Glass Processing Technology
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Lecture - 65

Internal Process Loss – Part II

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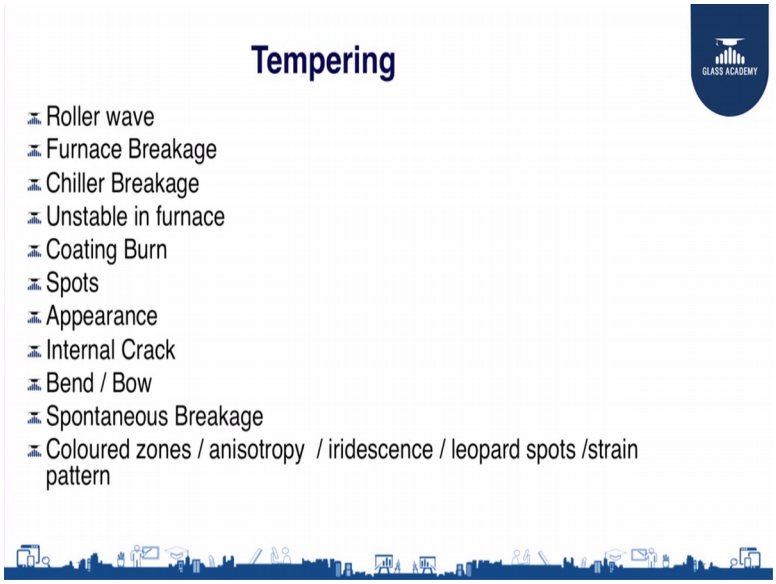

Now, we will discuss on tempering department, what are the issues occurs in tempering? Because of these issues glass gets rejected, roller wave, furnace breakage, chiller breakage, unstable in furnace, coating burn, spots, appearance, internal crack, bend and bow, spontaneous breakage, coloured zones, leopard spots, strain pattern etcetera. These are the major defects if machine is not set properly or parameters are not set properly in tempering machine.

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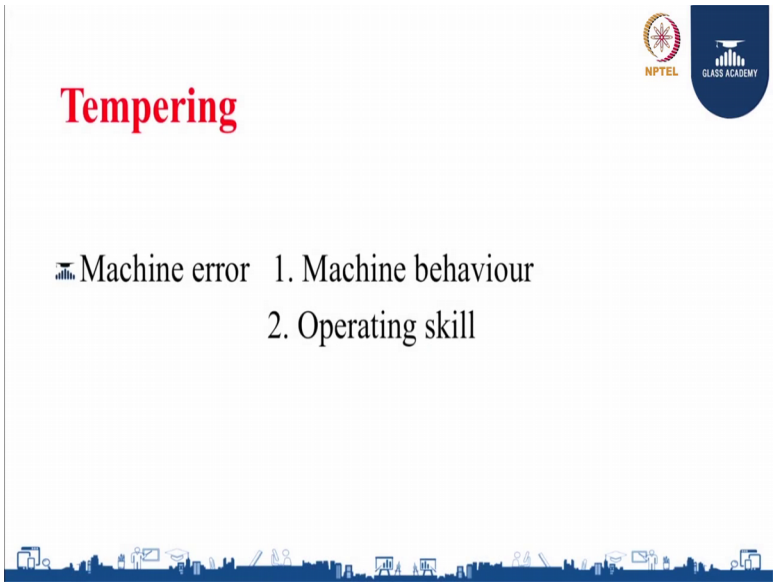

Now, let us discuss tempering, now, in tempering also we have to define whether it is a machine error or operating skill is missing, we need to check all the parameters like roller wave.

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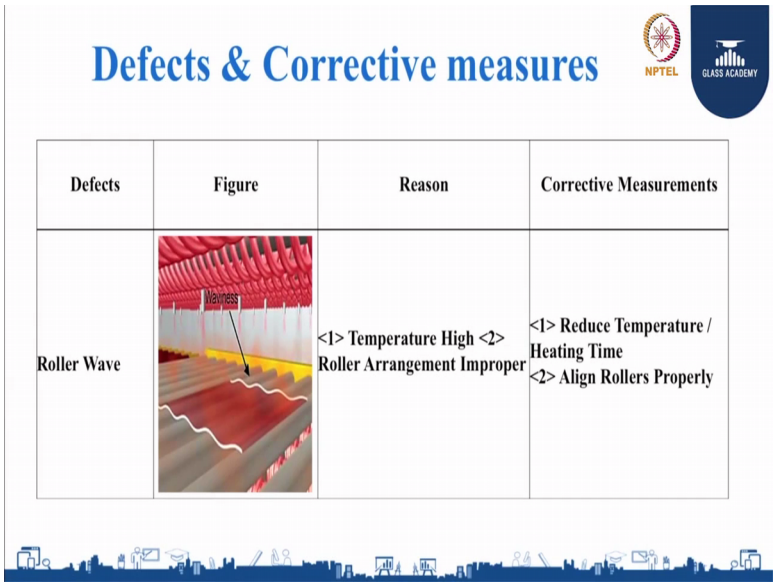

What could be the reason for having roller wave on glass? Temperature is high or roller arrangement is improper, what is the corrective action to be taken need to reduce temperature heating time. And second is align rollers properly, this corrective action will reduce your roller wave. Then we observe furnace breakages.

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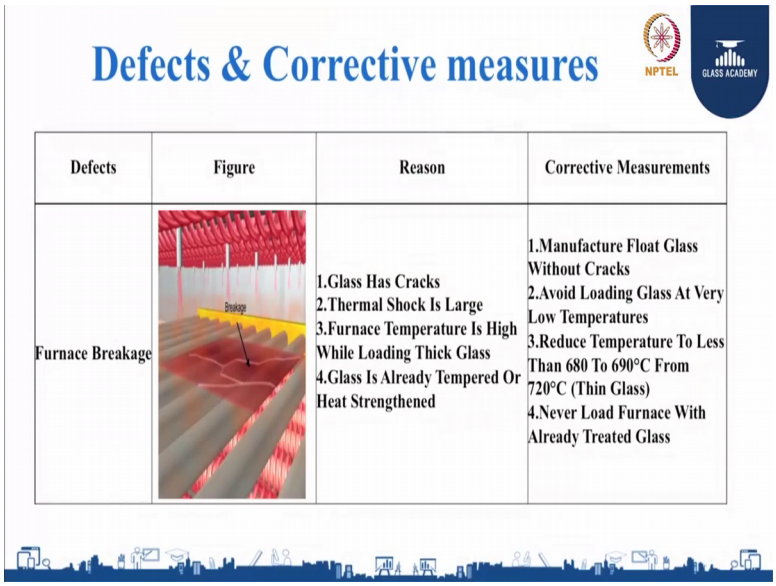

Breakages happens in glass, the reasons are glass must be having some crack or thermal shock is large, may be furnace temperature is high while loading thick glass and may be glass is already tempered or heat strengthened. These are the reasons because of which furnace breakage happens. And now let us understand what are the corrective actions?

Need to check glass and avoid if there is any crack in the glass. Avoid loading glass at very low temperature, reduce temperature to less than 680 to 690 centigrade from 720 for thin glass. Never load furnace with already never load furnace with glass which is already been tempered. This will avoid this will avoid furnace breakages and you will have good quality of glass.

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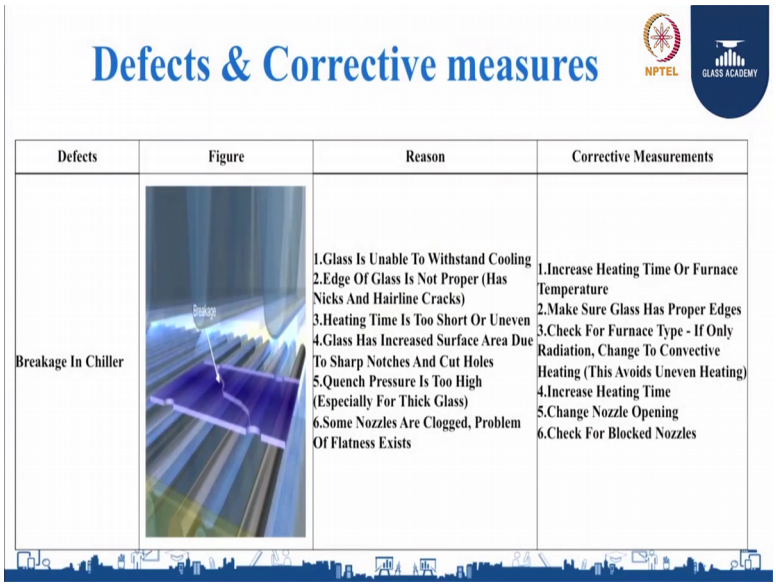

Another area of concern is breakages in chiller, reasons are glass is unable to withstand cooling, edge of glass is not proper there is a hair line crack in the glass. Heating time is too short or uneven glass has increased surface area due to sharp notches and cut holes. Quench pressure is too high specially for thick glass, some nozzles are clogged problem of flatness exists.

Corrective measures are increase in heating time of furnace temperature. Make sure glass has proper edge polish, check for furnace type if only radiation change to convective heating. This will avoid uneven heating. Increase heating time, change nozzles or clean nozzles, because nozzles should have a proper opening, check your nozzles of course.

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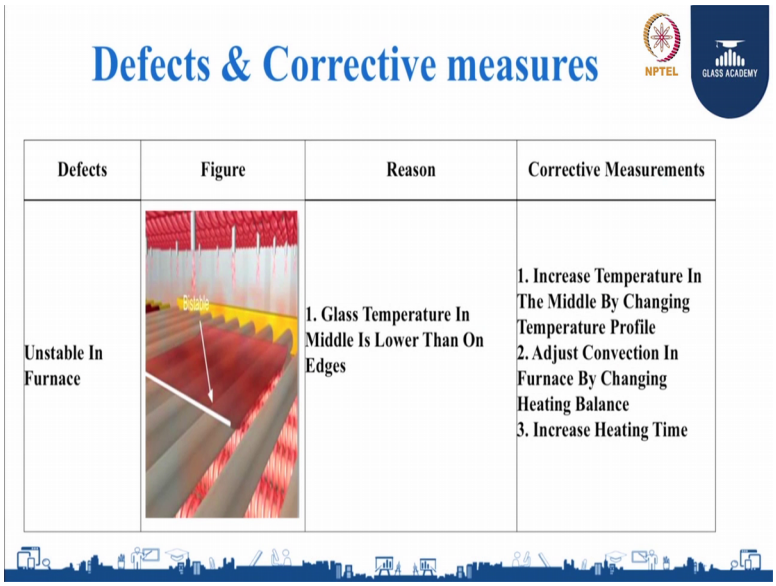

Unstable in furnace, glass temperature is lower than on edge that is middle of the glass temperature is high and at the end at the edges repeat. Unstable in furnace; glass temperature in middle is lower than on edges, this could cause problem. Corrective action is increase temperature in the middle by changing temperature profile, adjust convection in furnace by changing heating balance, increase heating time. So, you will be able to avoid instability in furnace.

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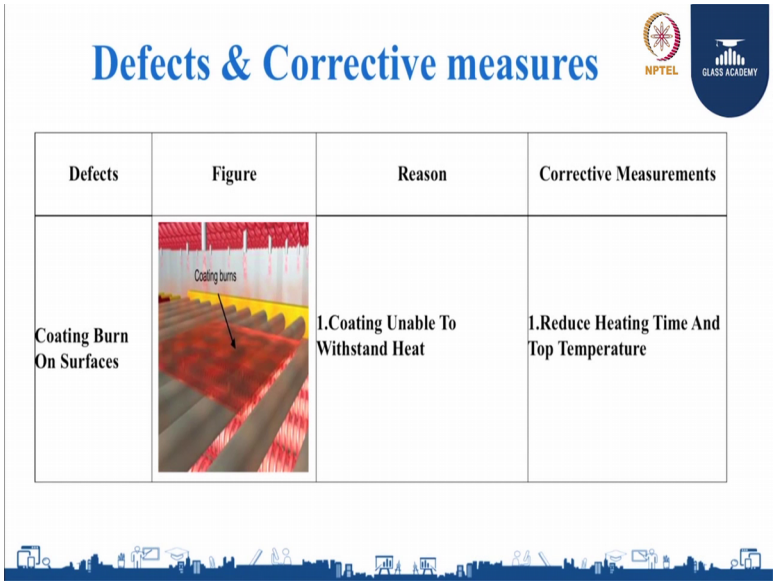

Coating burning on surface; reason is coating is unable to withstand the heat and corrective measure is reduce heating time and top temperature.

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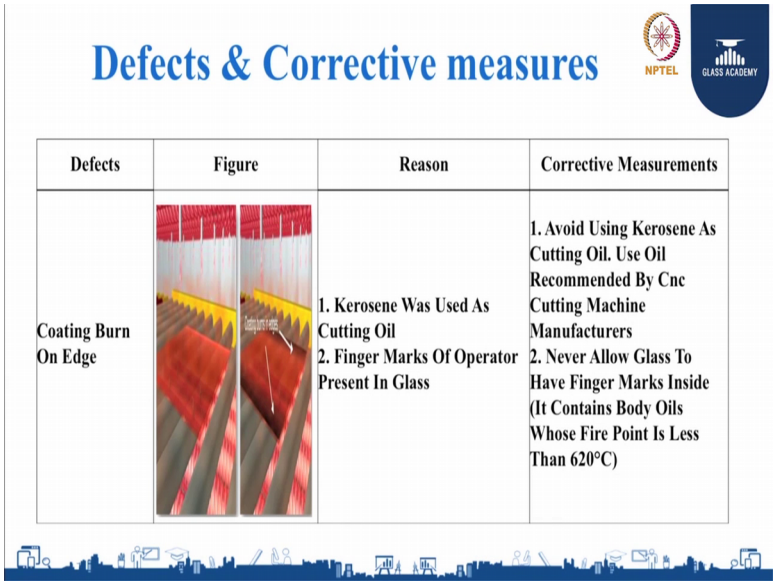

Coating burn on edge may be kerosene or cutting oil is used excessive, there are finger marks on glass because operator has not handled properly. And the corrective measure is avoid using kerosene and cutting oil and only use oil recommended by CNC cutting machine manufacturer. Never allow glass to have finger marks inside, because it will again lead to a coating burn, spots, coating scratches, reasons are glass is too hot when it comes out of furnace.

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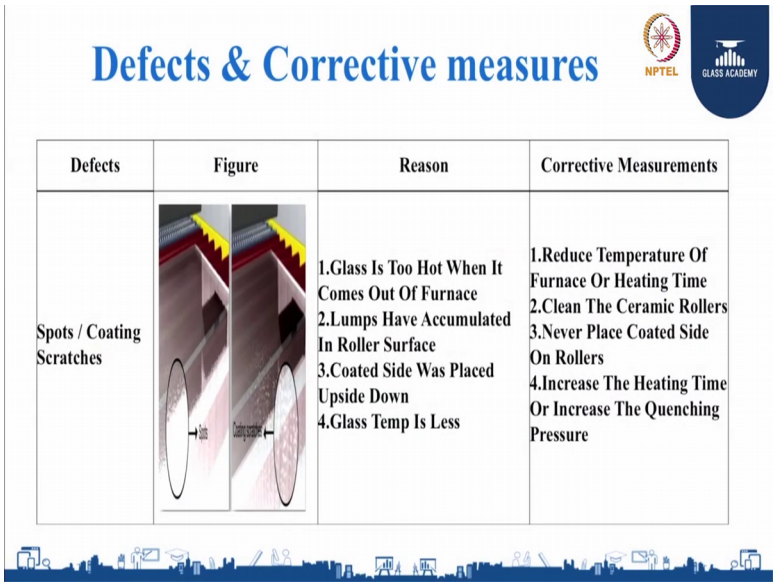

Lumps have accumulated in roller surface coated side was placed upside down glass temperature is low. Corrective measures are reduce temperature of furnace or heating time, clean the ceramic rollers never place coated side on rollers I mean glass, increase the heating time or increase the quenching pressure.

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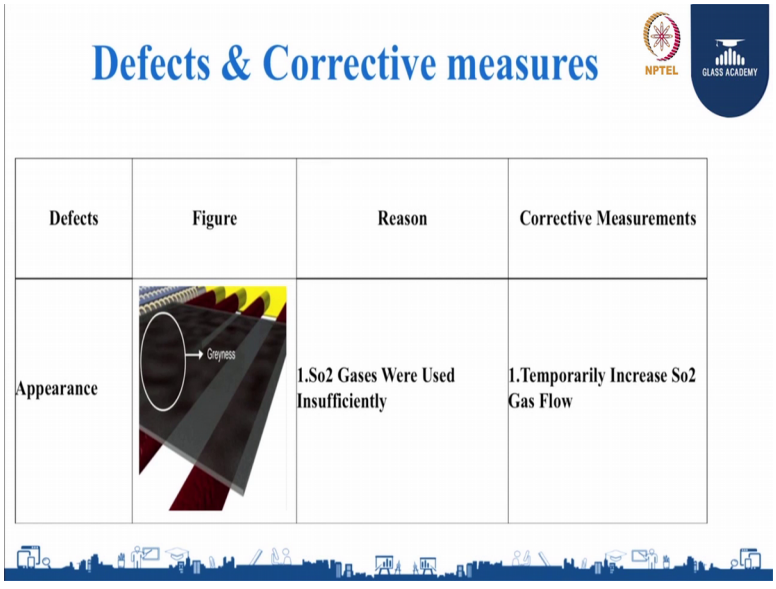

Appearance, reason is So2 gases were used inadequately corrective measure is temporarily increases So2 gas flow and appearance will come in live.

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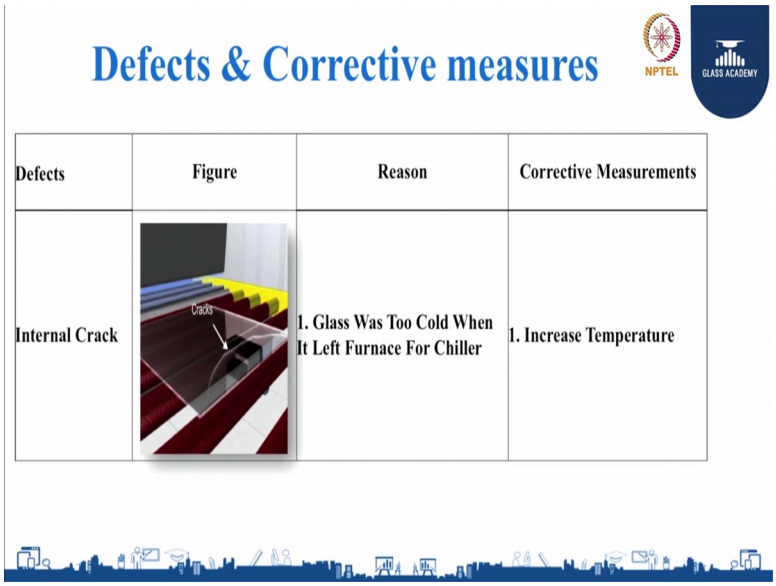

Internal crack, reasons are simple glass was too cold when it left furnace for chiller and corrective measure is increase your temperature.

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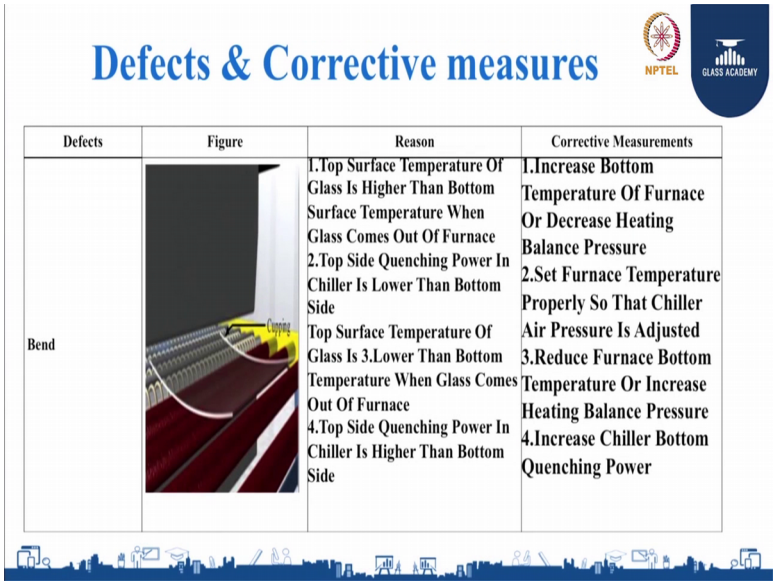

Bend observing glass, the reasons are very simple top surface temperature of glass is higher than bottom surface temperature when glass came out of furnace. Top side quenching power is chiller is lower than bottom side. Corrective measures are increase bottom temperature of furnace or decrease heating balance pressure. Set furnace temperature properly, so that chiller air pressure is adjusted. Reduce furnace bottom

temperature or increase heating balance pressure, increase chiller bottom quenching power. These corrective measures will make sure that bends are bend in glass is avoided.

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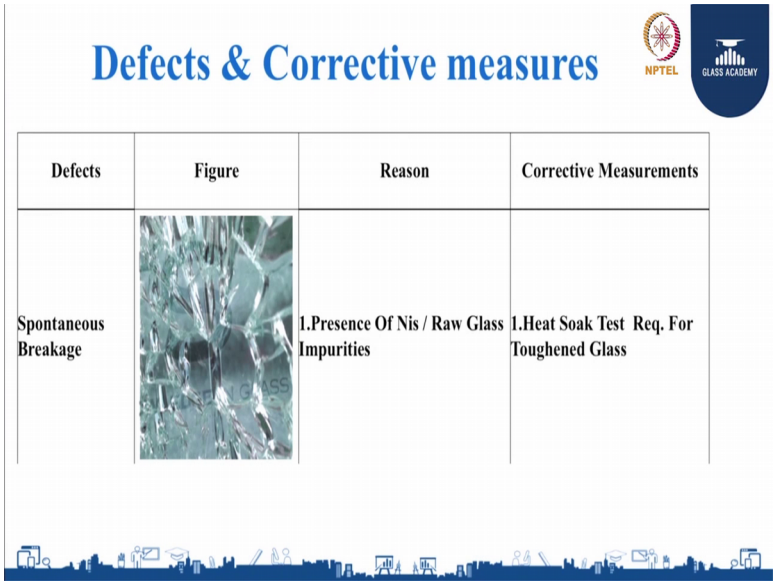

Spontaneous breakage, reason is very simple presence of Nis in raw material. Corrective measure is heat soak test can be done, so that spontaneous breakage is avoided.

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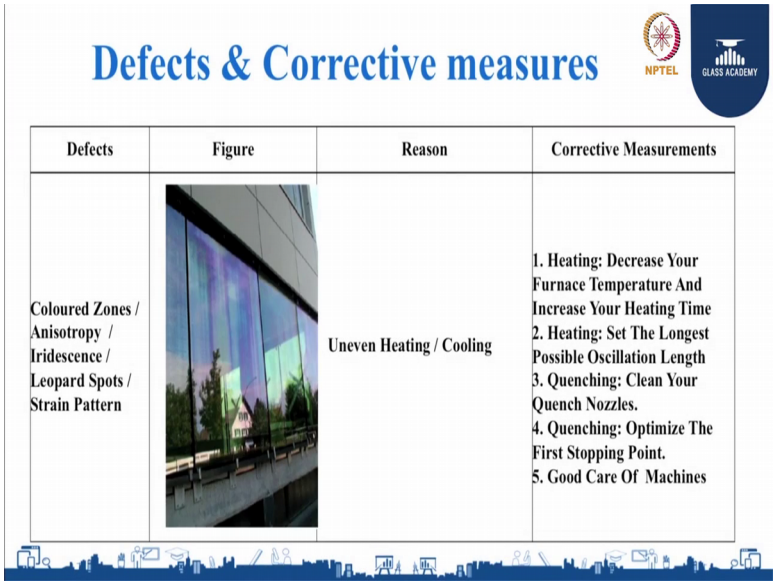

Now, coloured zone leopard spots or strain pattern, reason is simple uneven heating or cooling, decrease your furnace temperature and increase your heating time. Set the

longest possible oscillation length, clean your quench nozzles, optimize the first stopping point and of course good care of machine.

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