Glass Processing Technology
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Lecture – 20
Pre-Processing Glass – Drilling

Hello everyone. Gurpreet Singh, Saint Gobain Glass India; I am the technical manager west; I am taking care of the west regions. So, today I am going to cover the few topics. I am showed that my colleagues have been covered the pre-processing. And I am also is the taking care of the few parts like pre-processing glass. In the pre-processing, I will be cover drilling, which is very very important, which is very very important in the pre-processing while making the glasses. It is also a very mandatory to do the processing in very systematic and standard operating procedures.

So, I will be cover today pre-processing. The topic will be drilling. Drilling is the very important in the glass industries. You see in the many glasses you be seen, when you going at the shops, and you be see the doors. In the doors there are some handles are there that alls are fixed with the help of holes. But, how we are doing the drilling, it is also important. We will cover in this topic.

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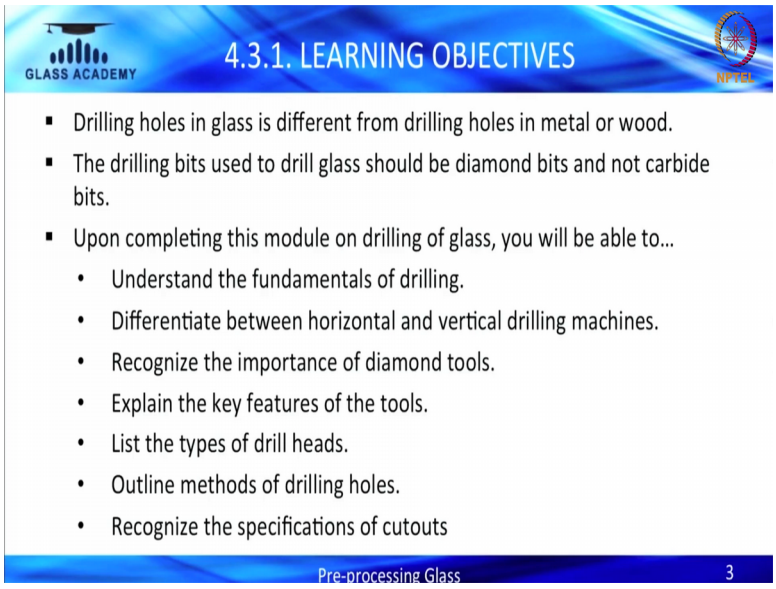

So, let us start from the drilling. Drilling is also same as it is like, you have seen in somewhere like in the your home, and in your furniture. If you seen in the furnitures and

in the various, you know that in the shops and the drillings are there, but in the glass it is the different from the drillings. Drilling bit is used to drill glass should be diamond bits and not carbide bits.

Obviously, what happened when you using in the processing the drill bit should be diamond, because why it is diamond, because if you use the diamond, the life of the wheel will be longer as compare to the other metals like carbide bits, and although already we have explain.

So, what do we are completing in this module on drilling of glass, you will be understand in my end of the all the presentation, you will I will cover understand the fundamentals of drilling. Differentiate between the horizontal and vertical drilling machines. Recognize of the importance of diamond tools explain the key feature of the tools. List the type of drill heads. Outline method of drilling holes. A recognize a specification of a cutouts. This topics will cover, and you will end of the day, you will learn about what is drilling. And you will be get more experience from this slides.

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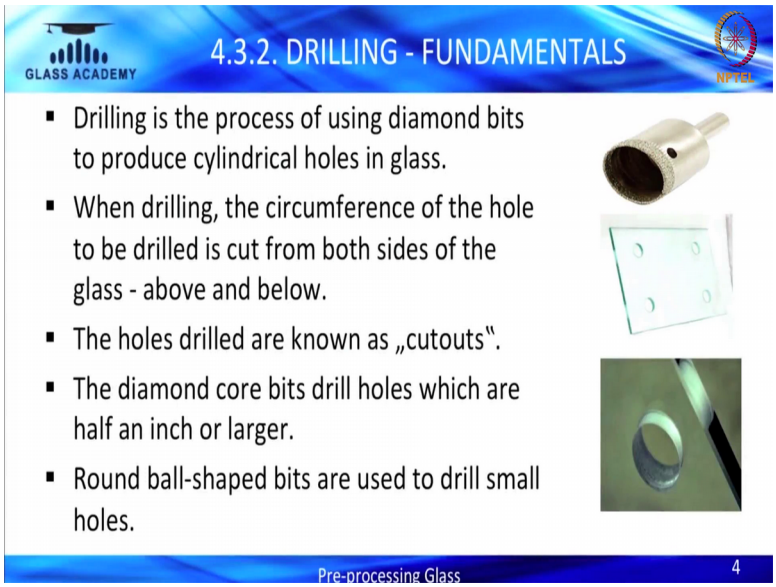

Let us start from the drilling-fundamentals. So, what is actually, if you see in the right side, there is a one picture, which is show you the drill coated on the inch or half inch of the, this cylindrical drill bits. When drilling, the circumference of the hole is to be from the both side. When you have gone to the processing line, if you see the while, who is doing the drilling, it is always should be from top side and bottom side. We also known

as the hole has a cutouts, yes. The diamond core bits, round ball-shaped its bits are used to drill small holes.

And obviously there are there various diamond tools are available in the market. According to the requirement, you can purchase the wheels and do the drilling as per your requirement. So, identification of the wheel is very important. And all the drill bit should be on your floor, so that you can put in your head. So, the important part is when you doing the drilling or any processing, the safety the safety is also very important. So, while doing safety issue is also very important, because it all are mandatory, when you entering in the pre-processing.

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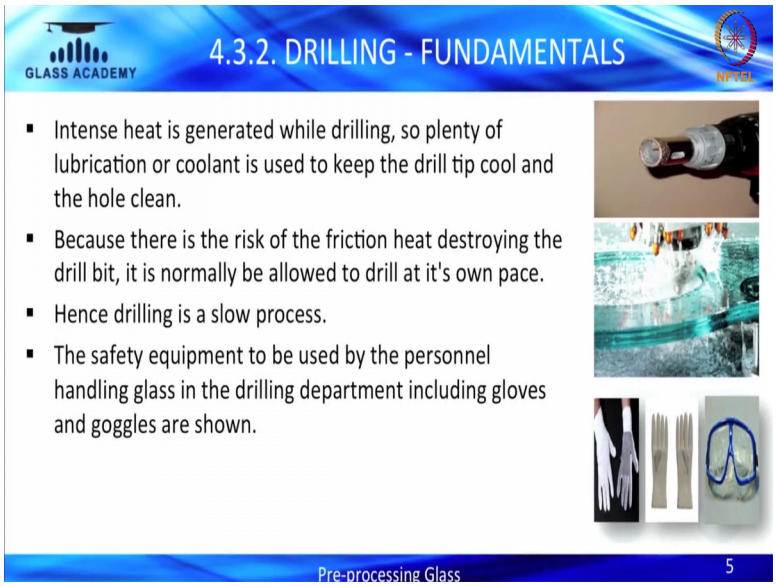

So, what I have explain in this trial, if you see the heat any metal to metal, if you are just rubbing and just doing the drilling, plenty of the heat will be get generate. So, what you will do, you will either use the coolant or other any liquid coolant you will use. But in this case, you will use the lubrication as the water, only water is here to use for the lubrication, because what happens, if we not use the proper lubrication, this will destroy this will destroy your drill bit. And it will be damage your glass, which you are going to drill.

The safety equipment, which has already explain in my previous slide, and I am still I am forcing you to whenever we are doing this kind of the process, you should always wear the gloves, goggles, which is very very important.

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So, next so this is very important, what I am showing you right now here, avoid the mismatch and chipping problem while making the holes. If we see the two images, first images there are the offset offsets are there. So, what is the problem, when you making the holes. This kind of offset, when you send the glasses to the site, and the fabricator people will not able to put some there fitting inside, it will be get rejected. You should take care while making the holes in the glass.

So, second picture, it is there. You see, it is the chipping around across the across the holes. So, these chipping is also a very it is not good as it is, because when you making this kind of holes, and when you sending to the your furnace, it will be get chance to glass will be get break inside the furnace, so that, when it we get the franchise, again it will be create the problem and your furnace will be get break down. So, it is so much important while making the holes in the glass.

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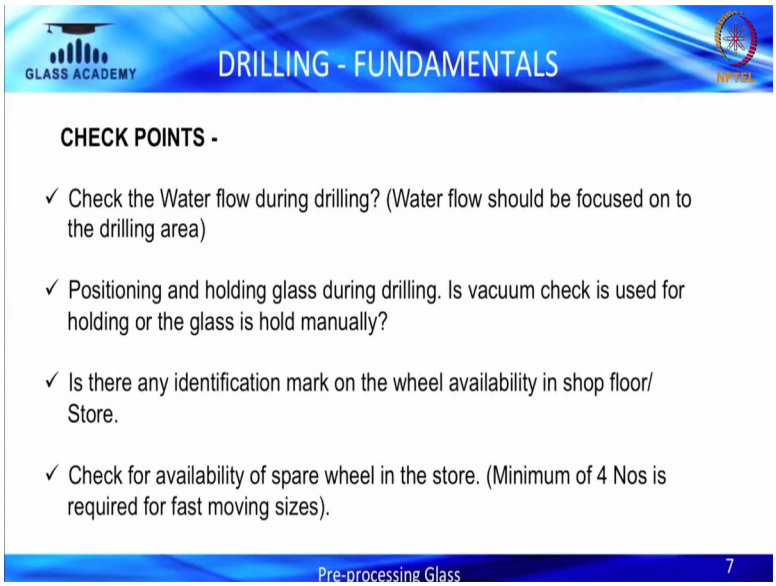

So, the next slide is what is important, when you making the drills in the holes. So, check list are there. So, you should check the water flow. So, if water will not flow properly, it mean that it will not be focus on the drill bit and as well as on the glass. So, heat will generate. So, it is very important, who is operator, who has to check. Whether of the water flow quantity or flow it is there or not.

Position of the hold glass during drilling in is vacuum check is used for the holding glass is manually. Obviously, in some of the cases, what we have observe, the peoples those are using the vacuum check, having a not proper using the cruising. So, what happen, when there holding the glass with the vacuum check, it is not properly get fixed on the table. It will be move here and there. So, again it is creating the problem. So, this is also is important when you making the holes and all these things this, this check list is very important.

So, another point is, is there any identification mark on the wheel availability on shop floor. Obviously, what happen, when you making any there are numbers of a hole bits are there in your floors. So, if you not putting any identification mark, so may be the chances that you will be select, whatever the require or you will may be this time, you can select another tool, and you can drill. Again it will be create the problem, while making the hole.

Check for availability of spare wheel in the store, because it is a consumable item. You should keep every minimum at least 4 numbers of the glass. 4 numbers of the fast moving this wheels in your stores that whenever it is require, you can easily take it from your store, and can put it.

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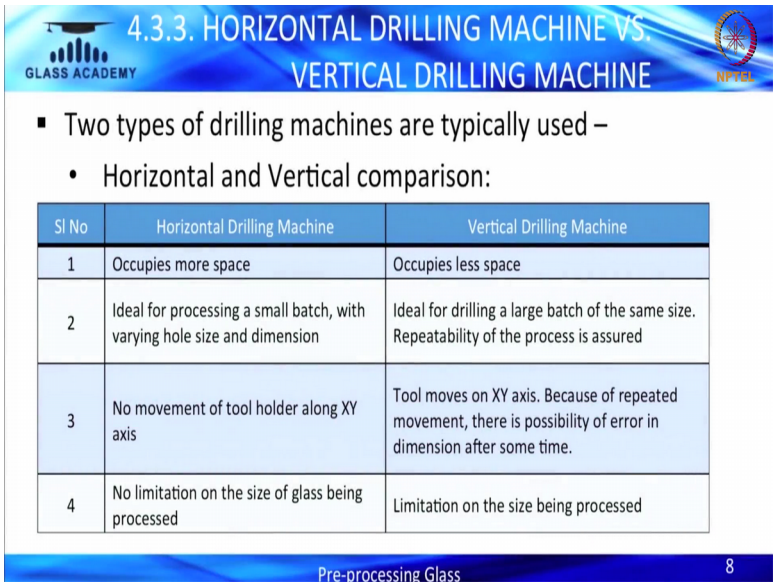

Sl No	Horizontal Drilling Machine	Vertical Drilling Machine
1	Occupies more space	Occupies less space
2	Ideal for processing a small batch, with varying hole size and dimension	Ideal for drilling a large batch of the same size. Repeatability of the process is assured
3	No movement of tool holder along XY axis	Tool moves on XY axis. Because of repeated movement, there is possibility of error in dimension after some time.
4	No limitation on the size of glass being processed	Limitation on the size being processed

So, what happen, what we have discussed already about the safety? We have discussed about the holes. We have discussed about the, how many holes, what kind of the issue, we are facing. So, let us discuss on the drilling machines. So, there are two kind of drilling machines are there. One is a horizontal, and vertical.

This depend upon the process of the processor, those having the horizontal and vertical machine both horizontal, vertical machine having there both advantages. Like horizontal machine is occupy more space. Obviously, the horizontal position, it will be take more space. And for the vertical occupies less space, because it is vertical, you can put in somewhere in your, where you have a space, you can easily put and you can make it out.

Ideal for processing and for horizontal drilling machine; Ideal for processing a small batch, with the varying hole size and dimensions and for vertical ideal for drilling a large batch for the same size. Repeatedly for the pre-process is assured. So, what happen, when you have a small batch, so you can easily make the holes in the horizontal machines but, when you have a large batch, and repeated the process, you can make sure, it should be done it a vertical drilling machine.

In the horizontal machine one disadvantage is no movement of tool holder along xy axis. So, what happened, when you put the glass in the horizontal position, it you cannot move in the x axis and y axis directions, but that benefit you will get in the vertical machine. Tool moves on xy axis, because of the repeated movement, and there is a possibility of error dimension after some time, because obviously if there will be a repeated glasses will be then, then might be chances that the dimension error will become accrue in the vertical drilling machine.

So, in the horizontal machine having their own advantage, as I always I told you, no limitation on the size of glass being processed. So, you can in the horizontal machine. You can process, any size of the glass, and can move the glass in any direction is very easily. But, in the vertical there are some limitation sizes and there are limitations glasses should only process. So, these are the difference between horizontal and the vertical drilling machines.

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Figure 53

So, my next slide will be upc. This are the horizontal machines, horizontal drilling machine. And this are the vertical drilling machines. So, as I told you, it is depend upon the processor those having its facility though both have, their own advantages the comparison, I already shown to you.

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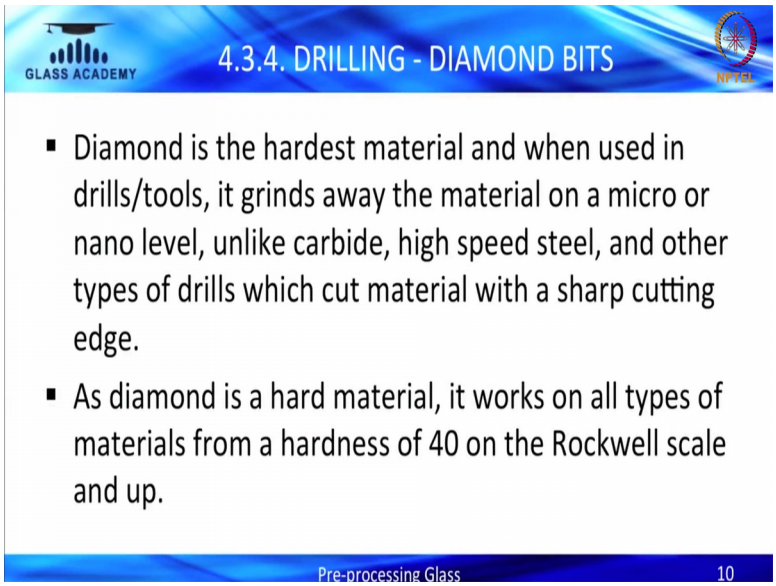

So, let us go to the next slides. So, let us talk, now we have discuss on that drilling machines. We have discuss on the safety. We have discuss on the everything about the drilling. Let us discuss on the diamond bits. Diamond bit is the tools, which is major, which is the heart of the drilling machines. The diamond is the hardest material, you as you know very well that is the hardest material as compare to other any other metals.

When use in (Refer Time: 10:41), it grinds away the material in a micro, nano level mean, then whatever the when you going for the drilling, it will be easily remove all the chippings, and all the your small small edges, which are not proper drill. It will be easily get removed by the diamond drill bit, and high speed steel another. So, as diamond is a hard materials look work on all types of materials from hardness. The hardness of this diamond is 40 on the Rockwell scale and up. It is mean the, it is the hardest of the drill bit it is more than 40 on the Rockwell scale. So, let us go to the next slide.

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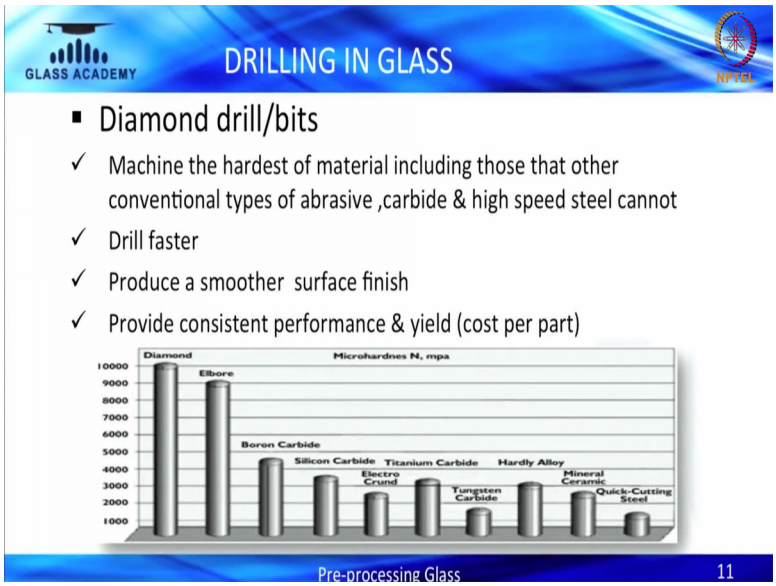

So, there are the diamond bit, drill bits. If you see the machine is the hardest of the material, which I already explain you that, the types of abrasive, carbide, and high speed steel cannot. The benefit of the diamond drill bit it is a drill faster. Produce a smoother and surface finish. Provide consistent performance and yield cost per unit. If you see in the this graph, I have shown you, this diamond is harder than other any material. Let us boron carbide, then silicon carbide, electro, titanium carbide, tungsten carbide, all are the as compare to all are the metals this diamond is a hardest material.

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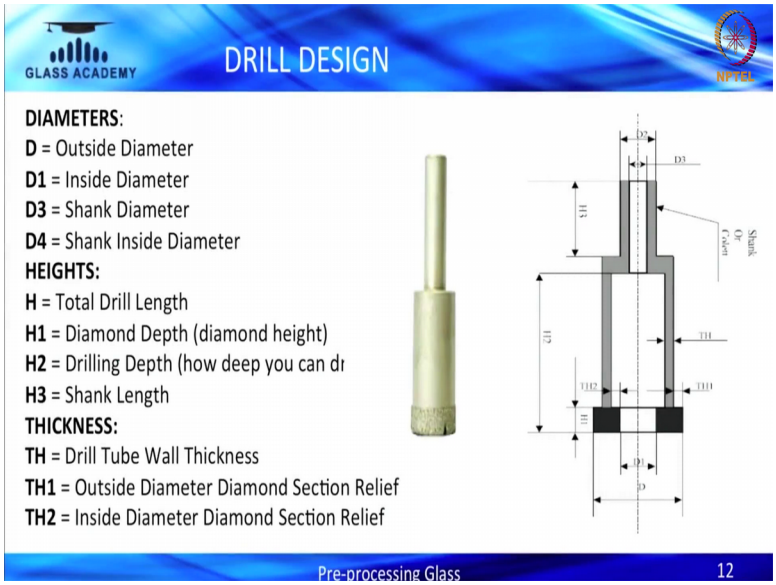

So, let us talk about the drill design. So, what is a drill design, if you see in the right side, in this is a actual picture of your drill bit. And this is the drawing. Drawing it is mentioned, what is the actual dimensions of the drill bit. So, if you see the diameter outside D is equal to outside diameter, so which is it this, which I show this arrow this arrow. If you see, this is a D, and this is actually it is, it is here from here it is D. So, D1 is inside diameter, like here it is a D1 inside diameter sorry [FL] D1 is inside diameter. And the D3 is a shank diameter.

So, these heights, H is equal to total drill length. If you see in the right side, though height, height is given. Diamond depth it is given. Drilling depth, how deep you can drill. H3 shank length it is given. Thickness drill tube wall thickness, outside diameter diamond section relief, inside diameter diamond section relief. All the parameters has been covered in this slide, it is given in drawing. And as well as this is the actual case, so that we you can easily identify, what you actual this drill bit, what is the diameter of what these two, what we have telling to the actually into shank diameter, what is actual shank diameter, you can see in the right side of this picture, where arrow it is.

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