Laminating flat glass

Andrew Weidenhamer* introduces a process to control the removal of water from interlayer materials during glass laminating.

Casso-Solar Technologies' experience in laminating flat glass stems from the traditional machines that tack the glass prior to finishing in an autoclave. Initially, machines were designed for clear glass where heating the laminate with infrared (IR) produced efficient results.

Infrared

IR energy is controlled by the temperature of the heating element. Different temperatures produce specific energy wavelengths. For example, a heater temperature of 700°C has a peak wavelength of 3.0 microns. As the heater temperature increases, the wavelength gets shorter.

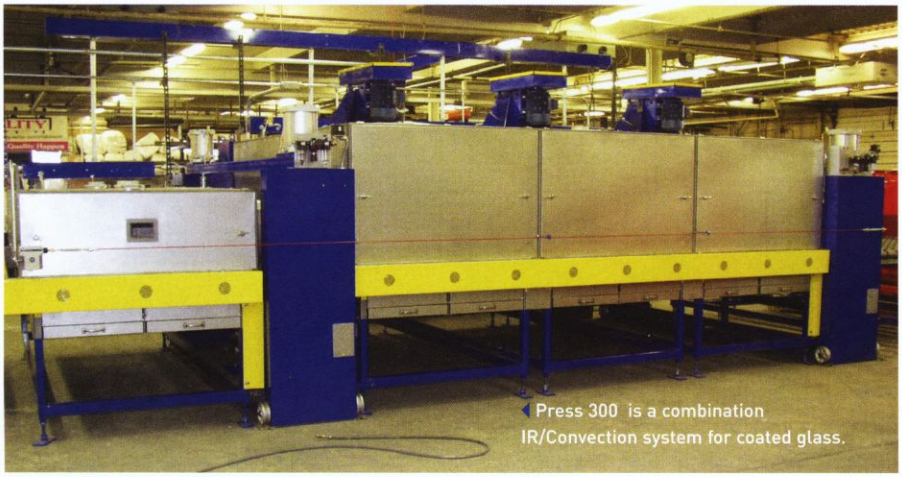
A glass surface will absorb IR energy at wavelengths of 3.0 microns and longer. Glass, depending on thickness, will transmit through IR energy of 2.5 microns and shorter. Thus the ideal condition to heat a laminate is to control the IR energy to penetrate the glass, as well as to heat the interlayer film, which indicates operating the heaters at wavelengths between 2.5 and 3.0 microns. This energy efficient method can be harnessed with closed loop control on the heater temperature.

Wavelength

When a product is run and there is too much power in the system at the optimum wavelength, it is recommended to turn off extra heaters to maintain the optimum wavelength on the heaters that are operating. Turning down the overall heater temperature will reduce efficiency and is not recommended.

Coated glass

Many coated glass products reflect IR energy and convection heating is added to the ovens to maintain process productivity. Such systems utilise medium velocity air nozzles, directing hot air onto the coated surface.



Press 300 is a combination IR/Convection system for coated glass.

Processing

Non-autoclave processing has been known for years. Polyvinyl butyral (PVB), one of the more common interlayer materials used for architectural and automotive glass, contains a small amount of water. When standard PVB is heated to curing temperatures at atmospheric pressures, small bubbles can form, representing the water coming out of solution in the PVB.

▲ Laminating press with positioned programmed press pressure, speed and gap.

Autoclaves provide heat for curing the PVB and pressure to force the water to stay in solution. Non-autoclave processing can be successful if the moisture in the PVB is reduced before or during processing and before the PVB reaches the curing temperature.

System

Casso-Solar Technologies has developed a process to control the removal of water during a vacuum/heat process.

Other interlayer materials that do not retain water are successfully processed without an autoclave. Typical photovoltaic (PV) laminating machines use such materials and can laminate with rapid cycle times also due to the thin nature of the laminate.

The system involves minimal handling and can be used on glass sizes up to 96 x 180 inches.

It is for use with architectural coated and non-coated glass, decorative glass, structural glass products, PV, ballistic and appliance glass. ■

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