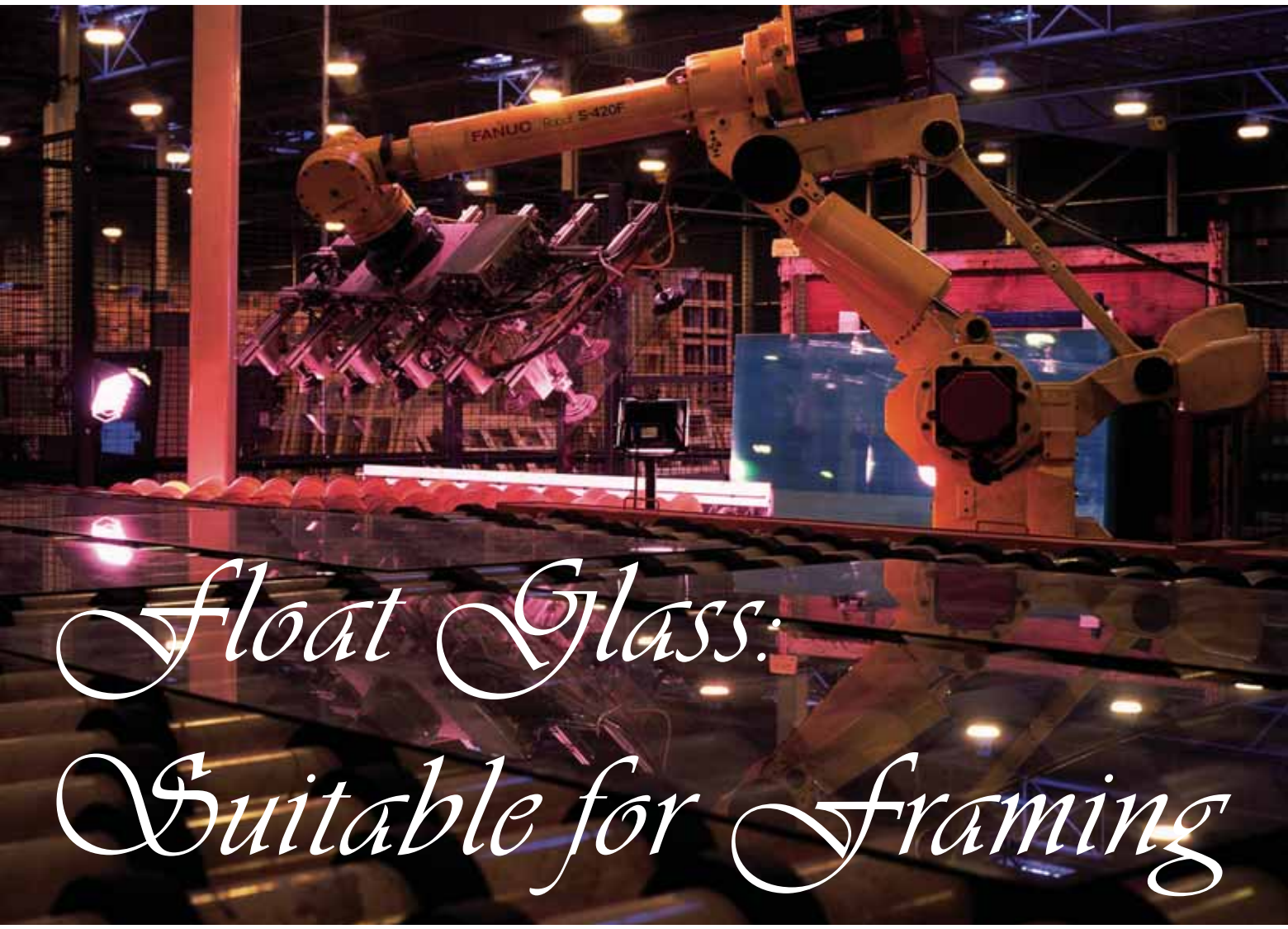

Float Glass: Suitable for Framing

A brilliant work of art, be it a painting, print, photograph, or object, deserves a great frame. But even works of artistic genius need protection from the elements—the sort of protection only glazing can provide. Until the 20th century, glass was not a common framing treatment and for good reason: flat glass worthy of framing was not perfected until the 20th century.

The practice of glass making is thousands of years old. Ancient ceramicists discovered the practice around 4000 B.C. By combining substances of unequal value and usefulness—such as sand, soda ash, and limestone—the early glassmakers learned to create something of lasting value and beauty for manifold applications. This remains true today, but the process is decidedly more sophisticated.

As far back as the 17th century, flat glass manufacturing took the form of one of two processes: first, ground and polished plate glass and later, sheet glass. Both processes were expensive and generated a lot of waste, not to mention optic flaws caused by imperfect raw material mixtures. Such glass was not ideal for protecting visual works of art, and was used primarily for windows.

The float glass process, which became the standard in the mid-20th century, proved less expensive and more efficient as it offered greater quality control. Few flat glass operations in the world today still use sheet or plate production methods, as the float process offers clear advantages. Glass produced by the float process is the type used in framing, as well as many other applications including automotive manufacturing and architecture.

In modern float glass manufacturing, the raw materials, including sand, soda, limestone, dolomite, cullet, carbon, salt cake, and, sometimes, rouge, are stored separately in silos, weighed according to the glass recipe, mixed, and then transported to the charging hopper located at the beginning of the furnace. This is the starting point of a float line that can be nearly half a kilometer long. At the far end of this line emerge the sheets of glass.

Making Float Glass

The mixed raw materials are charged and melted at a temperature of 1,500°C, forming glass. Burning fuel oil or gas can produce the heat required to achieve this temperature. The furnace holds glass for approximately three days, which gives the entrapped gases and bubbles time to escape in a process known as refining. Use of superior materials and stringent control over the melting process are essential to creating high quality glass.

The molten glass then flows onto a mirror-like surface of liquid tin, where a sheet of glass is formed by floatation. Since the tin has a much higher density than the glass, the liquid glass will form a perfectly flat sheet floating directly on the surface of the liquid tin. This step is the "tin bath."

Top rollers on either side of the float line draw out the glass to give it the required width and thickness, the latter of which can range from 1.5mm up to 25mm. Along this course, the temperature of the glass and of the tin gradually decreases from 1,100°C to 600°C. The float line delivers glass with what is called a "fire finish," as lustrous as new chinaware.

Once the glass emerges from the tin bath in the form of a continuous sheet, it flows along a roller conveyor to the annealing tunnel or "lehr." There, the glass is gradually cooled (the annealing process) so as to ensure perfect flatness and eliminate any internal mechanical stresses, which could result in breakage. When the glass exits the lehr, it is ready for inspection; in many operations today, this is done with an optical laser scanner. Next, programmed diamond wheels cut the glass to specified sizes prior to being mechanically or manually removed and sorted for shipping. (The robotic glass loader seen on the previous page is performing this action.)

At the "hot end" of the float line, the ingredients for glass are loaded and melted. This begins the manufacturing process, which results in sheets of glass at the end of the line.

A control room, such as the one seen here, can be found in a modern float glass manufacturing facility. Here, the forming glass can be monitored throughout the entire process.

A continuous sheet of glass begins its exit from the manufacturing area, at the "cold end" of the float line.

As mentioned earlier, float glass is used in a variety of ways, including automotive applications, construction, and picture framing. When produced for these applications, the glass often receives specialty treatments after fabrication, such as ultraviolet (UV) blocking properties and/or non-glare coatings.

Because of high iron content, ordinary float glass has traditionally had a green tint. As the technology for glass production has progressed, float glass without that greenish tint has been developed, providing a choice that many framers have sought for their work. We, at Guardian, have introduced the Extra Clear line, which reflects those innovative properties. Framers have long sought glass that doesn't dull or distort the true color spectrum of framed images and this type of float glass offers that characteristic. ■

The text of this article was provided by the staff at Guardian Industries.