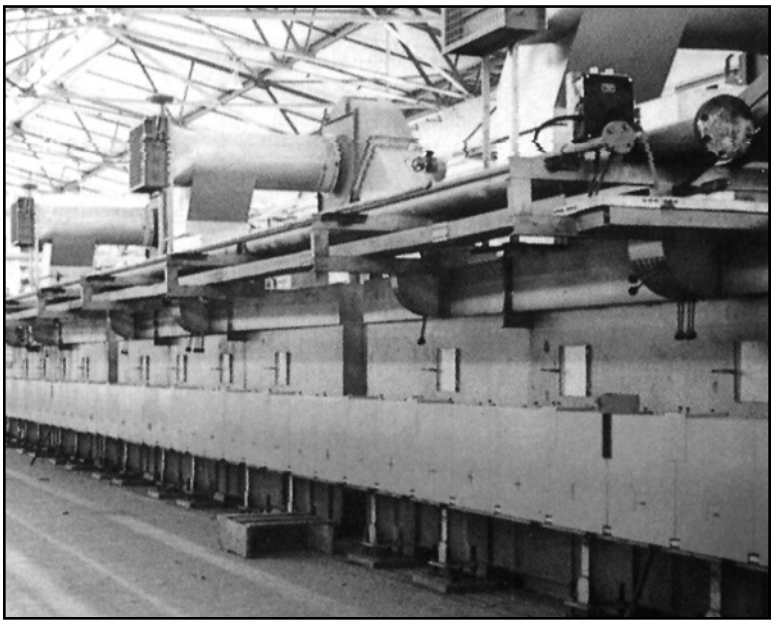
Application Notes – *AN106*

Float Glass Annealing Lehr Temperature



Typical float glass annealing lehr

After the flat glass exits the float zone oven, the glass has to be cooled in the annealing lehr. The temperature profile across the glass is quite critical. If the glass is cooled properly during it's time in the lehr, it will have a good property called cut-ability. If the glass has been properly annealed, it will be easier to cut into the final shape and there will be less breakage of the glass. The obvious goal is to get the most finished glass that is possible from the process.

The most common method to determine the glass temperature profile is to space as many as seven infrared thermometers across the lehr and observe the temperature in each of the locations. There is one basic problem with this choice of temperature measurement. Each instrument has a life of its own. These instruments can be calibrated to indicate the same temperature at a specific value but as the ambient temperature of the sensor changes, they will not be as repeatable as desired by the operator, especially when resolutions of 1 or 2ºC are required. This problem leaves the operator with the question of: "If I see a temperature difference of 5ºC from one side of the glass to the other side is it really a 5ºC difference or is some of the difference in the instruments"?

The best instrument for this temperature profile is a Line Scanner. The line scanner actually can provide a continuous line profile across the glass and can also provide a thermal picture that is easy to interpret as to how the lehr is really cooling the glass. The advantage of the scanner instead of seven thermometers is the fact that the scanner only uses one detector. Thus, when the operator sees a 1 or 2ºC change in temperature, he knows that this is a real temperature change – not a difference in instruments.

Line scanners have been installed at the entrance and exit to the lehr by many Ircon customers. However, most operators want to know the glass temperature inside of the lehr because the shape of the profile is deliberately changed as the glass progresses through the lehr. As many as three additional scanners are supplied along the length of the lehr to adjust the temperature profile as the glass proceeds through the lehr.

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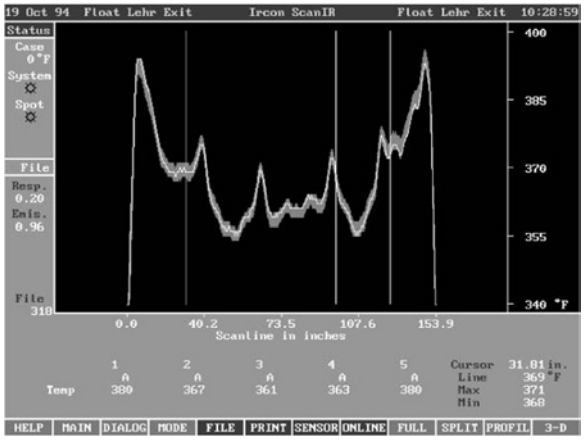
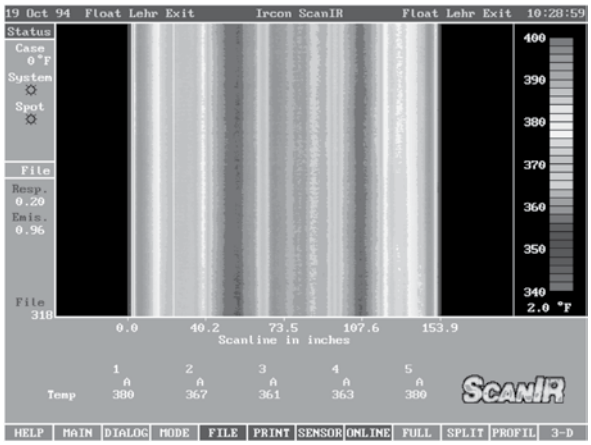
Installing a scanner in a lehr is a little more difficult than installing standard spot type instruments. First, the scanner requires an opening about 100 mm (4") wide across the full width of the lehr. Of course, this is a large opening which can upset the air flow in the lehr. Ircon has designed a special shroud and air purge which will fit over the opening and provide the proper air flow to keep the SO2 away from the lens of the scanner but does not introduce too much air into the lehr to upset the cooling rate. By the way, Ircon recognizes that it is difficult to cut this four inch slot in the lehr after it is built. We suggest that whenever you plan a rebuild or purchase a new lehr, specify that the openings be supplied and then the scanner can be installed after the lehr is installed and running.

The Ircon ScanIR has a feature of up to ten linear outputs. Each output can be matched to the cooling zones present in the lehr. As a result, a closed loop control system could be developed to automatically control the cooling of the glass at each critical point in the lehr.



Temperature profile image of float glass at the lehr exit showing cursor line temperature (Min. and Max.)



Thermal image produced by an Ircon line scanner (Scan IR) of float glass at the exit of the lehr.

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