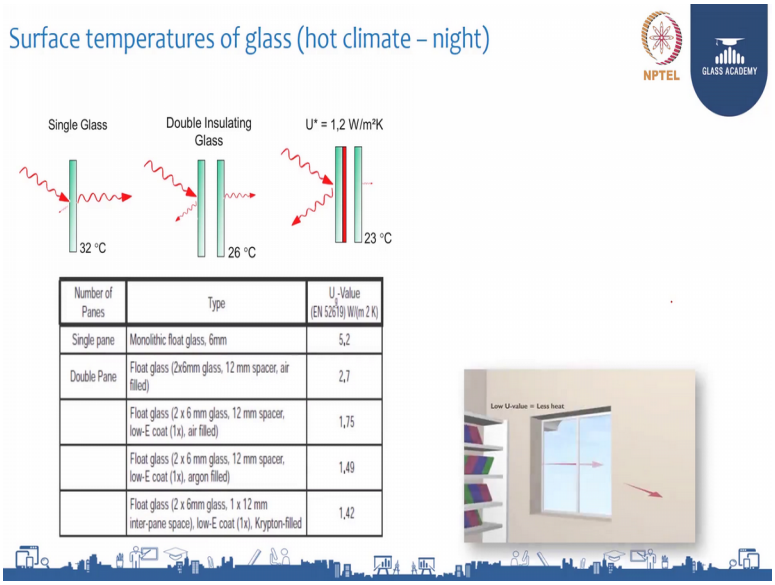

So, single glass if you see the 30 degree centigrated (Refer Time: 06:32) if you use double glazed without you know any solar controlled glasses only single glass I mean clear glass, you will get a reduction of 8 degree 26 degree centigrade. Whereas, if you use 1.2 watts per meter square Kelvin as a double coated solar control (Refer Time: 06:50) coating if you are doing at. So, you have a reduction of you know 23 degree centigrade you can get it whereas, it was a 32. So, you will get a considerable you know heat reduction inside the building. So, thereby you can analyze the energy saving. So, this is (Refer Time: 07:08) which we were talked about it.

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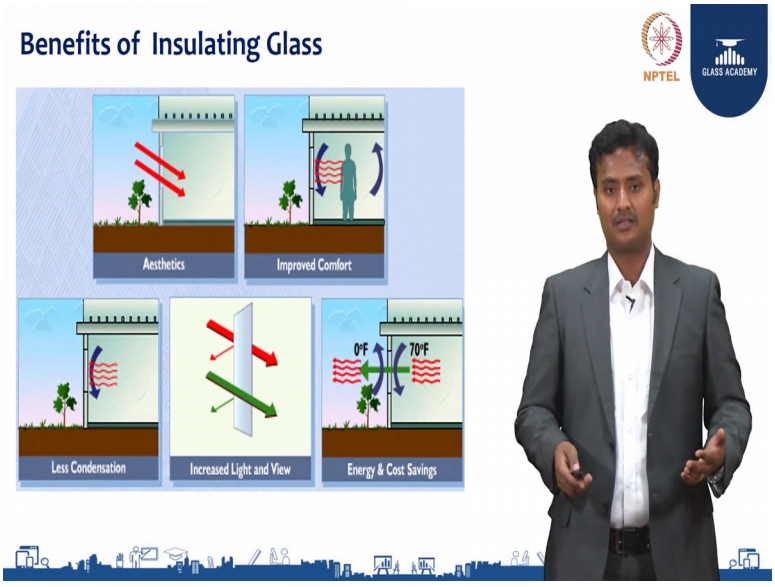

So, benefits of insulating glasses. First and primarily it is be aesthetically, it is will be a appealing in a facade. So, every been a nowadays you see wherever you go in a metropolitan city. So, all I T and complexes are facade. So, basically you can see that the amount of glass has been used widely it is nowadays the construction industry has been widely you know moving across the global.

So, the glass occupying the more space there by you get the aesthetic feeling you know ok. You can use use the nearly it was ACP a was you know occupied nowadays the glass has been occupied the space of you know building. This is a facade you can get aesthetic and improve comfort. So, which talk about if you use a solar and triple silver theme insulated coating glasses, we use double glazed you can have a great infer I mean inside comfort people can go and sit near the glasses.

Whereas, if we use is very single glasses a single pane you cannot go and sit the glasses and near to the glasses we can achieve this. Less condensation we talked about this is basic an which is playing a vital role, in terms of absorbing the water moisture inside the DGU, if anything happen it absorbs. So, it will give you the transparency as well as less condensation effect. I can I would say there is no condensation effect.

And increase light and view it is most important factor for I G U panel or in terms of glass usages, it will avoid the artificials lights inside the building. If you use the number of you know glass in your building, you can considerable reduction of your energy bill because you do not want to use artificial lighting.

So, the glass would allow the how much light you can decide? What glass you can use it, how much reflection inside what light transmission has to come inside you can decide. So, there are wide variety of glasses are available. So, through which we can achieve this increased light and view or decreased light and view also we can achieve this.

Having said that energy saving it is most important nowadays and this is a you know factor for all the economical growth. So, the amount of common emission is will have to reduce. So, the either glass usage will you know give you the way back in a period of 2 years it will give a way back thereby you can considerable production of your energy bills.

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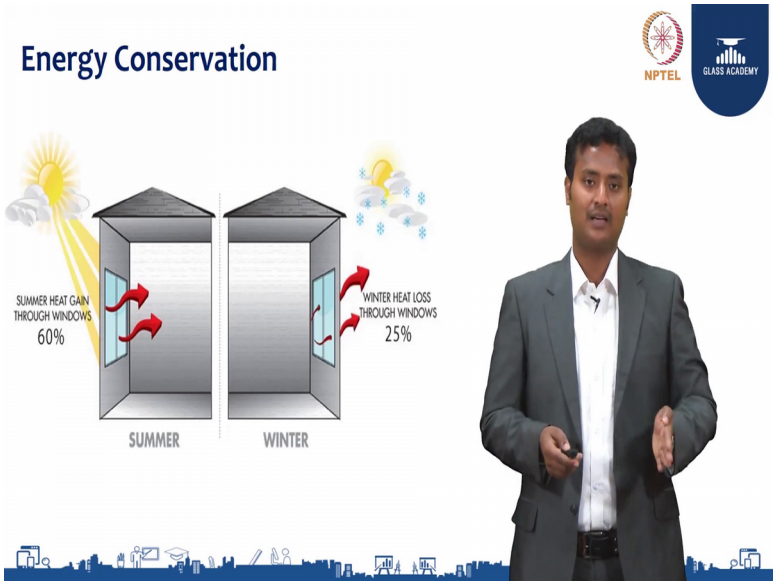

So, energy conservation we talked about. So, if you want to use in summer. So, you will have to use air conditioning. So, there by the considerable heat it come inside will be know reflected (Refer Time: 09:56) stopped, it will not allow to your heat penetrate to the building. So, the glass will put at the heat coming from the outside to inside. So, thereby you have a greater energy saving.

And winters as well so, the inside heat would not go away it will retain that. So, you winter you need a heat that so, this whatever thermal heat like a bulbs, laptops, or other appliances body heat which is producing inside that the thermal heat which is inside. So, it will not escape. So, through this a glass so, it will considerably. So, we do not want to heating where as in India we do not have heating technology. So, other like European countries are having heating technology I mean inside the room if it is colder then heat it. So, again we do not want invest for heating the building inside the building when winter is on.

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And, perfect transparency most wanted people want to see outside. Nowadays people are seeing like you know curtains or blinds or lowers or any obstacles to view outside has problem right now. So, you can choose appropriate glass thereby you can see from inside to outside. So, outside to inside also it can select the appropriate glass selection.

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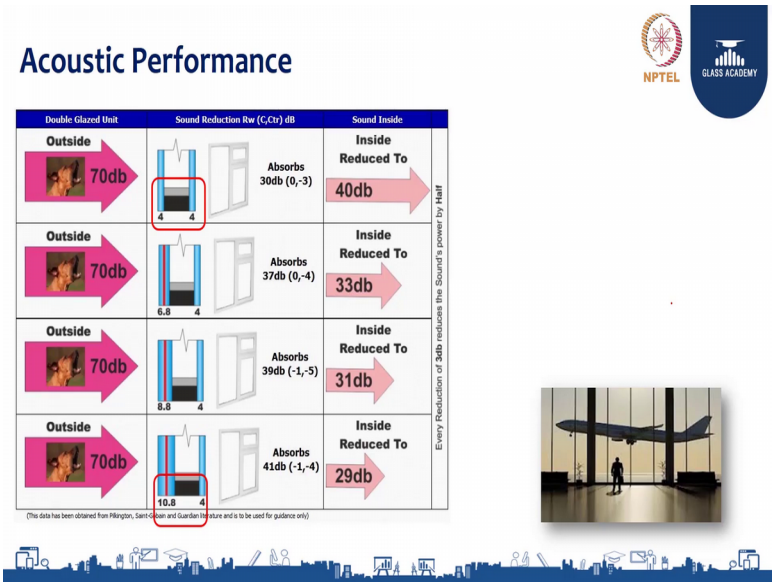

Acoustic performance yes you can definitely you can achieve this, because if you use a laminated glass with on DGU you will have a more performance. You can see here it is a normal 4 plus 4 you will have a decibels of 40 decibel you know which is reduced I mean inside to the reduce. Whereas, it was a 70 decibel outside if you use a double glaze you will have a 40 decibels.

So, 30 decibel has been completely reduced it is a quite you know effective changes here on acoustic performance. So, likewise the more increase the more layer you increase it of laminator (Refer Time: 11:48) the thickness of the D G U we will have a respective acoustic performance. It is widely used in hospitals and airports where you airport you know well take off you know we will have a huge a blowing air sound from this plane.

So, occupant will get disturbed or you know it is not comfortable category. So, you will not have a comfortable on your board I mean journey. So, now, to protect that one so, the double glazed unit with laminated glass would ideally you know helpful for such a traffic areas, can be used in hospitals yes you want use your you know patience to be very calm at the time of the you know inside the hospital. So, you can use such a product. So, you know they can protect from the outside.

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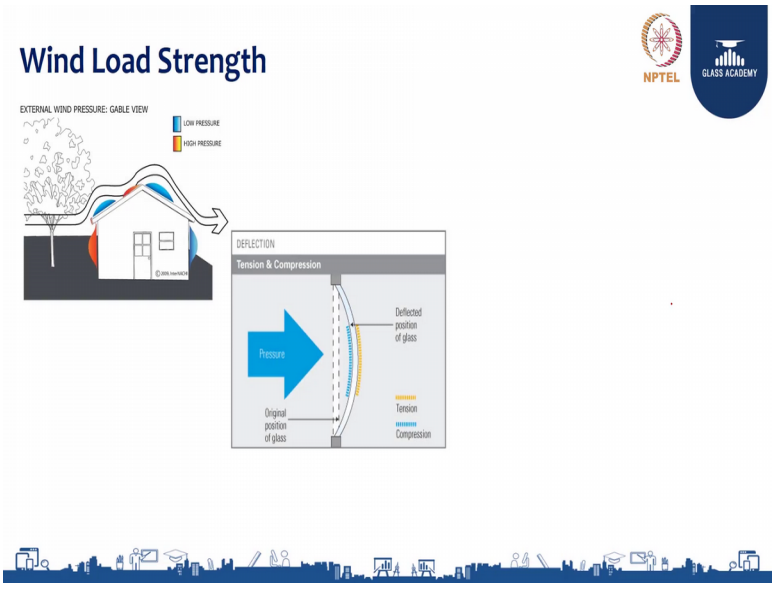

The wind load yes it will deflect the glass would deflect. So, this will mechanically you know sealed. So, this will the deflection can be allowed and it will go to the original positions if you use a double glazed unit.

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Application of inserting unit this like you can see the architecture glass.

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Façade, a Residential application, you see the you know wider view which you can get it from the glass.

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Earlier it is completely mercenaries cement, now you can see what is happening you know around the country through the glass. So, widely used in facade I G U s.

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You can do the you know number of coloring I mean either you can form of ceramic digital painting or laminated, you know PVB can be changed. So, we can have a greater you know color performance on your building you can choose, it through with help of I G U s.

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So, any shape not only rectangular square, it can be done you know any shape of the building you can do it on the double glazed unit.

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So, these are the, you know common applications Skylight.

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It is a most more light would come and pass from top side to inside. So, you need not use any artificial light inside. So, now a days it is very you know famous in India and European country therefore, ahead for using such application for skylight.

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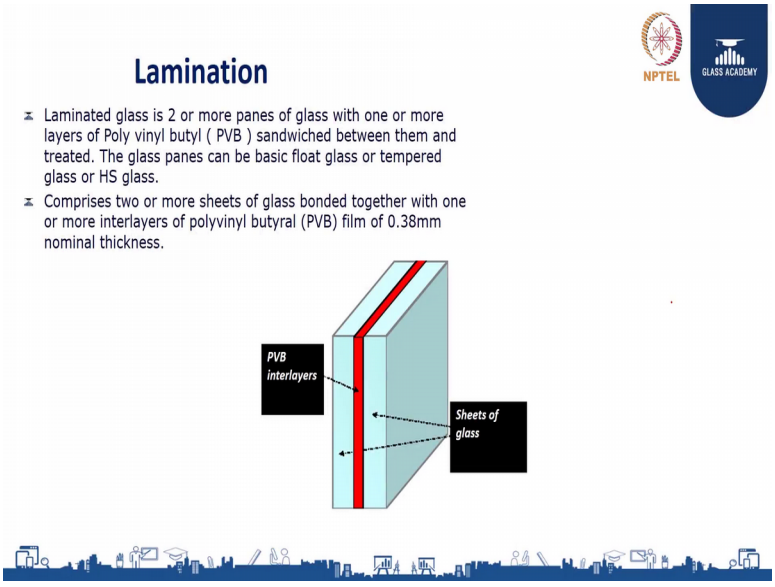

Let us move on to laminated glass. Basically there are 2 layer basically 2 panes of glass fuse more or one or more layer of a poly vinyl butyl sandwiched between them and treated a subject to heat and pressure is applied. The pair can be a basic float glass or tempered glass or annealed glass you can say or heat strengthen glass ok.

So, different type of glasses processed glass can be sandwiched, it is comprises 2 or more sheets of the bonded you know held with help of the polyvinyl butyral interlayer, which is called that is the prime function of interlayer, which is having capacity of holding together of the 2 panes, it is nominally it is 0.38 mm of nominal thicknesses.

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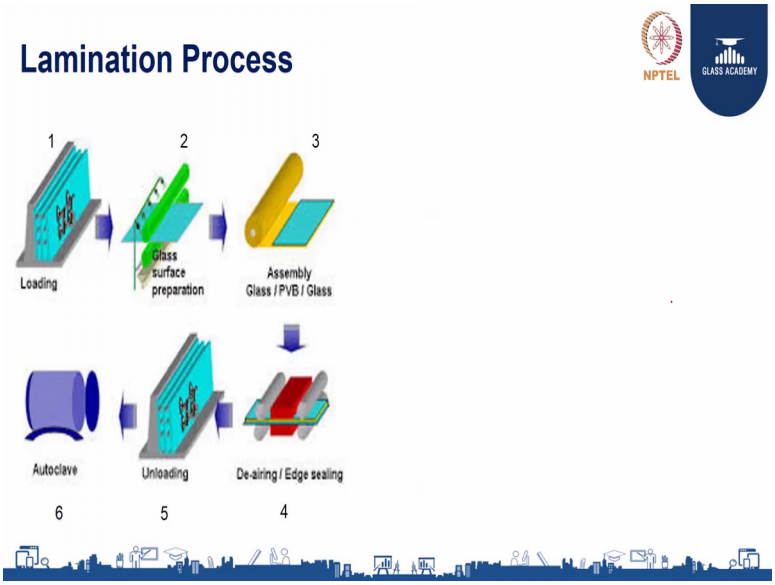

So, this is a lamination process like loading glass surface preparations washing and nip role assembly, where you have a lap roaming you have rollers, crusher chambers and heating heaters where, completely glass and PVB has been kept over there. So, it will be released from the nip role process the air packets will be sealed, which is all the peripheral be sealed and it will be a translucent, in order to get a transparent we will have to keep it into autoclave process. So, thereby we will get a transparent glass.

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So, laminated glass breakages with these are the glass you can see this is the event of breakages it held together it will not fall off. So, it will protect occupant inside even if it in case breakages you have a you know replacement time. So, till the new glass comes so, you need not to panic. So, this will you know help in terms of occupant as well as a processer to not deliver the glass. So, this is fragmentation pattern of laminated glasses.

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Benefits yes, safety and security bullet resistance, loss you can do cyclone, blast resistance, solar control, and UV protection yes the 99 percentage of U V protection you can get it from a laminated glasses. For example, if you use any curtains or you are near the furniture's you will get faded over year if you use normal clear glass. If you use a

laminated glasses thereby you can protect your furnitures near to the glasses. And, noise control which you discuss about having (Refer Time: 16:32) noise control acoustic performance you can get it from the laminated glasses. And safety combined with privacy, which is called a privacy like where you want in a single click you know means electrically operated glass which you have a film inside. So, if you use energy to the glass it will become a opaque to transparent opaque you can play accordingly you can do it from this laminated glasses.

And, decorative purposes yes decorative purpose you can laminate with is any papers silks, photos, lot of things you can do it on the laminated glass, which means that is EVA process ethyl vinyl acetate which is basically interior applications.

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Next, we are going to talk about the printing on glass, basically enamels are mineral paints, which can be printed on glass. Several process like screen printing, a spray painting, roller coater or digital printer. So, these are the process of processor would do for kind of printing on glass.

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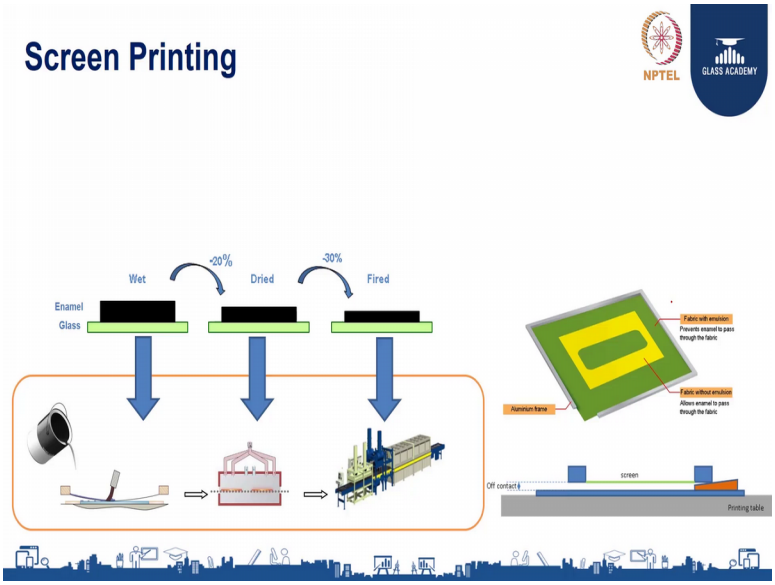

So, what is happening? So, you can see let us discuss first on the screen printing. So, screen printing nothing, but we have a mess like screen will be fabricated with help of aluminium at the periphery, in a tight motion you have to keep it. And you can see here we are applying the paint like a basically it is a ceramic it is a glass flake with the pigment in with the mixing of a proportion according to the thickness what you want. And you can mix and you can pour on the top of the screen and you can you see that the drying process is happening. After, that it will be fired process basically once it fired which is basically tempering process. Once you do that that coating is getting fused on the glass surfaces thereby people cannot remove at the you cannot remove it basically the coating is kept deposited which means fused on the glass.

So, it is a permanent bonding between the class and surface of the coating through which the screen printing is helped you can do any dots, stripes based on the design of your silk strain you can get the patterns.

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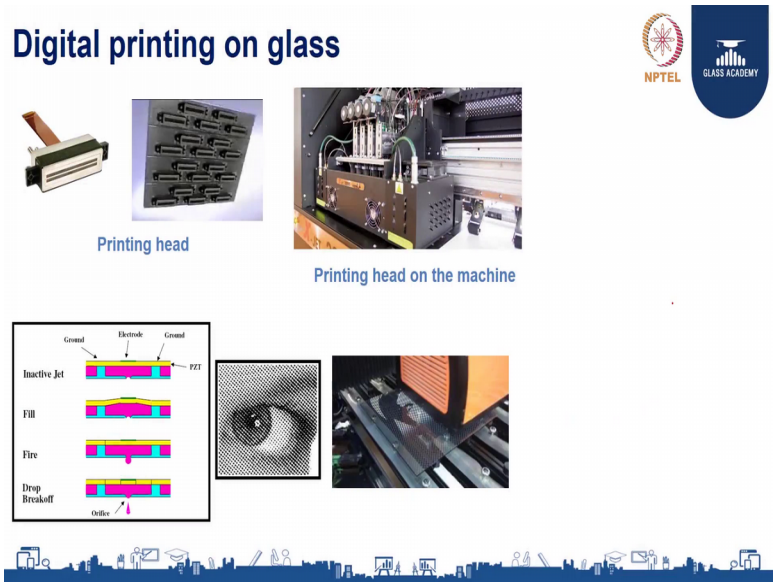

Next is digital printing on glass you can see that printing head on the machines how it is looks like? And, this is the picture know this is a DPI Dots Per Inches. So, you can see this is eye, which you know it is a minute dots which is has been deposited on the surfaces thereby you can get a image of the on the glass surfaces.

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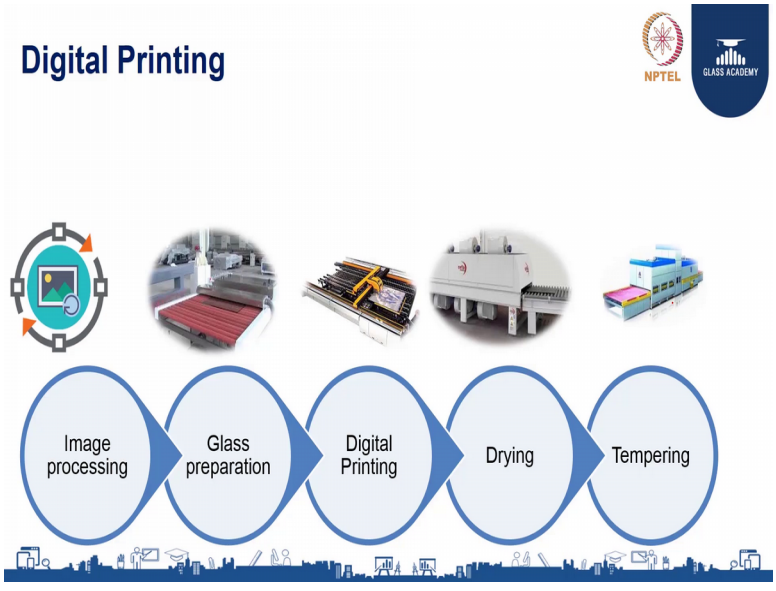

Digital printing process like a first of all image processing basically whatever image you want to print it, you will have to keep it to the computerized system, which will help for printed to analyze, which is you know it will give a image processing how much

percentage of resolutions and as well as how much percentage color has to be given to the headers.

So, these are the image processing will be taken care by the software of the computer. And, glass preparations most important you should be away from the dust another fingerprints other (Refer Time: 19:46) I mean, surface be very free from that basically for printing, otherwise printing would not possible you to do effective printing. Digital printing may head as which is passing and drying once you have done it and it will keep on drying process after that you can do a tempering.

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So, these are the applications.

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You can get it done through digital printing.

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Next let us talk about frosting. Frosting is 2 types; one is sand frosting and acid frosting sand frosting is nothing, but you can see the machine which is vertical machines where you can load the class. And, this machine has a header, which will has a lot of orifice nozzle, where the sand some sand is getting you know pump to through this orifice where thereby you can get a surface roughness through this.

So, wherever you want to eliminate the roughness you can you can polyvinyl film you can apply the surfaces. So, that when it passes through the when you doing application

over there. So, those areas will be protected with the help of polyvinyl. So, thereby you can get a enormous design.

Whatever design you want to do it you can achieve through this masking effect with help of a polyvinyl. And, next we will move on to acid frosted appearance may be given to the glass by covering it mixture of magnesium sulphates. So, this is a acid. So, basically which is step over on the table I mean on the glass surfaces, when it solution dries the magnesium sulphate crystallize into the glasses, you can get the frosting affect. Basically sand frosting have a surface is very rough whereas acid frosting would not have a rough, but you can see there the finishes would be the identical, you can see the application below the pictures are shows acid frosting as well as sand frosting.

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