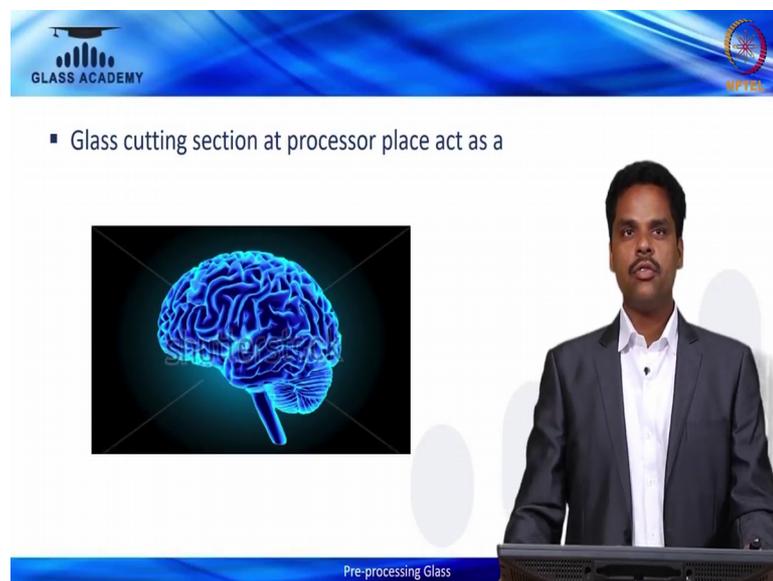


Glass Processing Technology
Prof. Mr. Jayakumar
Department of Civil Engineering
Indian Institute of Technology, Madras

Lecture - 19
Cutting and Snapping

Welcome all today we are going to discuss about the Cutting and Snapping section at the processor place. Cutting line is the very plays a very important role in processing place.

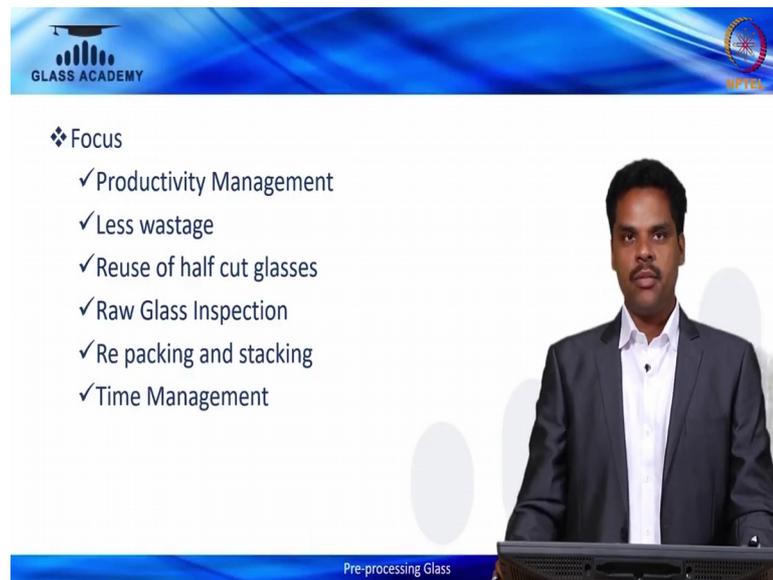
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The slide features a blue header with the 'GLASS ACADEMY' logo on the left and the 'NPTEL' logo on the right. Below the header, a bullet point reads: 'Glass cutting section at processor place act as a'. To the left of the speaker is a glowing blue 3D model of a human brain. To the right is a photograph of Prof. Mr. Jayakumar, a man in a dark suit and white shirt, standing behind a podium. At the bottom of the slide, the text 'Pre-processing Glass' is visible.

And it act as a human brain at processor place, where the entire system of the processor place is depends upon this section only. So, where the entire system is depends upon this cutting sections of and the focus of this.

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GLASS ACADEMY

NPTEL

❖ Focus

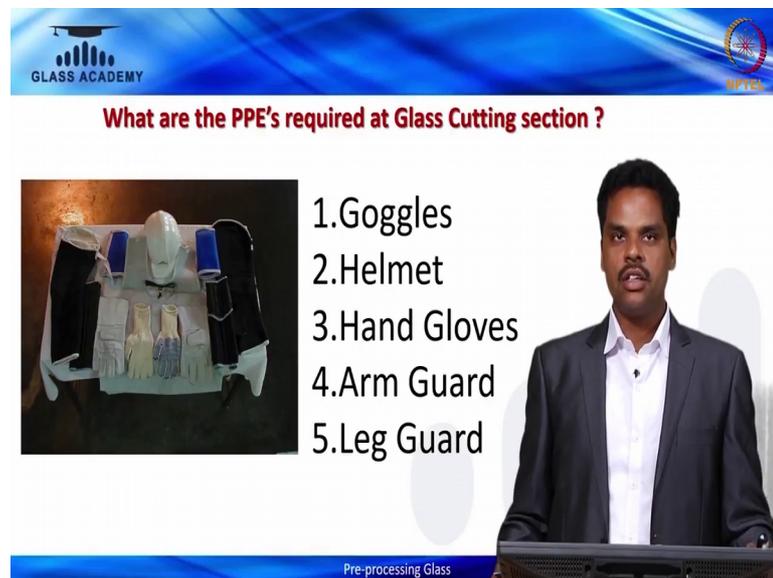
- ✓ Productivity Management
- ✓ Less wastage
- ✓ Reuse of half cut glasses
- ✓ Raw Glass Inspection
- ✓ Re packing and stacking
- ✓ Time Management

Pre-processing Glass

The slide features a blue header with the Glass Academy logo on the left and the NPTEL logo on the right. A presenter in a dark suit and white shirt stands on the right side of the slide. The background is white with faint blue circles. The text is in a clean, sans-serif font.

Cutting section will be productivity management, and less wastage, and reuse of half cut glasses and raw glass inceptions, repacking and stacking and time management.

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GLASS ACADEMY

NPTEL

What are the PPE's required at Glass Cutting section ?

1. Goggles
2. Helmet
3. Hand Gloves
4. Arm Guard
5. Leg Guard

Pre-processing Glass

The slide features a blue header with the Glass Academy logo on the left and the NPTEL logo on the right. A presenter in a dark suit and white shirt stands on the right side of the slide. On the left, there is an image of a white protective suit with various pieces of PPE. The background is white with faint blue circles. The text is in a clean, sans-serif font.

These are the things where the cutting section will be focussed, so before starting the process and the, what are the PPE's, the PPE's are very important in the cutting section. So, the following PPE's needs to be use at the cutting area, in from the picture you can identify the goggles and helmet, hand gloves, arm guard and the leg guard. So, this is the necessary PPE's you need to use in the cutting section wherever in the processing place.

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The slide features a blue header with the 'GLASS ACADEMY' logo on the left and the 'IITR' logo on the right. The main content area is white with a list of session focus points. On the right side of the slide, there is a photograph of a man in a dark suit and white shirt standing behind a podium. The text 'Pre-processing Glass' is visible at the bottom of the slide.

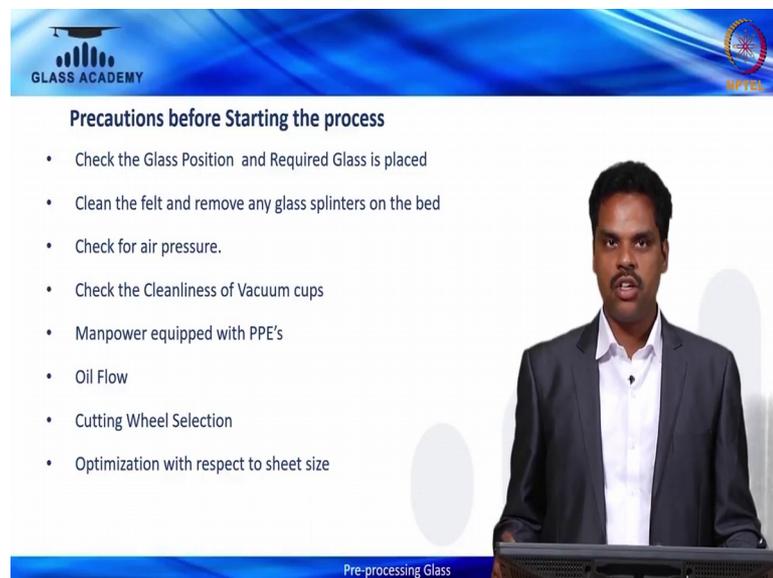
Session Focus

- ❖ Precaution in Cutting Process
- ❖ Methods of Cutting
- ❖ Types of Cutting wheel
- ❖ Types of Cutting oil
- ❖ Snapping
- ❖ Stacking
- ❖ Optimization tool
- ❖ Do and Don't in Cutting section

Pre-processing Glass

So, next we are going to see about the, what is this session is focussed about here. This precaution in cutting process methods of cutting types of cutting wheel, and types of cutting oil snapping, stacking, optimization tools and do and don'ts in cutting section.

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The slide features a blue header with the 'GLASS ACADEMY' logo on the left and the 'IITR' logo on the right. The main content area is white with a list of precautions. On the right side of the slide, there is a photograph of the same man in a dark suit and white shirt standing behind a podium. The text 'Pre-processing Glass' is visible at the bottom of the slide.

Precautions before Starting the process

- Check the Glass Position and Required Glass is placed
- Clean the felt and remove any glass splinters on the bed
- Check for air pressure.
- Check the Cleanliness of Vacuum cups
- Manpower equipped with PPE's
- Oil Flow
- Cutting Wheel Selection
- Optimization with respect to sheet size

Pre-processing Glass

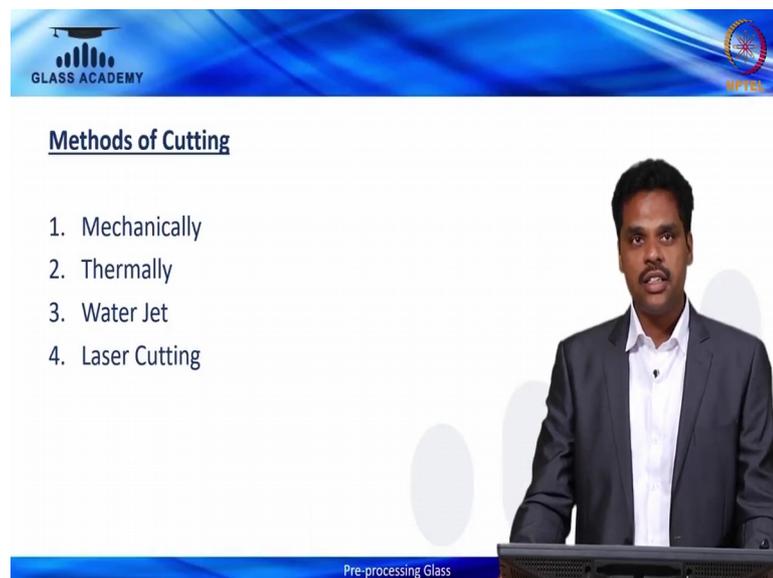
So, first we will discuss about this precautions before starting the process. So, check the glass position and the required, glass is placed at the trolley, means it is an 1 rack and clean check the cleanliness of the felt, and the cutting bed area.

And check the air pressures, whether it is working fine and check the cleanliness of the vacuum cups, vacuum cups cleanliness is very plays a very important roles in the clear glass and coater glasses because whatever the dust is settled a vacuum place chances, for that to accumulate in the glasses if in that, further it will cause damage to the glasses.

And the man power equipped with the PPE's please ensure that the man powers are equipped with the PPE's, and the oil flow in the cutting machineries and the cutting wheel selections, depends upon the thickness of the glasses the cutting wheel will be differentiated. So, please ensure that the cutting wheel, what you are selected is as per the thickness, and the optimization with respect to this sheet sales.

So, optimization is also plays in a very important role in cutting places, where we need to minimize the wastages so, please ensure that the optimization is as per the sheet size, what you are exactly going to cut.

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GLASS ACADEMY

NPTEL

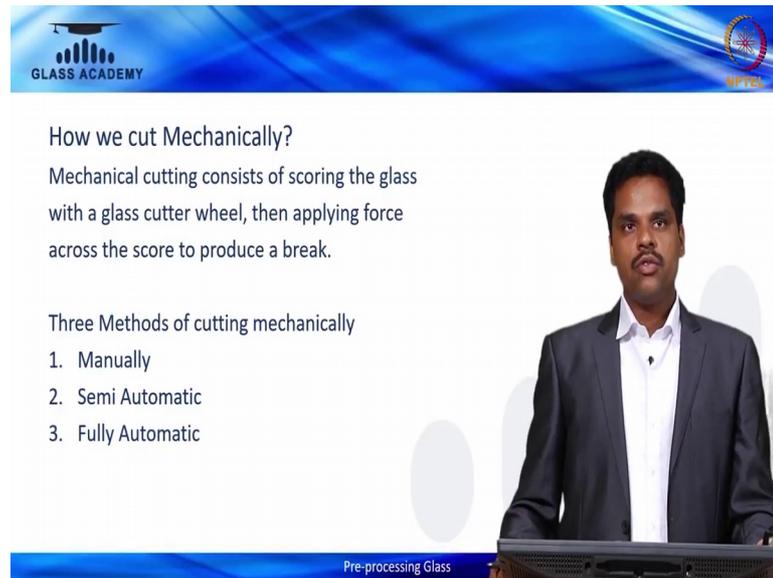
Methods of Cutting

1. Mechanically
2. Thermally
3. Water Jet
4. Laser Cutting

Pre-processing Glass

Next we are going to see the methods of cutting, glass can be cutted in a four different ways, mechanically, thermally and water jet cutting lines, and laser cutting lines.

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GLASS ACADEMY

NPTEL

How we cut Mechanically?

Mechanical cutting consists of scoring the glass with a glass cutter wheel, then applying force across the score to produce a break.

Three Methods of cutting mechanically

1. Manually
2. Semi Automatic
3. Fully Automatic

Pre-processing Glass

The slide features a blue header with the Glass Academy logo on the left and the NPTEL logo on the right. The main content is white with black text. On the right side, there is a photograph of a man in a dark suit and white shirt standing behind a laptop. The footer is a blue bar with the text 'Pre-processing Glass'.

So, first we will discuss about the mechanical, how we cut mechanically. Mechanically consist of the scoring the glass and glass cutter in the wheel, then applying a force across the score to produce a break is, a mechanically how we cut the glass there are three methods involved in this mechanical mechanically process. First is manually, and the second is semi automatic and third is fully automatic.

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GLASS ACADEMY

NPTEL

Manual Cutting

T cutter with freely rotating ball rollers which is used as a guide

Adjustable head for fixing length and height

Pre-processing Glass

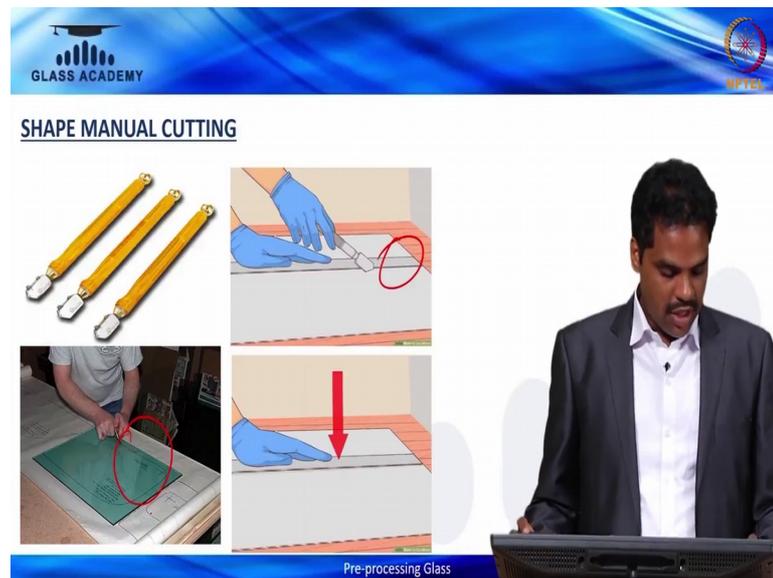
The slide features a blue header with the Glass Academy logo on the left and the NPTEL logo on the right. The title 'Manual Cutting' is centered. Below the title is a video inset showing a manual glass cutting process. The video shows a worker using a T-cutter on a glass sheet. Red arrows point to the T-cutter and the adjustable head. The main content is white with black text. On the right side, there is a photograph of the same man in a dark suit and white shirt standing behind a laptop. The footer is a blue bar with the text 'Pre-processing Glass'.

So, first we will see how we cut manually so, manual cutting process is nothing like place the glass over the cutting bed, and place your T cutter from the edges of the glass.

And use your adjustable heads for fixing the length and height, and please ensure that the edge cutter, ensure that the T cutter is placed from the edges properly. Any deviations from this place will cause to the variation in dimension of the glasses.

So, please ensure that the edge cut T cutter is placed properly over the glass, and before you are placing the glass sheet in the cutting table. You just check whether the cleanliness of the cutting table, please ensure the glass cutting table is very clear.

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And second for shape manual cutting the same scorer will be used, with a ruler in the place, we can see the ruler which can be used for manual scoring. And you can see you just see the this, manual scoring will be mostly it will be used in the shaped glasses.

So, with the help of T cutter you can cut the glass sizes in flat glasses, and they with the shaped glasses you need to go with the manual scorer. And one more thing this manual scoring, if you want to cut the shape plus you need to place that in some place, they use to place the templates over the glasses and, they use to cut the with the manual scoring this is the shape glass cutting process.

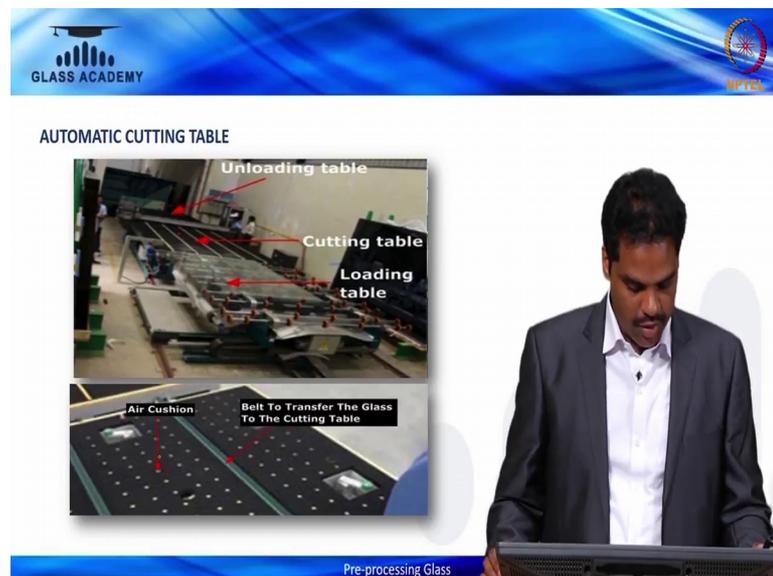
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And next we are going to see about the semi automatic cutting table, this is nothing, but the same like a manual cutting where the if once you placed the glass over the cutting table, once you placed a glass over the cutting table.

The a CNC machine will start operating itself and, it will cuts whatever the size you required. And you please ensure in this section also, whether the cleanliness of the cutting table is fine. And the third thing is automatic cutting table, this you can while see all over the processing place.

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Now, this set up is quite common in all the places, this I just explain you about the paths of this automatic cutting table, you can see the loading table and you can see the cutting table here. And this the third last one is the unloading table and, I just explain you how it will works.

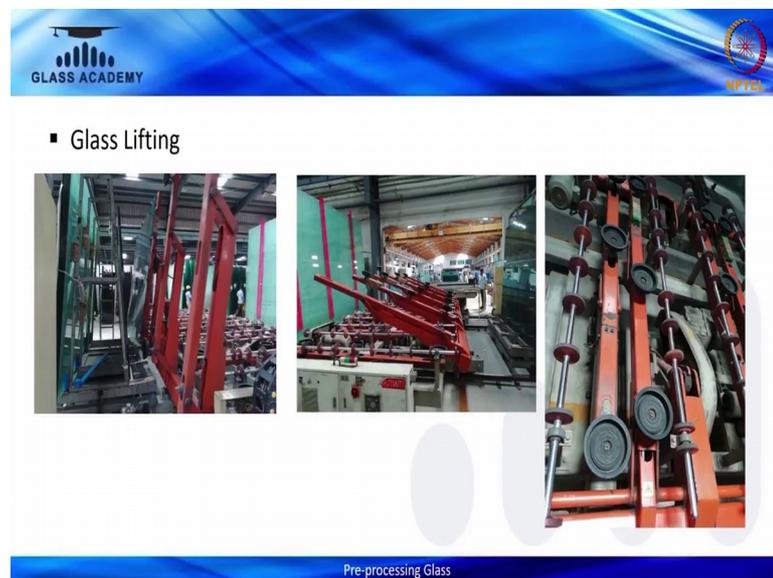
And before that this needs to be taken care this air quotients, where the air compressed will be passed through make the glass float over the bed. And it will be very easy for you to move the glass here, and around.

And a maximum depends of the thickness of the glass the air pressure will be applied, maximum it will goes up to 6 bars, 4 bar to 6 bar.

And there will say there will be I felt which use to transfer the glass from section, to section means from loading to cutting table to the unloading table.

So, please ensure that that air quotient nozzles are free from dust, and please ensure the felt condition is good. So, these are the points you need to be taken care, before you are starting your cutting process as we discussed earlier.

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So, in the automatic cutting tables set up, you can find how we lift the glass through the glass lifting process. It is nothing, but the vacuumed chamber vacuum cups we will be present over that channels and, it will just lift the glass from the L rack.

And this is a double side tinted table, you can see from this both from both the side we can take a glass. So, this is called the double side tinted table and, these are the vacuum cups, as we discussed earlier please ensure that the cleanliness of the vacuum cups. And just check whether the rubber conditions of the vacuum cups.

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So, I can show you the video, how the glass transfers from the warehouse to the cutting section. So, this is the video, you can refer that video how it can be transferred.

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Once the glass is transfer from the L rack to the cutting table the glass flows towards the scoring area.

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GLASS ACADEMY

NPTEL

▪ Glass Cutting



Pre-processing Glass

So, this is the glass cutting scoring area you can see the CNC playing machine, which will be programmed whatever the size we required. So, once the glass is reached through to the scoring area, the CNC is starts its operations.

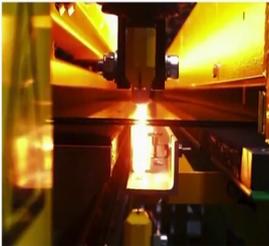
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GLASS ACADEMY

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Thermal Cutting

- Thermal cutting employs a sharp flame to heat a narrow band of the glass
- Most commonly used cutting glasses of thickness less than 2mm.

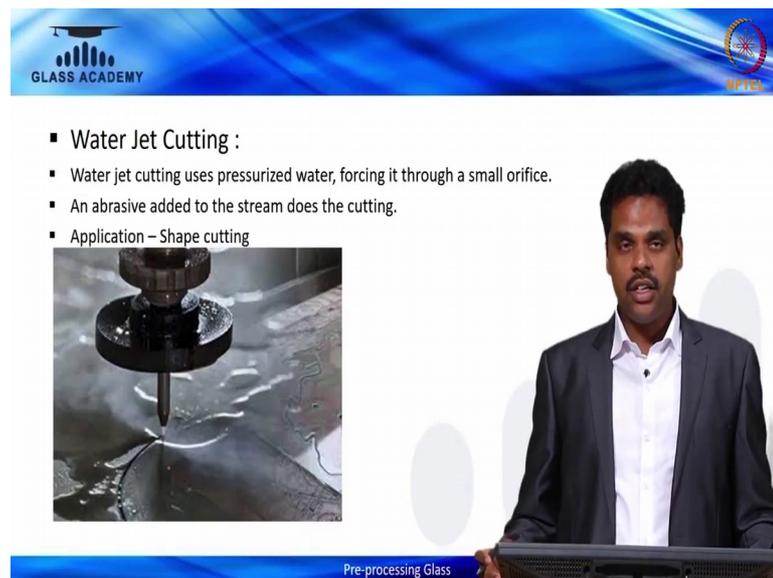


Pre-processing Glass

So, next we are going to see about the thermal cutting process, thermal cutting employs a short flame to heat a narrow band of the glass. Most commonly used in cutting glass of thickness less than 2 mm.

So, for thermal cutting process, the glass will be placed inside the setups and it will be cutted as per the requirement.

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The slide features a blue header with the 'GLASS ACADEMY' logo on the left and the 'NPTEL' logo on the right. The main content area is white and contains a bulleted list under the heading 'Water Jet Cutting :'. The list includes three points: 'Water jet cutting uses pressurized water, forcing it through a small orifice.', 'An abrasive added to the stream does the cutting.', and 'Application - Shape cutting'. To the left of the text is a close-up photograph of a water jet cutting nozzle in operation, with a high-pressure stream of water and abrasive particles cutting through a metal plate. To the right of the text is a photograph of a male presenter in a dark suit and white shirt, standing behind a laptop. At the bottom of the slide, a blue bar contains the text 'Pre-processing Glass'.

- **Water Jet Cutting :**
 - Water jet cutting uses pressurized water, forcing it through a small orifice.
 - An abrasive added to the stream does the cutting.
 - Application - Shape cutting

Next we are going to see about the water jetting cutting area. So, water jet cutting uses pressurized water forcing it, through a small orifice. And abrasive is added to the stream does the cutting, this mostly commonly used for shape cutting and fine and good finishers.

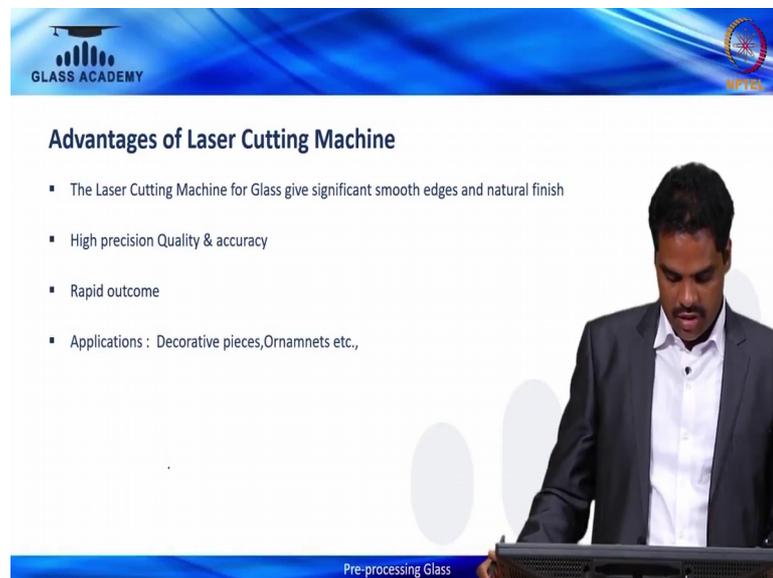
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The slide features a blue header with the 'GLASS ACADEMY' logo on the left and the 'NPTEL' logo on the right. The main title is 'Laser Cutting : Laser Cutting Machine'. Below the title is a bullet point: '▪ Under the laser-cutting method, a certain temperature is generated at each point of the planned scoring line by laser energy.' To the left of the text is an inset image showing a laser beam cutting through a piece of glass, with a bright blue light at the point of contact. To the right is a photograph of a man in a dark suit and white shirt sitting at a desk, looking at a laptop. At the bottom of the slide, there is a blue bar with the text 'Pre-processing Glass'.

Forth it comes is the laser cutting, under laser cutting method a certain temperature is generated at each point of the point scoring line by laser energy.

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The slide features a blue header with the 'GLASS ACADEMY' logo on the left and the 'NPTEL' logo on the right. The main title is 'Advantages of Laser Cutting Machine'. Below the title is a list of advantages: '▪ The Laser Cutting Machine for Glass give significant smooth edges and natural finish', '▪ High precision Quality & accuracy', '▪ Rapid outcome', and '▪ Applications : Decorative pieces,Ornamnets etc.,'. To the right is a photograph of the same man in a dark suit and white shirt sitting at a desk, looking at a laptop. At the bottom of the slide, there is a blue bar with the text 'Pre-processing Glass'.

And you can see the advantage of laser cutting machines, let just the laser cutting machine is for glass give significance smooth the edges and natural finishes, high precision quality and accuracy, rapid outcome. And most commonly it will be applied in decorative pieces ornamentals etcetera.

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Cutting Wheel

- mix contains 90-95% of tungsten and about 5-10% of cobalt.
- Tungsten, a very hard element, imparts hardness to the material, but it is brittle and its particles break away.

Tungsten Carbide Wheel

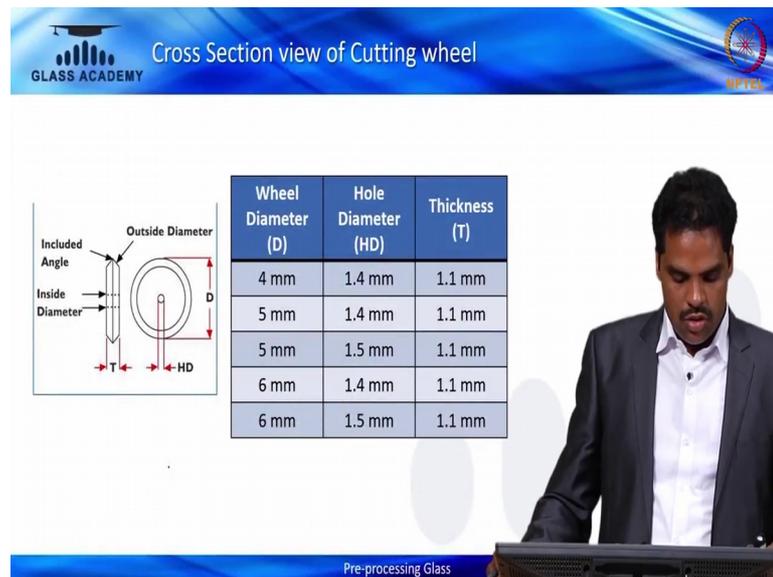
Pre-processing Glass

So, cutting wheel cutting wheel in the cutting section a plays a major role, there are there we most commonly used is tungsten carbide wheel. The tungsten carbide wheel is nothing, but a 90 to 95 percentage of tungsten and 5 to 10 percentage of the cobalt.

You may know that tungsten is a very heard element, in fact, hardness to the material, but it is brittle and it is particles, they once the particles breaks away.

So, most commonly used to cutting wheel is the tungsten carbide wheel all over the world. So, the cutting wheel, angle will changed depends upon the thickness of the glasses.

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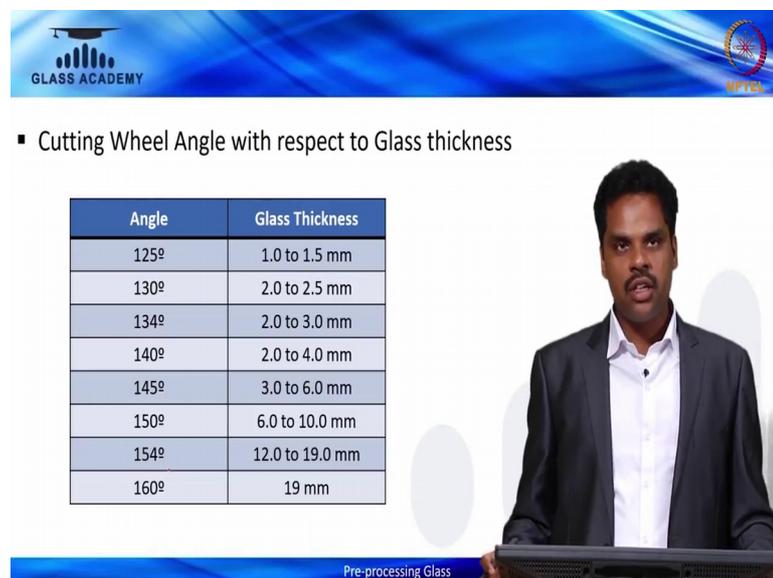
The slide features a blue header with the 'GLASS ACADEMY' logo on the left and the 'NPTEL' logo on the right. The main title is 'Cross Section view of Cutting wheel'. On the left, a diagram shows a cross-section of a cutting wheel with labels: 'Included Angle' at the top, 'Outside Diameter' (D) on the right, 'Inside Diameter' on the left, and 'Thickness (T)' and 'Hole Diameter (HD)' at the bottom. To the right of the diagram is a table with three columns: 'Wheel Diameter (D)', 'Hole Diameter (HD)', and 'Thickness (T)'. The table contains five rows of data. On the right side of the slide, a man in a suit is shown from the chest up, looking at a laptop.

Wheel Diameter (D)	Hole Diameter (HD)	Thickness (T)
4 mm	1.4 mm	1.1 mm
5 mm	1.4 mm	1.1 mm
5 mm	1.5 mm	1.1 mm
6 mm	1.4 mm	1.1 mm
6 mm	1.5 mm	1.1 mm

Pre-processing Glass

So, there you can see the cross section of the cutting wheel, its just explains you about the wheel diameter, hole diameter and thickness.

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The slide features a blue header with the 'GLASS ACADEMY' logo on the left and the 'NPTEL' logo on the right. The main title is 'Cutting Wheel Angle with respect to Glass thickness'. Below the title is a table with two columns: 'Angle' and 'Glass Thickness'. The table contains seven rows of data. On the right side of the slide, a man in a suit is shown from the chest up, looking at a laptop.

Angle	Glass Thickness
125°	1.0 to 1.5 mm
130°	2.0 to 2.5 mm
134°	2.0 to 3.0 mm
140°	2.0 to 4.0 mm
145°	3.0 to 6.0 mm
150°	6.0 to 10.0 mm
154°	12.0 to 19.0 mm
160°	19 mm

Pre-processing Glass

As we discuss the earlier cutting wheel anger with respect to the glass thickness. So, if you see from this chart 1 to 1.5 mm they will use 125 degree angle, 2 to two point a mm, they will use 130 degree angle.

And 2 to 3 mm 134 and 2 to 4 mm 140 and 3 to 6 mm 145 and 6 to 10 mm is 150. And 12 to 19 mm 154 and 19 mm above nineteen mm will be 160. So, if you are use, if you are not following these norms with respect to the glass thickness.

It I will cause you the uneven breakage, or uneven scoring and it will gives a very irrespective finishes to the glasses.

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So, you can see what is good scoring and what is bad scoring, the if you can see the good scoring, will have a single line and the bad scoring n with the different scoring patterns.

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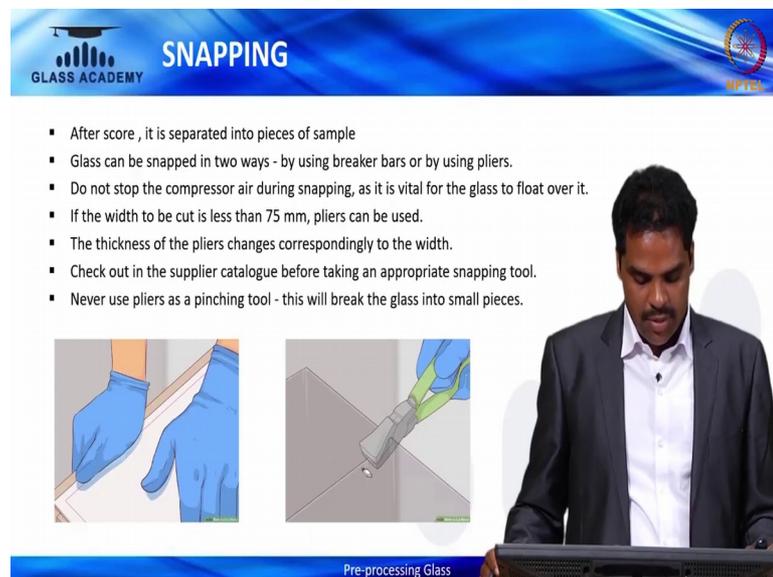
Next coming to the cutting oil, cutting of cutting of glass is easier and smoother with the use of oil is here the cutting oil it will be used as a lubrication part, when the glass scoring is taking part between the glass and the cutting wheel.

So, the glass between the glass and the cutting wheel the oil will be spilled at minimum level, and you should ensure that that what the glass the cutting oil what we are using is a vaporising type. And another quality of oil is that should be easily removable by glass washing machine.

And it must not create a undue contamination to the washing machines and finally, it must be with a high vaporising type, please ensure this points while selecting the cutting oil.

Let us looks a various cutting oils available. So, non numeral oil based totally evaporating cutting fluids, includes Acecut 5250 Acecut 5503 and Acecut 5929. And the other products also is available in our local market, you can ensure what is the glass, whatever the terms and conditions requested and the you can select whatever it is matching through it.

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SNAPPING

GLASS ACADEMY NPTEL

- After score, it is separated into pieces of sample
- Glass can be snapped in two ways - by using breaker bars or by using pliers.
- Do not stop the compressor air during snapping, as it is vital for the glass to float over it.
- If the width to be cut is less than 75 mm, pliers can be used.
- The thickness of the pliers changes correspondingly to the width.
- Check out in the supplier catalogue before taking an appropriate snapping tool.
- Never use pliers as a pinching tool - this will break the glass into small pieces.

Pre-processing Glass

So, next we are coming to the snapping section. After scoring of the glass, you can see the video about the snapping section which will be played after this slide. So, the

snapping is nothing, but after once the glass is cutted with the CNC machines or manual cutting, this snapping part will be taken.

The snapping is it is separated into pieces of samples, glass can be snapped in two ways by using a breaker bar or by using a pilers. Do not stop the compressor air during a snapping and, it is a vital for the glass to float over it. If the width to be cut is less than 75 mm pilers can be used, the thickness of the pilers changes correspondingly to there width.

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Checkout in the supplier catalogue, before taking in a appropriate snapping tool, never use pillars as a pinching tool, this will break the glass into small pieces.

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The slide is titled "STACKING GLASS IN STILLAGE" and is part of a presentation from "GLASS ACADEMY". It features a speaker on the right side. The slide contains a bulleted list of guidelines for stacking glass in stillage, accompanied by two photographs showing glass sheets being handled in a factory setting. Red circles in the photos highlight specific areas of concern, such as the bottom of the stillage and the placement of glass sheets. The text on the slide reads:

- Certain safeguards need to be in place at this juncture.
- The wood at the bottom of the stillage should be without any undulations to eliminate the chances of glass breakage.
- Small glass sheets should rest over the large ones; otherwise, there is every likelihood of glass breakage.
- The best method is to keep uniformly sized glass in the same trolley.
- This also makes it easier to grind the glass in the double edge grinder without too much of movement of glass.

Pre-processing Glass

Once a glass is snapped stacking is the very important, which will avoid damages to the glasses, please ensure that the proper separator is used in between the glass.

And please ensure that the glass is stacked as per the sizes, certain safeguards need to be place in the at the junction before stacking the glass, you please ensure that the trolley is plays on a stopping conditions. The wooden at the bottom of the stilly should be without any undulations to eliminate the chances of glass breakage.

And small glass you should rest over the large once otherwise there is a very like wood of glass breakage. So, the best method is to keep uniformly size to glass is the same trolley; this also makes it easier to grip the glass in the double edger, without too much of movement of glasses.

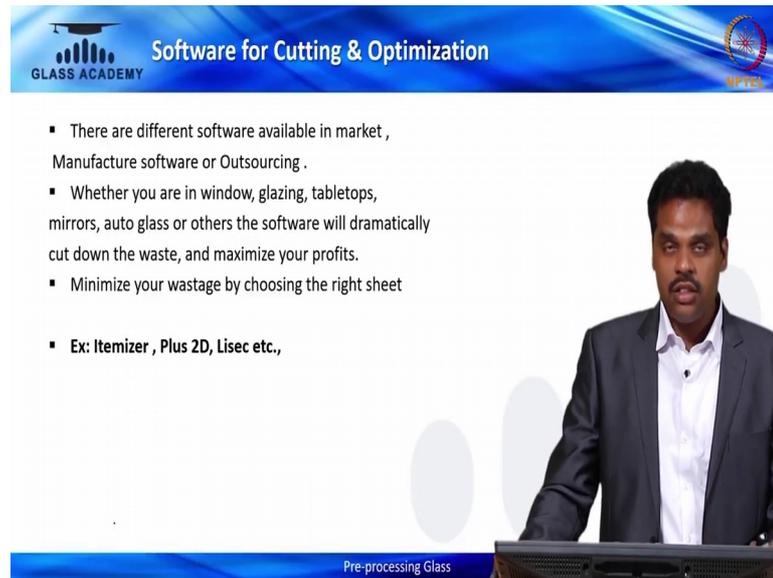
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The slide features a blue header with the text 'GLASS ACADEMY' and 'STACKING GLASS IN STILLAGE' next to a logo. Below the header, the text reads: 'For coated glass the following additional precaution needs to be taken:'. This is followed by two bullet points: '• The coating side of the first glass should always be kept away from the stillage, as the coating needs to be protected.' and '• The next glass should always be kept with the coating inside.'. On the right side of the slide, there is a photograph of a man in a dark suit and white shirt looking at a laptop. At the bottom of the slide, the text 'Pre-processing Glass' is visible.

For coated glass while you are stacking we need to take some precautions, the coating side of the first two glass should be always be kept away from the stillage as the coating needs to be protected.

So, if you are when you are placing a first two glass it should be in a reverse direction. Because that it will the coating part will get conduct with the trolley, and at the there are chances for coating damage. And next glass should be always kept with the coating inside please ensure while stacking, there are different software tools are available for cutting and optimizations.

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GLASS ACADEMY Software for Cutting & Optimization **NPTEL**

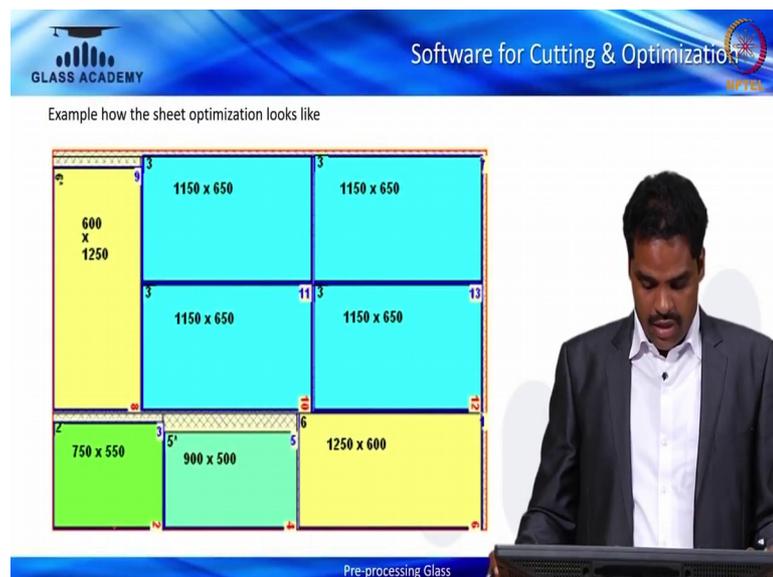
- There are different software available in market ,
Manufacture software or Outsourcing .
- Whether you are in window, glazing, tabletops,
mirrors, auto glass or others the software will dramatically
cut down the waste, and maximize your profits.
- Minimize your wastage by choosing the right sheet

- Ex: Itemizer , Plus 2D, Lisec etc.,

Pre-processing Glass

Whether you are in window glassing table tops, where as auto glass or software will dramatically cut on the base and maximise your profits. Minimize your wastage by choosing the right sheets, there are different software's available for example, itemizer and plus 2 D Lisec etcetera. Sometimes cutting manufacturing himself can provide, you the good cutting optimization software.

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GLASS ACADEMY Software for Cutting & Optimization **NPTEL**

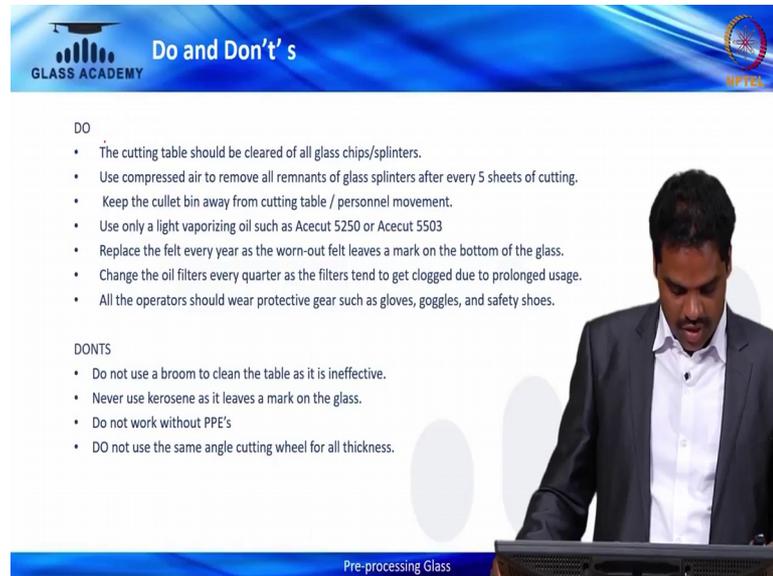
Example how the sheet optimization looks like

600 x 1250	1150 x 650	1150 x 650
	1150 x 650	1150 x 650
750 x 550	900 x 500	1250 x 600

Pre-processing Glass

So, this how the glass optimization looks, so, you can find there are very less wastage, available in this area. So, this is how it looks it at this sheets almost looks like a 95 percentage of field, good yields gives you a good productivity.

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The slide features a blue header with the Glass Academy logo and NPTEL logo. The main content is a list of 'DO' and 'DONT'S' instructions. On the right side, there is a photograph of a man in a suit looking down at a laptop. The text 'Pre-processing Glass' is visible at the bottom of the slide.

Do and Don't's

DO

- The cutting table should be cleared of all glass chips/splinters.
- Use compressed air to remove all remnants of glass splinters after every 5 sheets of cutting.
- Keep the cullet bin away from cutting table / personnel movement.
- Use only a light vaporizing oil such as Acecut 5250 or Acecut 5503
- Replace the felt every year as the worn-out felt leaves a mark on the bottom of the glass.
- Change the oil filters every quarter as the filters tend to get clogged due to prolonged usage.
- All the operators should wear protective gear such as gloves, goggles, and safety shoes.

DONT'S

- Do not use a broom to clean the table as it is ineffective.
- Never use kerosene as it leaves a mark on the glass.
- Do not work without PPE's
- DO not use the same angle cutting wheel for all thickness.

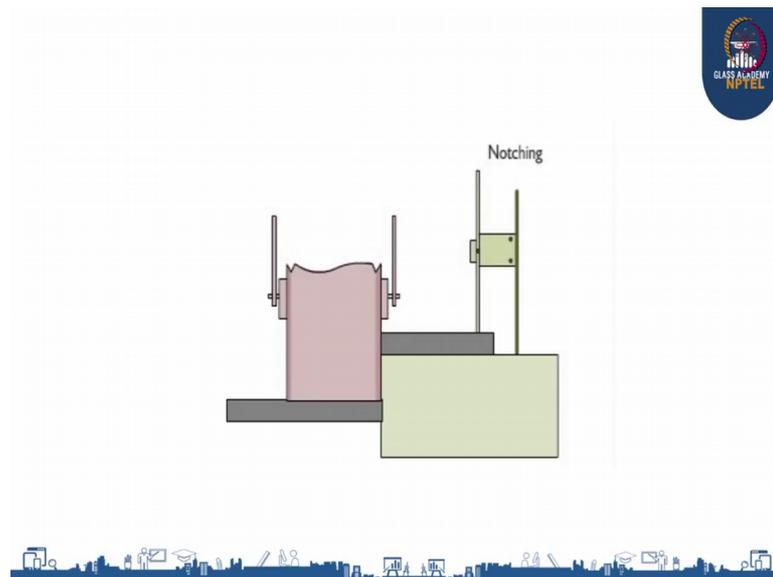
Pre-processing Glass

And there are some do and don'ts to be followed at the cutting actions. So, first we will see the dos, the cutting table should be cleared off all glasses, chips, printers used compressed air to remove all remnant of glass printers after every 5 sheets of cutting.

Keep the collect been away from cutting table fistulae movement, use only a life vaporising oil such as Acecut 5250 or Acecut 5503 replace the felt every year, as the worn out felt leaves a mark on the bottom of the glass. All the operator should wear protector gear such as gloves goggles, some safety shoes.

And change the oil filter every coater as the filter tend to get cloth due to prolonged usage, there are some dons to be noted do not use a broom to clean the table as it is a in effectives, never use a kerosene instead of a cutting oil. Do not work without PPE and do not use the same angle cutting will for all thickness, it will unnecessarily creates a scratches in the glasses and uneven scoring.

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This is the auto loader, where we are going to place the glasses keeps in a patience.

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And they are going to pick up the sheets with the help of vacuum cups, because if the vacuum has of the one glass and, it is taking to cutting belt.

Yeah now it is going to cutting belt, now it is getting aligned with the cutting table through the conveyor belt. Now, it is moving to cutting belt. So, now, the glass is in the cutting belt, you can see one more sheet is getting lifted through the auto loader.

See this is the order what the cutting person get, if you see this is the work order the tracing of this order is done through, the help of work order in the work order sometimes there might be different specifications.

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Work Order WITH MATERIALS

W.O. No / Booking No : **NWCH171804615 / 14128** Prepared Date : 27/02/2018

Ref : 2 SUBASH Project :

Party Name : FASHION D ENTERPRISES Consignee : FASHION D ENTERPRISES

Proforma No : P00218/010733

NO 741, 131ST STREET, 5TH BLDG
NAGAR, KODUNGAIYUR, CHE
CONTACT: CONTACT 9941628174
PH: FAJ

Proforma Invoice Full Sheet-

Logo:
10MM CLEAR GLASS TOUGHENED GLASS WITH CP- BLOCK

Process Route: Layer-1-C / G / T / FG

No	No. Ss	Wt	Ht	Area	Hls	Cnt	Cut	Big	Big	Big	Glass	Shape	Remark	Spl.Rem	Qty.	Produced Quant			
																Hls	out	Hls	L/Hls
1	1	546	1428	1.56								BLOC K			2				
2	2	1155	1428	1.65								BLOC K			1				
															3				

Raw Material Glass Use This Order-

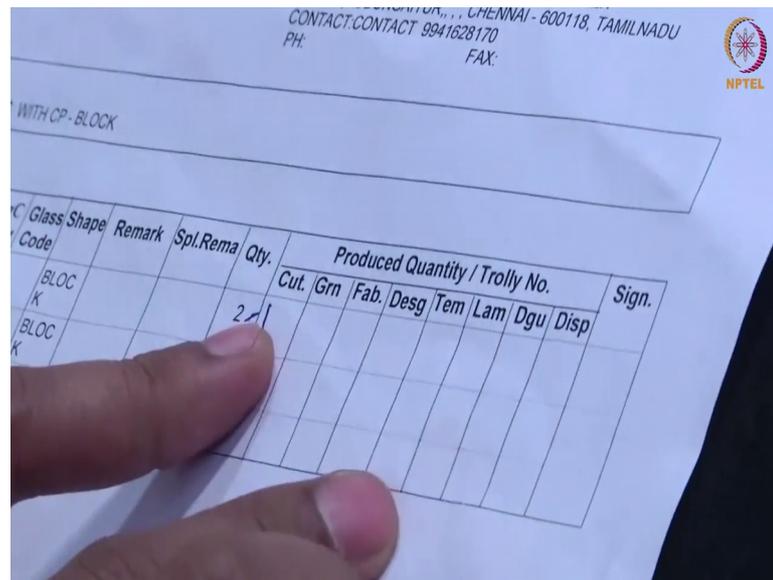
Note:
Work Order Instruction:
Approval Remark:
Note: UNLOADING BY BUYER

So, this booking number will give you the traceability. And next one the this is the particular market reference, marketing person who has referred to this particular order, and the customer name is fashion D enterprises and the billing address is, this is the billing address record of project name is there that will be mentioned here.

And this is the tentative delivery date that way that we are going to give to the customer. If you see this is the specification of the glass which describes, the thickness of the glass is 10 mm, and the type of glass is a clear glass and during the process, it has to be done toughening.

And the type of ad V grinding is CP and it is a rectangular glass. In this particular order if you see the width and height are given, and the are square meter is given here, if at all the glass is having holes or cut outs. That will be mentioned here and the shape it is a rectangular glass and the quantity is 2.

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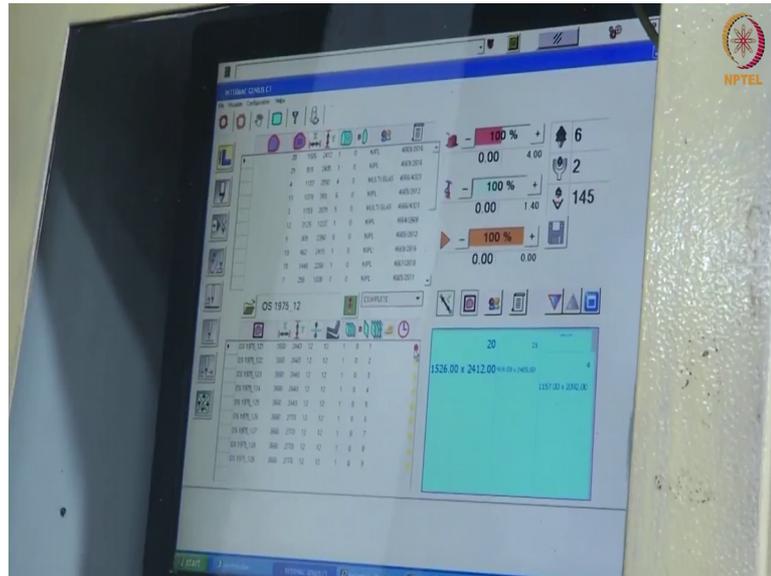
During the process this is the route pad, you can say cutting grinding fabrication design tempering lamination DGU and despatch. So, through this process the glass is going to get and ready for dispatch.

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Now, they are going to feed the sizes in the CNC machine, here the intention main purpose of this cutting operator is to, maximize the yield and minimize the wastage. So, if the proper of selection of sheet and the feeding of the sizes, will give you the wastage and yield percentage.

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You can see that is the perfect cut, this is a software used for optimization, you can see the sheets another sizes of the that is parent failed sizes you can see, totally four sizes are coming in that particular sheet. Now, first the admit the position in home position and now it is getting the scoring.

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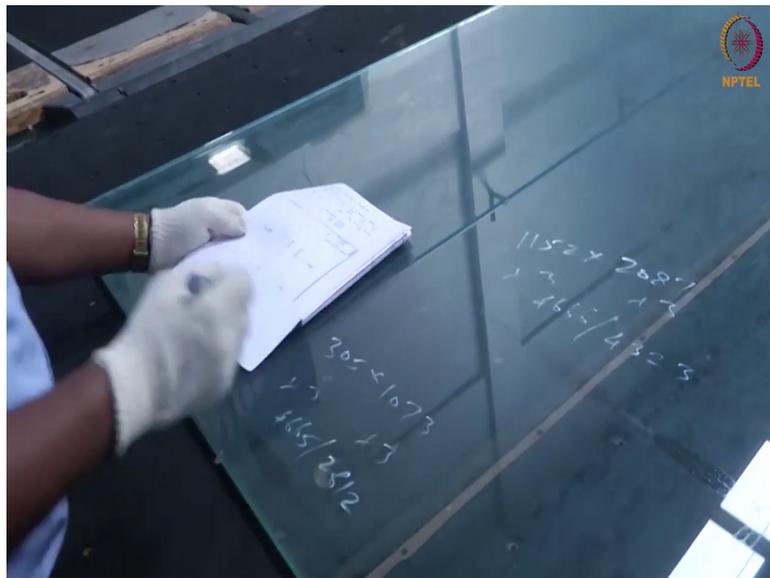


So, with the help of cutting oil, it will do impression to the glass, it will have cutting wheels inside their that head based on the glass thickness different cutting wheels can be used but (Refer Time: 24:42) thickness, we use 150 per degree angle cutting wheel.

Now, it is making a marking on the glass, now it is moving to the breaking table to the (Refer Time: 24:42) now it is going to moving to the breaking table, you can see the glass is moving through air.

You can see the bottom, you can find blower and it is moving through on air. Now with the help of tool, there we are able to break the excess glass do the tool pinching tool, which will be used to remove the excess trim.

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Now, he is writing the remarks or sizes or on the glass. So, here we need to make sure that all the operators, who are lifting glasses, or wearing aprons, arm guards gloves and safety shoes.

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Now, you see they have switched off the blower, or the air and the movement of the glass, with help of peddle they are going to break the glass that is the breaker. Now, you see he will removing the excess trim on the glass, weight come this side.

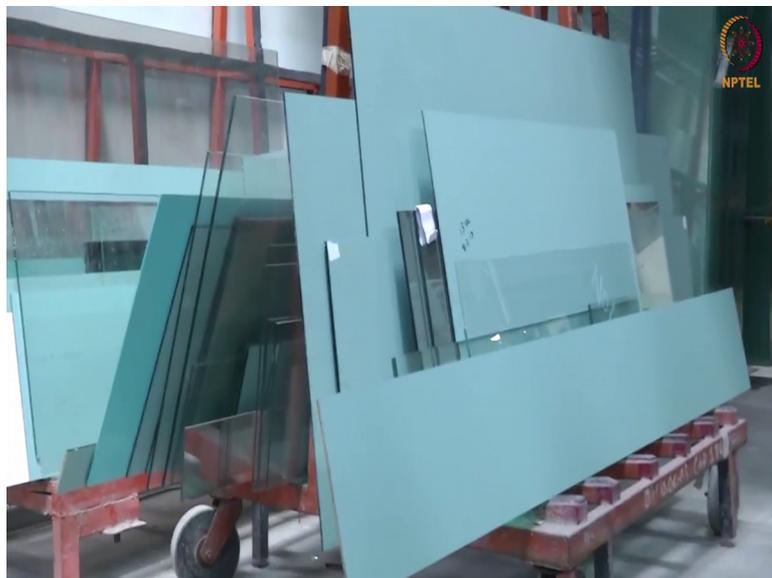
We need to make sure that the cutting belt is always free from (Refer Time: 28:02), to avoid scratches on the glass this is the off cut, where they are going to this is the scrap material. Now, you see in cutting there will be measuring the dimensions that is width they will be measuring the height, there will be checking even diagonal also. So, there will be noting the measurement, whether the, it is as per the customer requirement or not.

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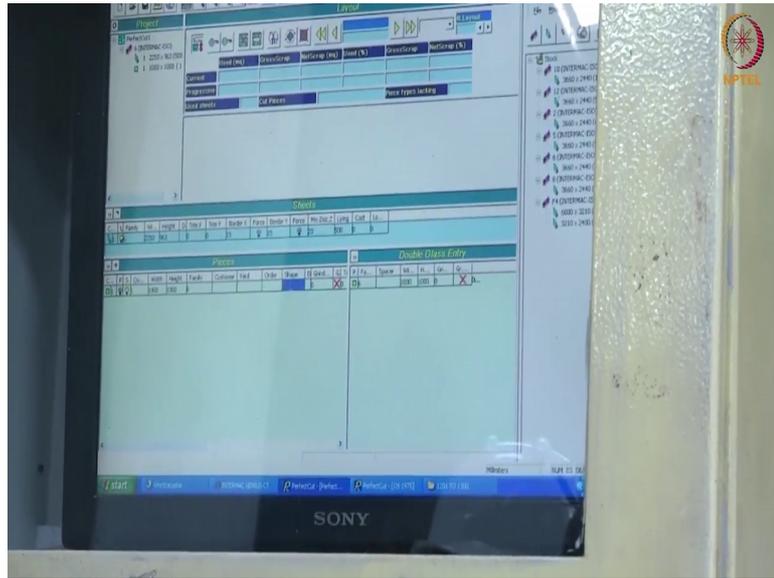
If you see they are using paper as the interleaving to avoid a direct contact to the glass. If you see the address or shop.

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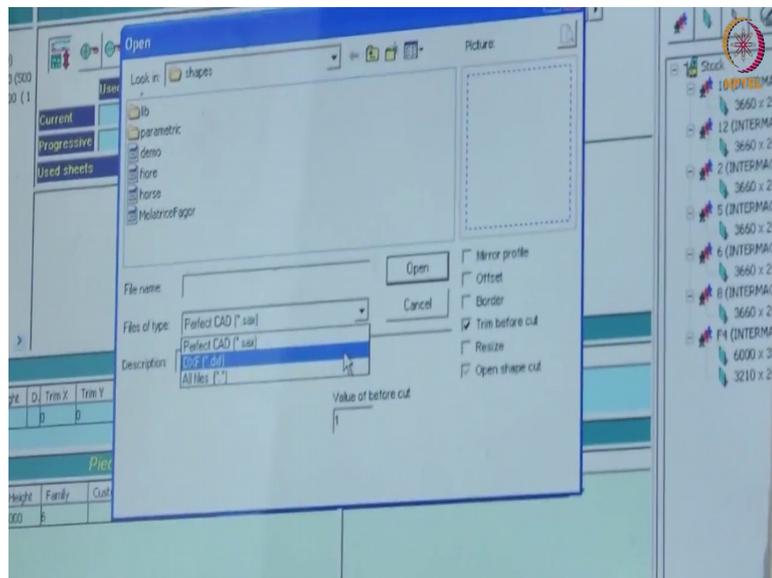
Now, it is going for grinding section, if you see these are all half cut glasses that is wastage means once the glass cutting is done these are all rest over pieces. You can say all these are off cut glasses that are kept on a trolley parent service and the end service.

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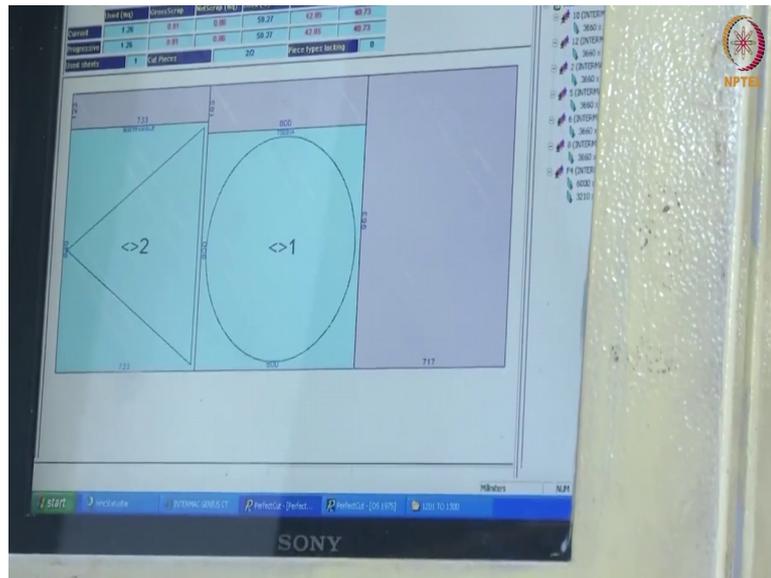
Before a shape we has reflected now he is going to so, a shape cutting.

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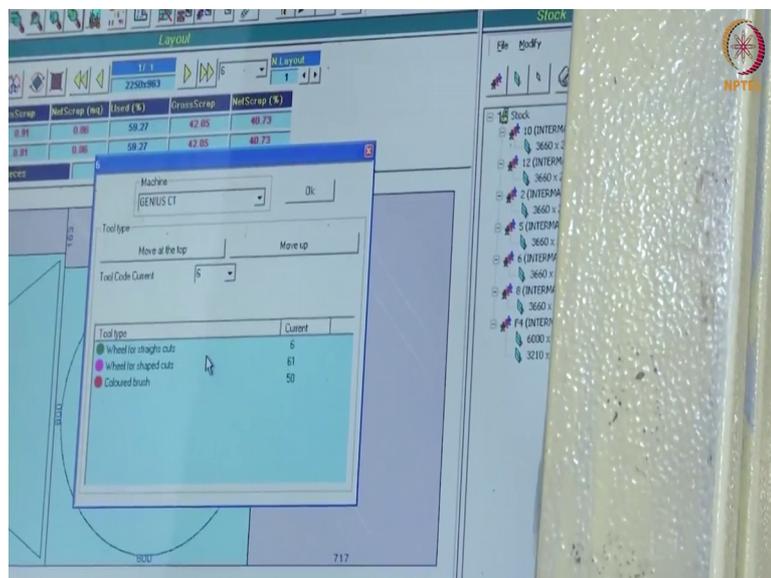
Now, he giving the boarder to the glass, he select in a appropriate drawing and giving the boarder to the glass. You can see the layout that is going to be get cut; it is a triangle and a circle.

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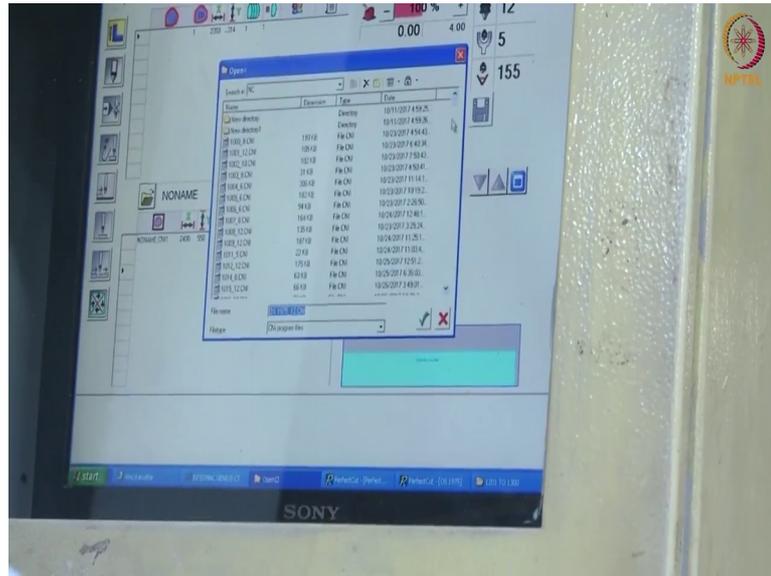
That is going to be exhibited.

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Now, now we starting a exploiting of this thing. Cutting is done basically with 1 to 2 bar pressure, and appropriate selection of the cutting wheel based on the glass thickness.

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Now, you can see now two so, therefore, cutting belt and the wheel that, glasses getting mark, or it is picking the tool.

Now, it is doing marking, you can say it is getting a shade log, he shade in the circular shapes; it is circular shape, now it is getting a triangle shape tool. So, in this with this machine we can do all types of shapes that is required.

Once the marking is done, now it is going to breaking table now it is going to breaking table, you can see the impression you can see the impression. Now, he going to break at a proper shape so, that is a circular glass, or this is that is a manual cutter with the help of manual cutter.

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They are going to break the glass, that is the manual cutter closed in see, how he is breaking is making sure that in the time of breaking the glass it is not get damaged.

So, now, you can see the circular glass as will cut, or the blower for that easy movement of the glass it was excess. The glass is moving this a triangular glass.

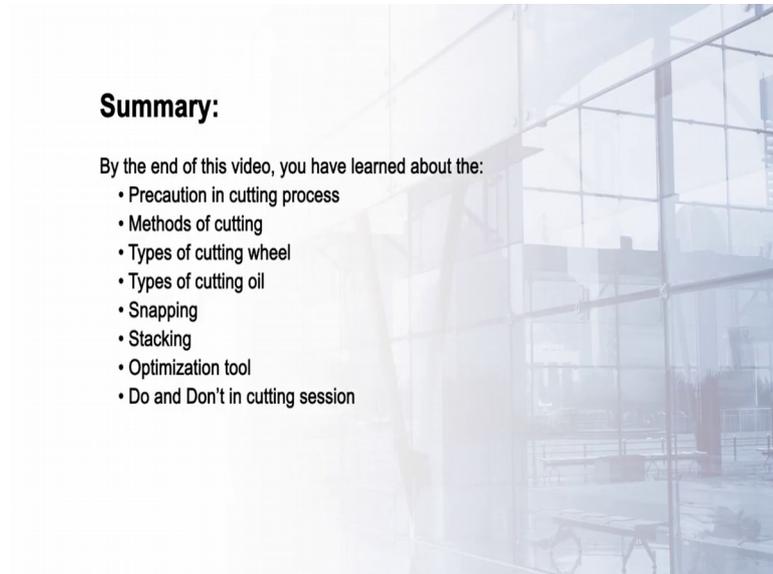
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Now you can see this is a triangular glass the glasses having sharp edges that will be grinded in the next stage. Now, online inspection will be done, here is needed the dimensions of the glass as per the customer requirement or not. Now, if you see for this

particulars circular glass, he is measuring the dia, he is measuring the dia for the circular glass.

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Thank you for this session.