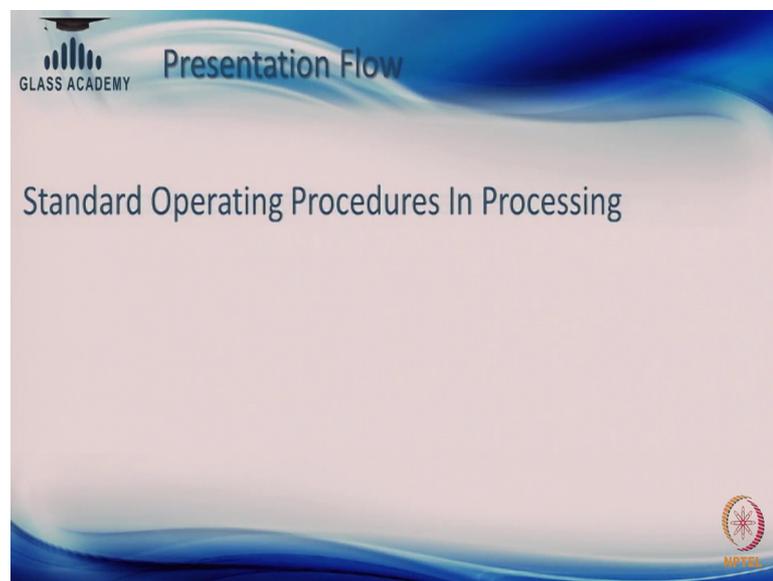


Glass Processing Technology
Mr. Anupam Sharma
Department of Civil Engineering
Indian Institute of Technology, Madras

Lecture - 22
Grinding and Fabrication

I am working here as a application engineer. So, my topic on Grinding and Fabrication; presentation flow.

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Standard operating procedure in processing.

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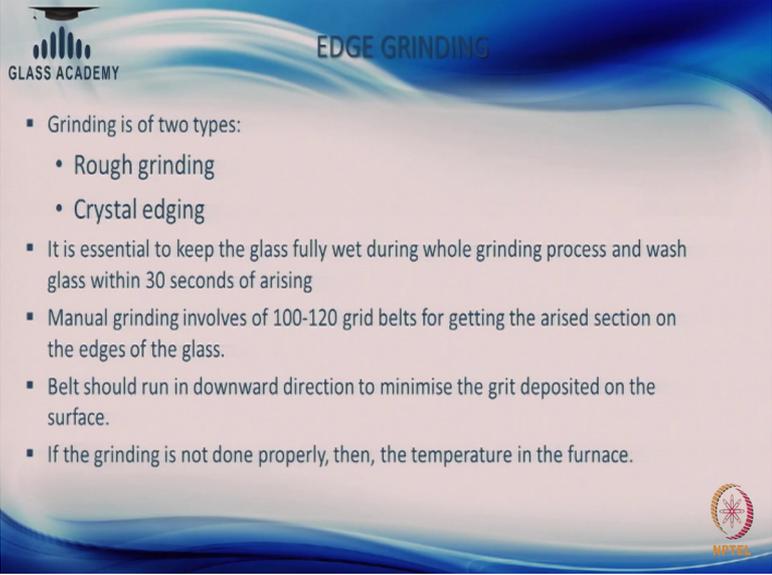
Presentation flow, operations in glass industries unloading, material handling and storage, cutting, grinding and polishing, washing, tempering, lamination, double glazing, packing, transportation, storage at project site, installation and cleaning.

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Safety tools and equipment, few are the safety tools photograph I have mentioned here. First one helmet, safety gloves, safety goggles, safety shoes and apron these are the safety tools edge grinding.

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GLASS ACADEMY **EDGE GRINDING**

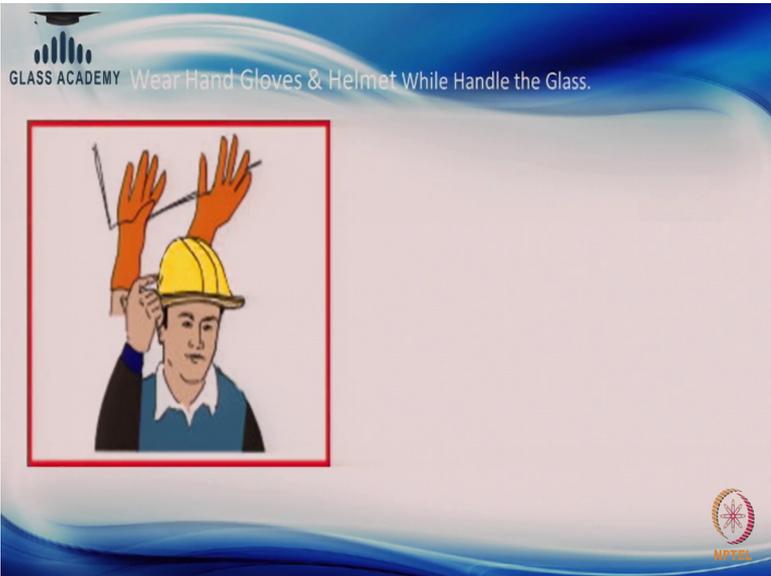
- Grinding is of two types:
 - Rough grinding
 - Crystal edging
- It is essential to keep the glass fully wet during whole grinding process and wash glass within 30 seconds of arising
- Manual grinding involves of 100-120 grid belts for getting the arised section on the edges of the glass.
- Belt should run in downward direction to minimise the grit deposited on the surface.
- If the grinding is not done properly, then, the temperature in the furnace.

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Grinding is of two types 1st is of rough grinding 2nd is crystal edging. It is essential to keep the glass fully wet during whole grinding process and wash glass within 30 second of arising.

Manual grinding involves of 100 to 120 of grid belts for getting the arrised section on the edges of the glass. Belt should run in downward direction to minimise the grit deposited on the surface. If the grinding is not done properly then the temperature in the furnace should increase.

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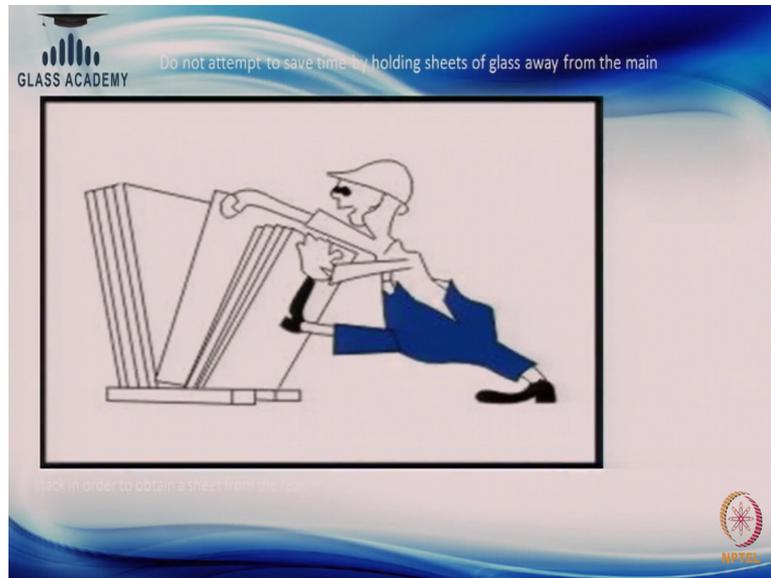
GLASS ACADEMY **Wear Hand Gloves & Helmet While Handle the Glass.**



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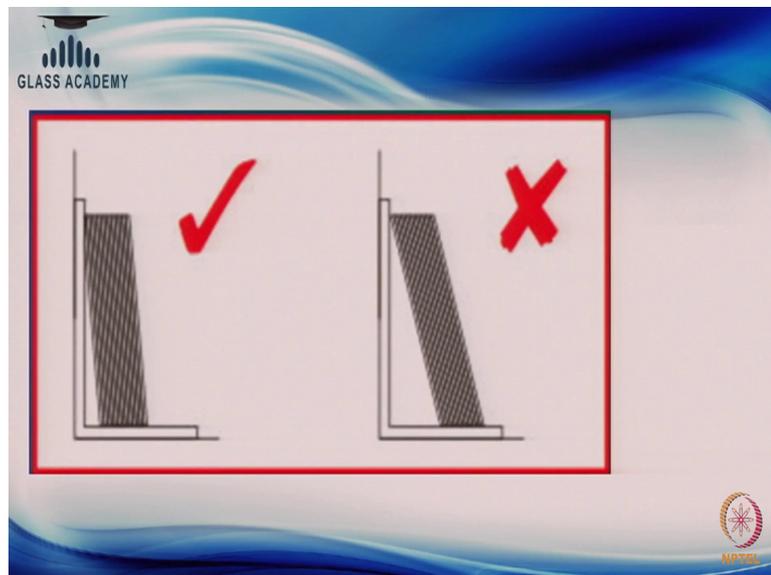
Wear hand gloves and helmet while handle the glass.

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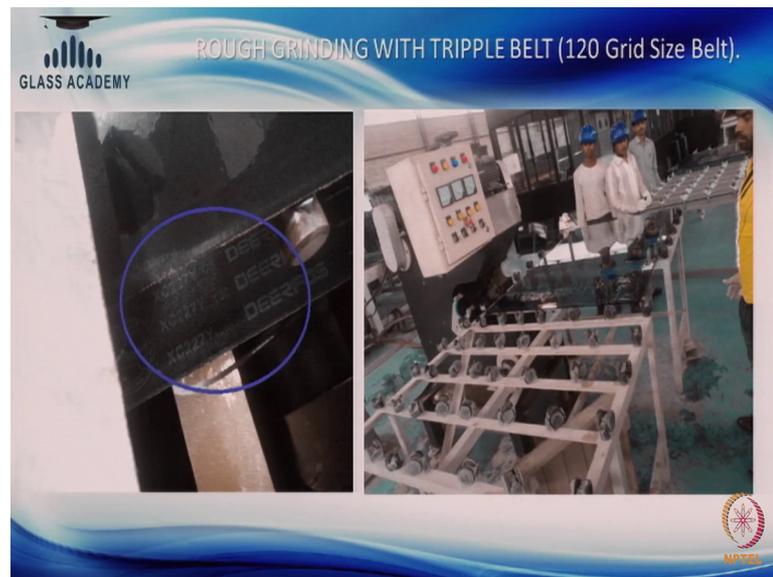
Do not attempt to save time by holding sheet of glass away from the main.

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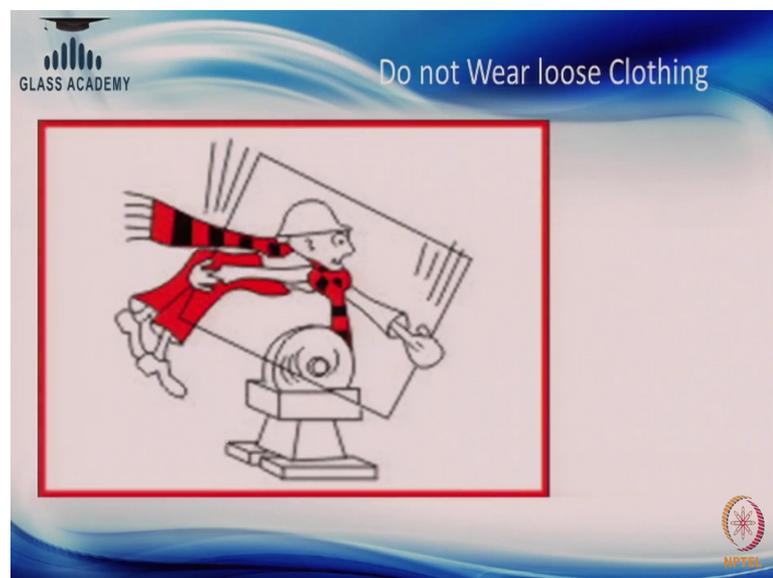
First one is the right method to store the glass, right 6 to sorry 3 to 7 degree angle.

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Rough grinding with triple belt 100 to 120 grid size belt.

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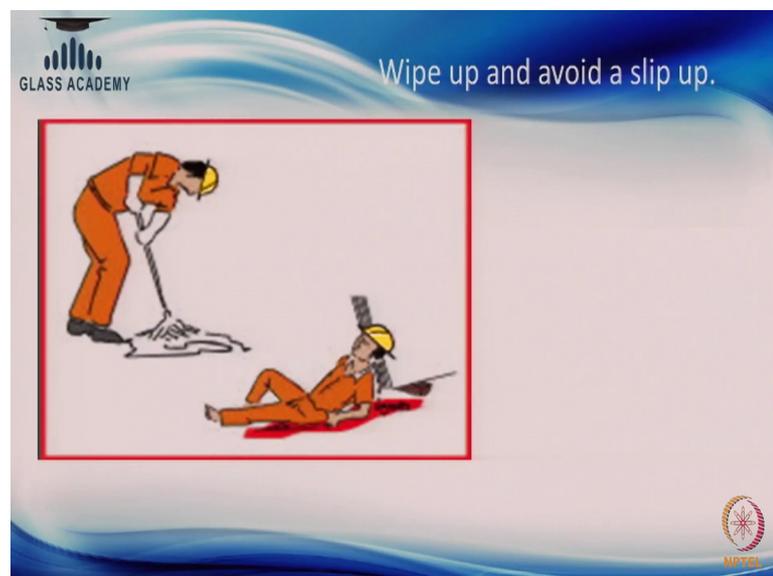
Do not wear loose clothing while you grind the glass to avoid the accident.

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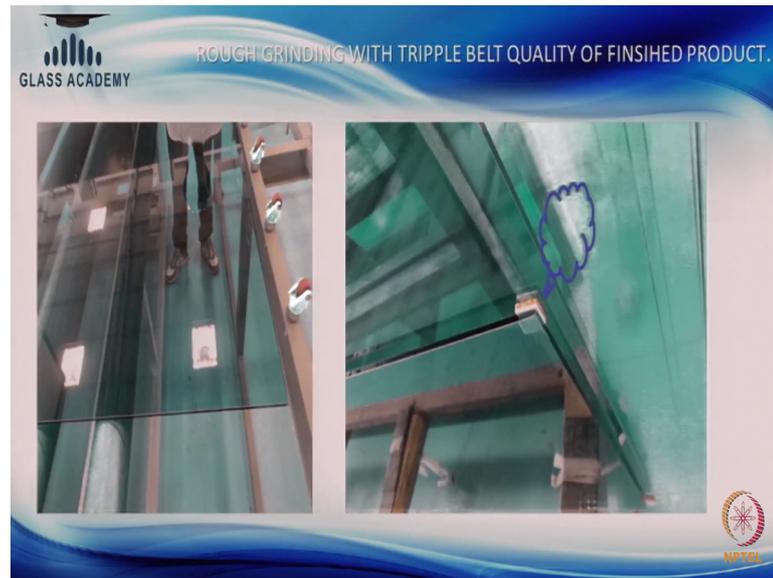
Rough grinding with triple belt in photograph mentioned.

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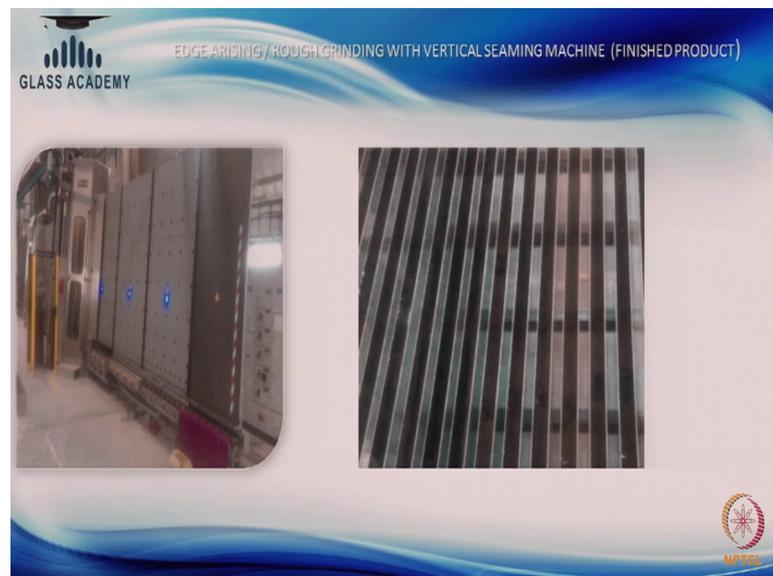
Wipe up and avoid a slip up while you do the grinding process if there is access water on the soft floor we have to clean or wipe up that to avoid the accident.

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Rough grinding with triple belt quality of the finished products.

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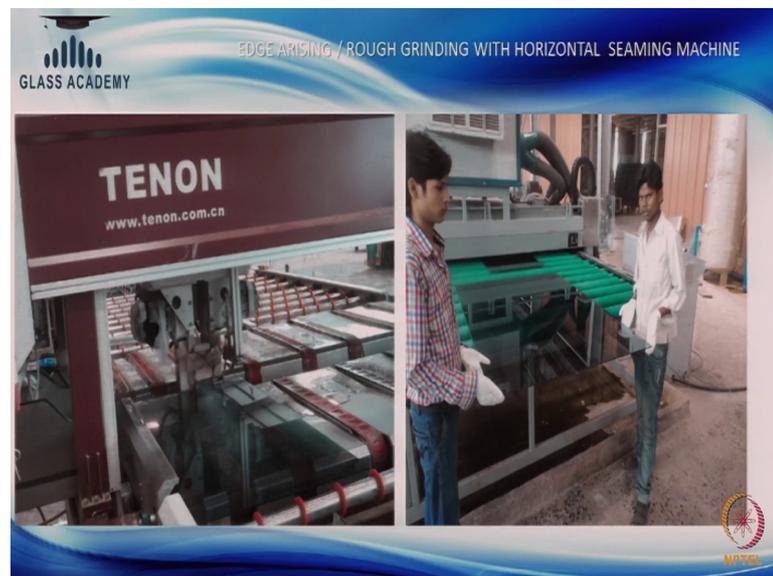
As arising or rough grinding with vertical seaming machine finished product. In first photograph there is a line of the vertical seaming in that we have to do grind with the fine belt like 140 to 160 grid size and photograph mention the photo finished product quality.

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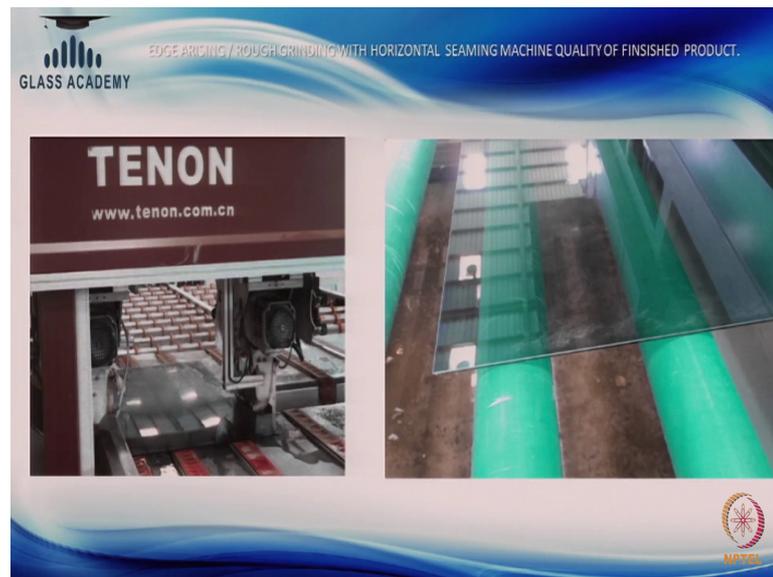


As arising or rough grinding with horizontal seaming machine.

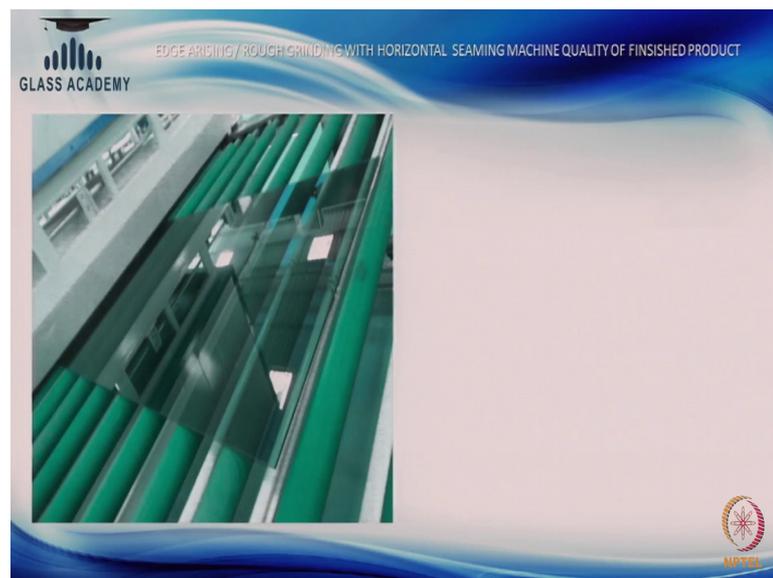
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(Refer Slide Time: 04:05)



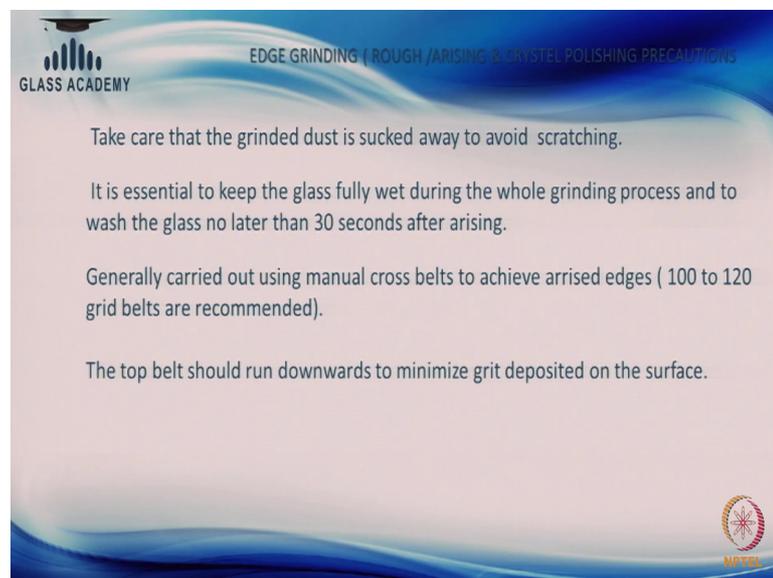
As arising or rough grinding with horizontal seaming machine, quality of the finished product.

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Double edger or crystal polish grinding, quality of the finished product first photograph mention the double edger and the second one is the finished product crystal polished product quality.

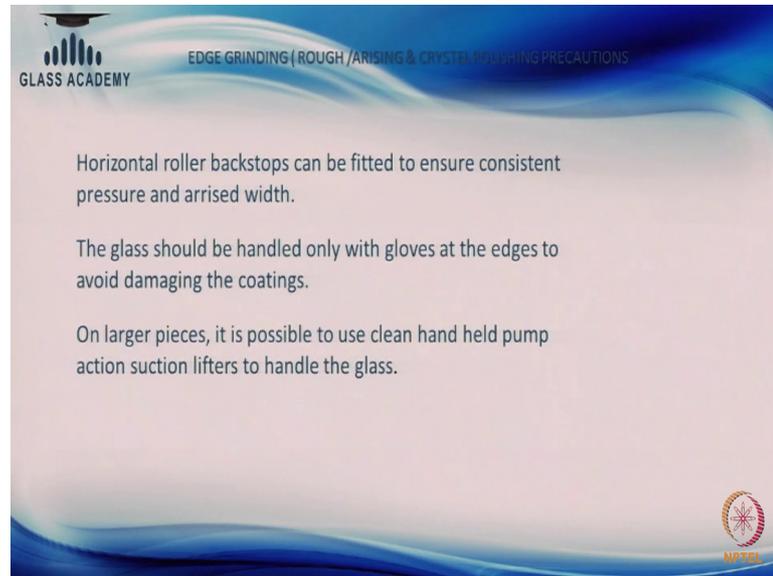
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As grinding rough arising and crystal polishing precautions, take care that the grinding dust is sucked away to avoid the scratches. It is essential to keep the glass fully wet during the whole grinding process and to do wash the glass no later than 30 seconds after arising.

Generally carried out using manual cross belts to achieve arise edges 100 to 120 grid belts are recommended. The top belt should run downward to minimise grid deposited on the surface.

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GLASS ACADEMY

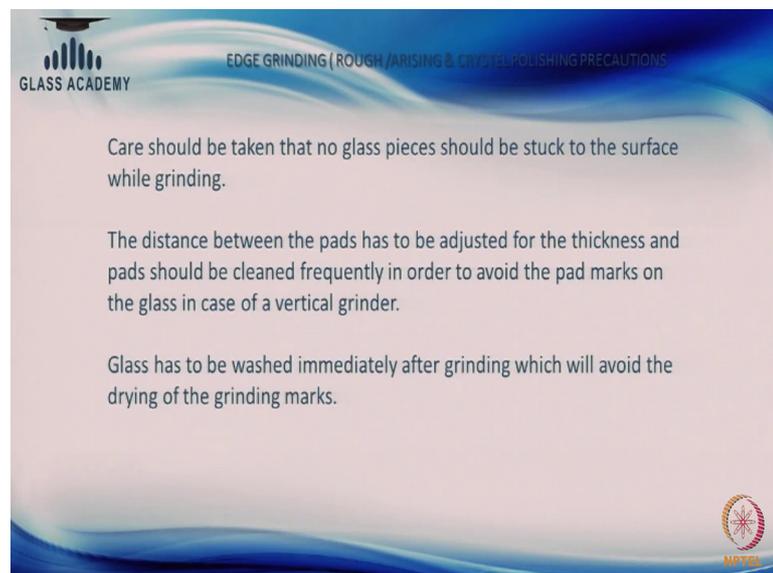
EDGE GRINDING (ROUGH / ARISING & CRYSTAL POLISHING PRECAUTIONS)

- Horizontal roller backstops can be fitted to ensure consistent pressure and arised width.
- The glass should be handled only with gloves at the edges to avoid damaging the coatings.
- On larger pieces, it is possible to use clean hand held pump action suction lifters to handle the glass.

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As grinding rougher arising and crystal polishing precautions horizontal roller backstops can be fitted to ensure consist pressure and arise width. The glass should be handled only with the glass at the edges to avoid damages the coating. On larger pieces, it is possible to use clean hand held pump action suction lifters to handle the glass.

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GLASS ACADEMY

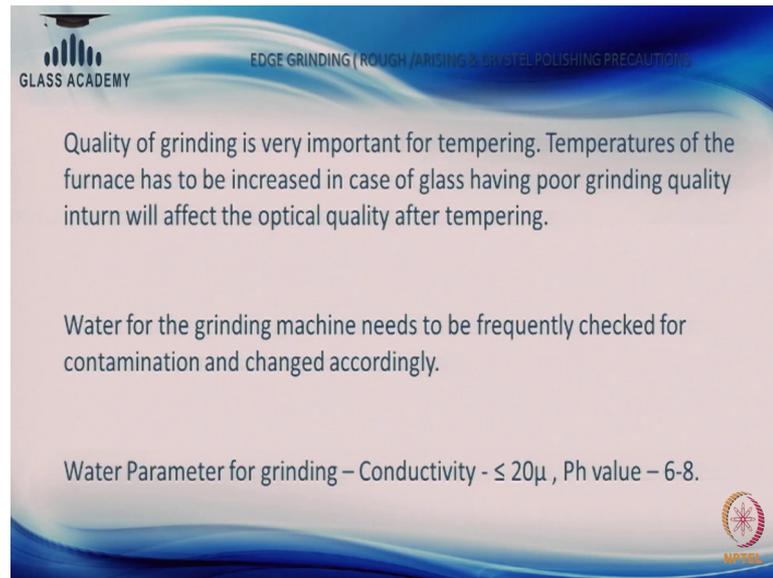
EDGE GRINDING (ROUGH / ARISING & CRYSTAL POLISHING PRECAUTIONS)

- Care should be taken that no glass pieces should be stuck to the surface while grinding.
- The distance between the pads has to be adjusted for the thickness and pads should be cleaned frequently in order to avoid the pad marks on the glass in case of a vertical grinder.
- Glass has to be washed immediately after grinding which will avoid the drying of the grinding marks.

NPTEL

Care should be taken that no glass pieces should be stuck to the surface while grinding. The distance between pads has to be adjusted for the thickness and pad should be cleaned frequently in order to avoid the pad marks on the glass in case of a vertical grinder. Glass has to be washed immediately after grinding which will avoid the drying of the grinding marks.

(Refer Slide Time: 06:11)



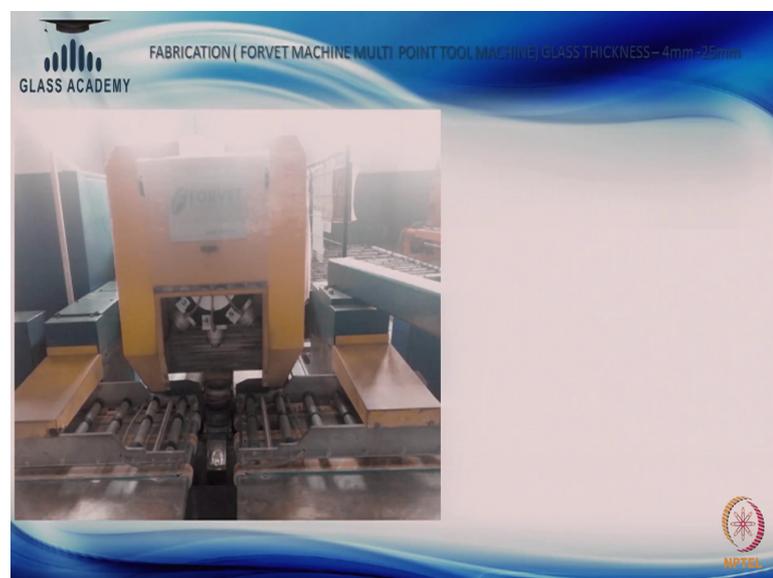
Quality of grinding is very important for tempering, temperature of the furnace has to be increased in case of glass having poor grinding quality in turn will affect the optical quality after tempering. Water for the grinding machine need to be frequently checked for the contamination and change accordingly. Water parameter for grinding, conductivity less than or equal to 20 microsiemens pH value 6 to 8.

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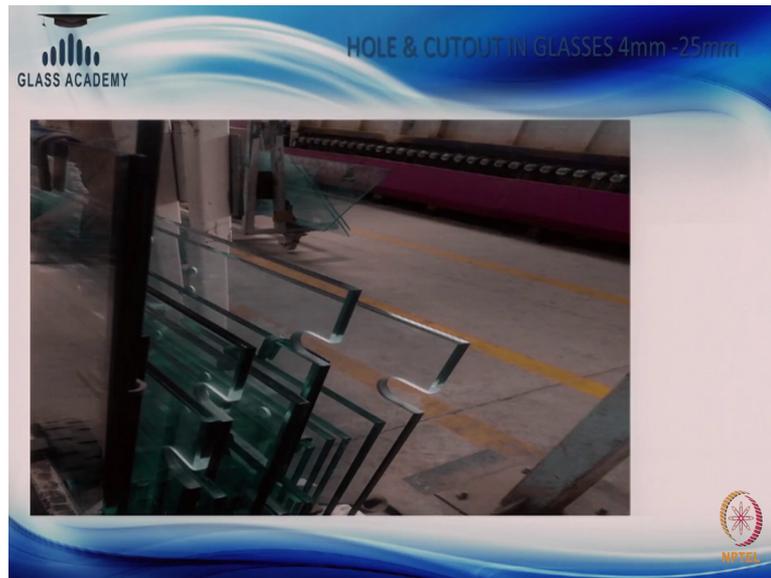
Fabrication; forvet machine glass thickness 4 mm to 25 mm automatic control with fully CNC.

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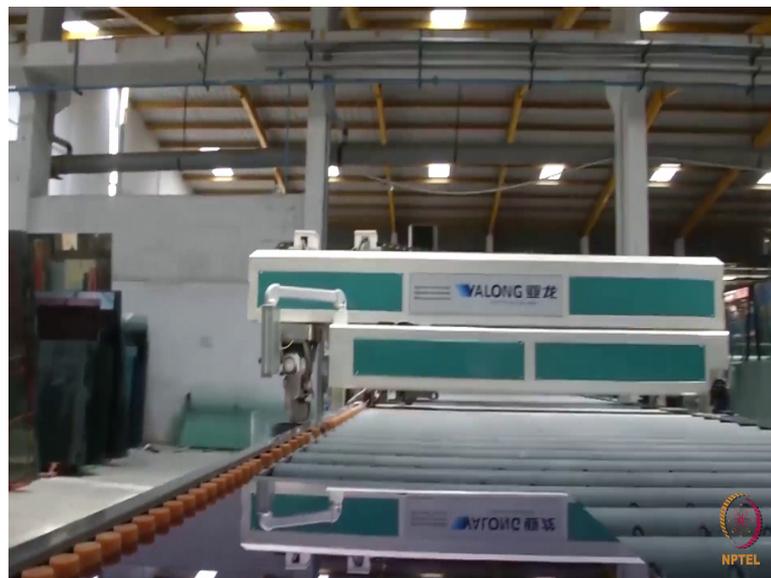
Fabrication forvet machine, multipoint tool machine glass thickness 4 mm to 25 mm.

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Hole and cut out in glasses 4 mm to 25 mm glass thickness, few are the mention photograph in which the cut out and hole done on the glass surface with the help of the forvet machine. And the finished product qualities better as compared to the manual hole cut out machine, hole and cut out in glasses 4 mm to 25 mm.

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As you say edges are sharp (Refer Time: 07:44). Now, we are going to see the seaming edges in cutting if you say once the glasses cutting over you can find the edges are sharp. So, we need to grind the edges of the glass. We can do grind edge grinding in two ways,

one is with the help of double edger and second one is with the help of seaming machine. When your edges are exposed you will be going for a double edger, you rotate that. I will show you this while speaking rotate show there once then you come back. When the edges are exposed we will be going for a double edger machine where the edges glass edges will be having polishing and the edges are exposed. whereas, in other cases the glasses will be going inside the frame or covered in that cases we will be doing with seaming machine.

So, through seaming machine we are just arising the sharpness on the glass and it is used for a covered edges. Seaming machine where we are feeding the glass inside conveyor.

(Refer Slide Time: 09:07)



The settings will be done and the head wheel cells as per the glass size with the spindle the glass will rotate all the four edges.

Now, the grinding is over next it is going to the washing section wait, wait. Next it is going to the washing section; come here. Now you see the screw seaming edge screw seaming machine all the four sides have been grinded and washing has been done. Now it is going to unloading table, before this is the auto unloader where the glass will be automatically unloaded. Now through the section cups the glass is getting placed on the trolley complete. It is having two heads; it is having two heads that is known as spindle. Two spindles will be moving and it will be grinding all the edges.

Now, the glass have been loaded, now it is going inside the seaming furnace, now the size will be sends and with the help of spindle it will be grinded, you can see. Now it is going from washing. One more glass, now it is going into washing.

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(Refer Slide Time: 15:05)



The glass is coming out from washing. We need to make sure that the water quality is also maintained in terms of pH 6 to 8 TDS 0 to 20 milligram per litre and conductivity is 0 to 20 micro seamen for centimeter stop. If you see the edges, the edges are just arrived and if you do not have polish on this edge compared to double edger where we are going

to get a polished on the edge surface. So, we are just arising the edges and removing the sharpness on the glass and this will this seamen edges are applicable for closed edges and when the edges are going inside the frame. So, see this you take this from this side.

So, just we are removing the sharpness and we are doing arising this edge finishing is applicable for covered edges and when the edges are going inside the frame. From this angle, all these are seamed edges where the edge grinding has been gone through seaming machine where arising the sharpness and giving and we are giving arrised to the edge arrised to the glass.

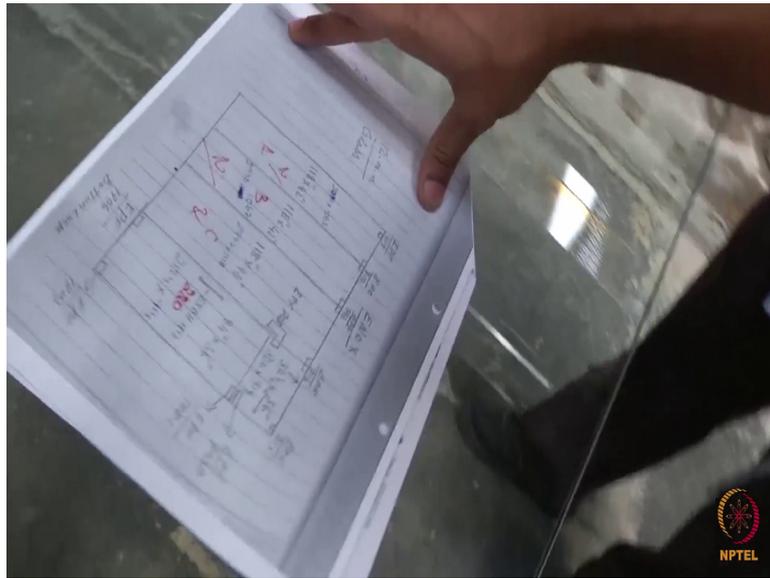
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So, this is our fabrication area where we will be doing glass holes and cut outs with the help of this drilling machine. Now you can see now they are drilling making a hole on to the glass; in the mean time you see here. Now they are mark they are doing marking on the glass, they have made a template that is known as Mickey Mouse cut out.

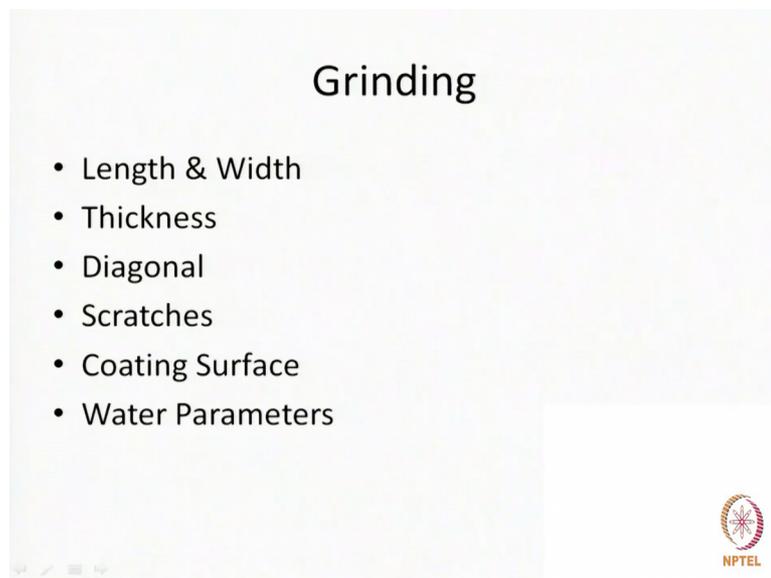
Now, they are going to cut this particular area. The in this particular section they are going to do marking as per the drawing, this is the drawing.

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So, now, they are going to do this A glass, this glass is having two cutouts one and two; as per the drawing two cuts one and two no hole ok.

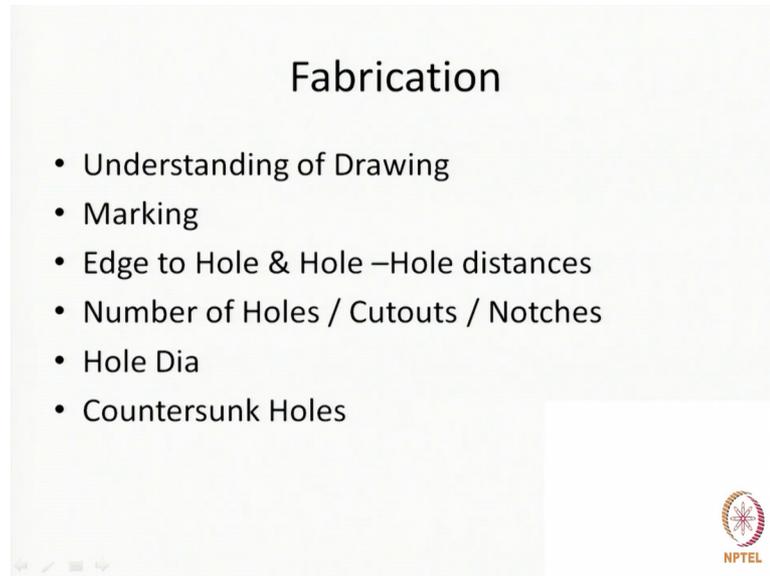
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In section, in the similar way the test that we go for grinding are similar to cutting. That is we are going to check the length and width with the help of measuring tape. Next we will be checking the overall thickness of the glass, diagonally also will be checking we will be checking for scratches, coating surface also we should be checking and coating should be always on the top side and along with the above parameters. We will be also

checking water parameters. So, that we are ensuring that there is a no reaction between the glass and the water by maintaining the pH temperature, pH tedious and conductivity values also the temperature of the water.

(Refer Slide Time: 19:31)



The slide is titled "Fabrication" and contains a bulleted list of topics. The list includes: Understanding of Drawing, Marking, Edge to Hole & Hole –Hole distances, Number of Holes / Cutouts / Notches, Hole Dia, and Countersunk Holes. The NPTEL logo is located in the bottom right corner of the slide.

- Understanding of Drawing
- Marking
- Edge to Hole & Hole –Hole distances
- Number of Holes / Cutouts / Notches
- Hole Dia
- Countersunk Holes

Next let us see what are the test we do for fabrication in fabrication. We need to first understand the drawing, what is the customer requirement; next, according to drawing we need to have the marking on the glass. Next we need to understand what is the distance from edge to hole, hole to hole and the number of holes in the glass cutouts and notches. We need to understand the hole dia, whether the glass is having any countersunk hole.

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Summary:

By the end of this video, you have learnt about the:

- Edge grinding
 - Rough grinding
 - Crystal edging
- Rough grinding with triple belt
- Vertical seaming machine
- Horizontal seaming machine
- Quality of the finished product
- Edge grinding - Polishing precautions
- Fabrication
- Hole and cutout in glasses

