Decorating large format glass

MIKE YOUNG OUTLINES SOME TECHNIQUES TO SCREEN PRINT AND ROLLER COAT ARCHITECTURAL GLASS

FIGURE 1: A FULLY AUTOMATIC, IN-LINE, LARGE FORMAT GLASS SCREENPRINTING MACHINE

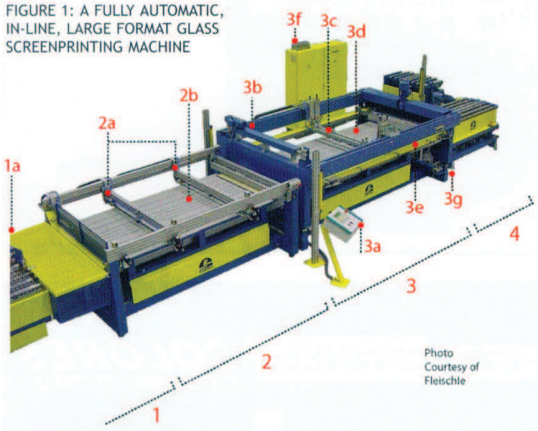

Photo Courtesy of Fleischle

For many reasons, architects today are rapidly changing the way the exteriors of buildings look by incorporating glass as a distinctive and important feature of their design. This modern approach is an ideal construction solution in terms of cost reduction, energy conservation and meeting environmental concerns. The aesthetic appeal no longer stops at the exterior, but has also found its way into interiors as a unique solution, both as a breathtaking decorative resource and as a superb approach for partitioning or concealing.

Although it was once considered exotic from an architectural standpoint, the use of printed or colour-coated glass is almost endless and is incorporated in some of the most prestigious building projects today. More and more exterior/interior doors, shower/bath enclosures, vanity tops, shelving, mirrors, partitioning, walls, skylights, ceiling canopies, elevators, balustrades, stair treads, table stops and floor tiles are fast becoming the popular glass-made items receiving colour, pattern or textured finishes.

Regardless of its function, size or colour, all architectural glass (as opposed to automotive or appliance glass) that is either printed or roller coated shares two commonalities:

FIGURE 2: A REVERSE ROLL COATER WITH POWERED INFEED AND OUTFEED CONVEYORS

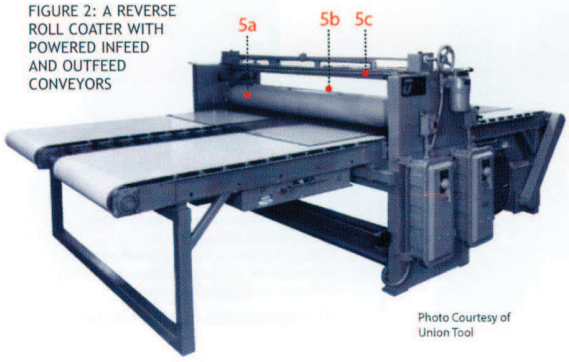

Photo Courtesy of Union Tool

the need to obtain a uniform deposit layer over the entire surface and to be processed in a clean environment.

A SOPHISTICATED PRINTING SYSTEM

Screenprinting has tremendous versatility to give a full monolithic flood, tints/transparencies from 10% to 90%, selective patterns to textured, and multicolour. However, the printing machines must be of robust construction to overcome the limitations of the screening process with large-format glass panels, to ensure full and uniform coverage without the obstacle of the 'sweet spot' in the middle of the screen.

It is important to realise this need because, unlike automotive glass printing where only about 10% of the glass surface is printed, most architectural glass requires a full coverage, either as a solid or image, on its entire surface. There are the factors of size, glass thickness and weight to consider when handling. Altogether, the mechanical stress and desired quality demand from the process are significantly greater than those experienced elsewhere with other forms of flat glass printing applications.

A question frequently asked by glass processors, "Why use a complex, sophisticated printing machine to print just one piece of glass or a limited run?" can be answered quite simply: a well designed and built printing system will yield top quality print results, superior to many that can be printed manually, and at a significantly faster production rate. For image, pattern, tint or textured finishes, application by screenprinting is the leading and most cost-effective method.

REPEATABLE OUTCOMES

The mechanical stability of the screening process leads to a predictable, repeatable outcome to obtain quality results quickly, day after day. For highest opacity, a roller coater becomes a preferred method to apply the coating.

While roller coating cannot provide an image or pattern to the glass, unlike screenprinting, it can deliver varying coating thicknesses to produce a solid opaque deposit, usually referred to as spandrel. For many glass processors it is becoming normal to have both coating systems available, working together to create the products conceived by architects and interior designers.

A typical large format architectural glass decorating line consists of three elements: a screenprinter, roll coater and dryer.

THE SCREENPRINTER

Glass panels are first washed and dried in a washer, which is a prerequisite to obtaining a blemish-free printed image or coating if roller-coated (section 1 of figure 1). Just before the cleaned glass panel exits the washer it enters the 'print/coating' room, usually climatically controlled for best results, which houses the printer and/or roller coater (point 1a).

The transfer or load conveyor manually feeds glass or uses an optional pre-squaring unit (as shown) to pre-position any size, shape or thickness. Section 2 of figure 1 shows the quick adjustable pre-register stops (2a) and robust transportation conveyor system built into the table surface (2b).

Section 3 of figure 1 shows a fully automatic, in-line, large format architectural glass screenprinting machine. Semi-automatic models are also available, where glass is manually fed and registered, as well as 3/4-automatic models where glass is automatically transported to the print table then manually registered.

An operator-friendly LCD display control panel is situated on a moveable stand to store recipes for quick setup recalls (3a). A heavy-duty constructed print head (3b) and a strong, non-flexing squeegee assembly unit are integral, with a built-in 'anti-drip' squeegee system which prevents ink from dripping onto the image area when flooding (3c).

The machine includes a flat print table for uniform printing on thin glass (3d), with built-in features for fast setups such as laser alignment, adjustable register stops and pneumatic screen clamping (3e). A main control cabinet is built to

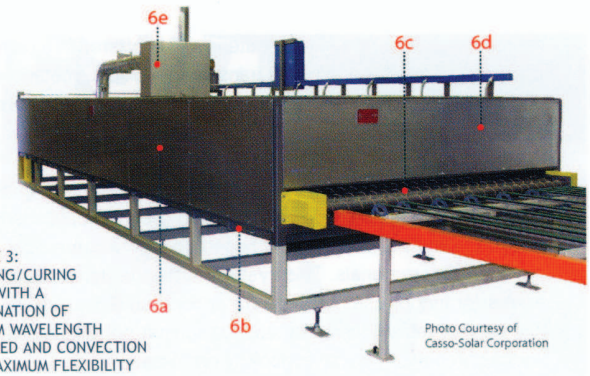

FIGURE 3:
A DRYING/CURING OVEN WITH A COMBINATION OF MEDIUM WAVELENGTH INFRARED AND CONVECTION FOR MAXIMUM FLEXIBILITY

UL508, CSA and NEC2006 codes (3f), and equipment is compact in size to free up valuable floor space (3g). An on-conveyor inspection area checks print quality before the printed glass goes into the dryer (section 4 of figure 1).

THE ROLL COATER

A reverse roll coater applies a full flood coating directly onto uncoated glass or over a previously screenprinted image. Power in-feed and out-feed conveyors interface with other system components (figure 2). The rubber-covered coating roll is grooved to handle ceramic or silicon-based coatings as well as other types (5a). The stationary doctor roll regulates the amount of coating transferred to the glass (5b).

THE DRYER

This consists of a drying/curing conveyor oven with a combination of medium wavelength IR and convection for flexibility and efficiency. The drying system must be suitable for water, miscible ceramic or silicone-based mediums as well as epoxies and other decorative inks. Due to residual heat generated by the heated ovens, they are positioned outside the 'print/coating' room so as not to upset its climatic conditions (figure 3).

An insulated enclosure with accessibility to the interior for maintenance (6a) and clean-out provisions for broken glass (6b) are included. A conveyor system, such as the driven roll conveyor with spiral wrap Kevlar rope shown (6c), will safely transport and track the glass through the oven.

A combination of medium wavelength electric infrared and convection to efficiently transfer energy to the ink/coating while scrubbing away the evaporated materials from the coating surface is also integral. Due to various demands of coating types, the drying system should have the ability to run either IR by itself or in combination with convection. The controls should also be closed loop for repeatability (6d). An effective exhaust system is needed to remove evaporated by-products from the oven to the outside (6e).

THE END PRODUCT

The most successful glass printing or coating operation is built around the people who run it. Cleanliness, equipment maintenance, environmentally controlled conditions for repeatability, and defined process procedures all contribute to producing a quality finished product. ■

ABOUT THE AUTHOR:

CASSO-SOLAR TECHNOLOGIES

506 Airport Executive Park
Nanuet, NY 10954
www.cassosolartechnologies.com
1-845-354-2010