

Screen Printing: A Versatile Solution for Glass and Ceramics

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April 1, 2016

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Screen printing has been a reliable and cost-effective technology for printing on a variety of glass and ceramic substrates for many years. Preferred in the packaging and decorative industries for its superior color vibrancy and image durability, the screen printing process can be adapted to innumerable flat and three-dimensional objects—large and small—with predictable quality and consistency, even over long production runs.

Advances in large-format screen printing machinery and integrated automated systems have led the way to significant growth in screen printing on glass for industrial and architectural applications such as automotive glass, building materials, home appliances, furniture, and high-end electronics. Screen printing on glass is also playing a major role in the rapidly expanding pharmaceutical and cosmetics products industries.

Providing high image quality through precision engineering and control while also being flexible and dependable, screen printing remains a dominant mass-imaging technology. The adaptability and cost-effectiveness of screen printing on glass and ceramics, particularly in production environments, ensure its continued viability. At the same time, researchers and engineers are constantly developing and refining screen printing on glass technologies for new uses and emerging industries.

To remain competitive in today's marketplace, commercial printers must minimize costs while maintaining high quality and image repeatability over long production runs. The special technical considerations of printing on glass surfaces make screen printing solutions even more attractive to engineers and production managers.

Clear Advantages

For commercial printers balancing cost and quality considerations, screen printing on glass provides significant advantages in quality, durability, versatility, and reliability. Modern screen printing equipment and materials provide printers with a broader color palette and superior color saturation. The thicker application of ink to substrate means more pigments than digital imaging, resulting in richer, more vibrant colors. Screen printing also allows the introduction of custom colors and special effects into the printing process.

Heavier ink coverage in the screen printing process also results in outstanding image durability compared to digital printing. Coatings and additives can be introduced to inks to enhance resistance to ultraviolet (UV) rays, moisture, chemicals, and scratching so that screen-printed images can be used outdoors and in other harsh or extreme environments without fading or wearing.

Screen printing processes are adaptable to a much wider range of substrate shapes than other printing technologies. A greater variety of inks is available to printers, including metallic and unique specialty inks. Screen printing is favored for most forms of high-volume glass printing production. Because of the consistency and stability of the screen printing process, it is preferred for large quantities and long production runs. Moreover, the reliability of the proven technology makes screen printing more cost-effective than digital printing, which may require frequent costly software and equipment updates.

Three-Dimensional Glass Substrates

Screen printing is particularly suitable for glass surfaces because it is easily adaptable to an almost unlimited variety of three-dimensional objects. Because of this versatility, screen printing is the preferred technology for glass and ceramic decorative and packaging applications. The beverage, cosmetics, and pharmaceutical industries rely on screen printing for aesthetic appeal and image accuracy in an increasingly competitive global marketplace.

Glass is commonly used as a packaging material for items such as bottles, jars, food containers, and cosmetics dispensers. Research shows that consumers prefer glass packaging for food and drink because it is perceived as healthy, safe, and environmentally friendly. Printing directly on the glass surface has several inherent advantages over adding adhesive labels—advantages that can be both aesthetic and functional.

Bottles, jars, boxes, bowls, wine glasses, beer mugs, tumblers, cups and much more can all be printed with attractive decorative designs. These items may also be printed with logos, slogans or other promotional content. Event-specific custom-printed items are among the most popular and effective promotional materials available to advertisers and marketers. Specialty coatings, such as metallic or reflective inks, are often used in conjunction with these types of campaigns.

In addition to its greater design flexibility and higher image quality, screen printing offers economic advantages over paper labelling, eliminating the costs of label application. It also results in increased label durability. Silkscreen-decorated bottles arrive at the bottling line ready to be filled and packaged, eliminating the cost of adding labeling machines to production lines. The superior durability of ceramic screen-printed labels adds value and reduces costs. Ceramic labels are not damaged or removed during shipping and handling, and are consistently less vulnerable to wastage in warehouse or retail environments.

Cosmetic industry applications include pill bottles, spray bottles, tubes and jars. The quality of screen-printed images reinforces brand prestige and supports the retail price point. Consumer perception of glass as a high-end packaging material is greatly enhanced by screen printed decoration. Some European cosmetics manufacturers have led the way in printing warnings and instructions directly onto the packaging, eliminating the need for labelling and becoming more environmentally friendly, which has a strong consumer appeal.

The biomedical and pharmaceutical industries offer opportunities for significant growth for glass printing in the 21st century. Screen printing is increasingly used to print on blood pressure bags, syringes, IV bags, sample dishes, microscope slides and other sensitive three-dimensional surfaces. Printing on medical devices and tools creates a unique set of challenges, including printing on irregular surfaces and specially treated glass. In some applications, Class IV medical-grade inks, which withstand frequent sterilizations, can be used. As with other applications, screen printing excels at maintaining image consistency at high volumes.

Flat Glass Substrates

The most significant growth in screen printing on glass in recent years has been centered in the automotive and architectural glass industries. Large-format automatic screen printing systems capable of handling a wide range of substrate sizes and weights allow precision registration of windows and large glass panels for high-quality screen printing.

Printing can range from decorative (e.g., graphics and logos) and informational (e.g., labels and instructions) to functional (e.g., antennae or window defrosting elements). Complex integrated modular systems may include automatic scratch-free conveyance of the glass panels, inspection stations, drying and curing units, and storage solutions.

Glass is increasingly ubiquitous in building design and construction, creating a host of opportunities for screen printers. Printed glass panels may be used in both interior and exterior construction, including large-format exterior facades, windows and doors, decorative panels, inserts, mirrors, and tiles. The superior durability of screen-printed images is especially suited to exterior applications.

The most common glass printing uses within the appliance industry include refrigerator shelves and drawers, ceramic oven tops, oven windows and control panels, flat screens for televisions, and computer screens. Screen printing technology improves the appearance and functionality of all these items and contributes to overall production efficiency. Other opportunities for growth in printing on flat glass include point-of-purchase and outdoor advertising, which increasingly use glass, ceramic, and similar materials for a clean, modern look and appeal.

The Clear Choice

Today's screen printing machinery and materials feature state-of-the-art engineering that leads to ultra-precise registration and process control. Systems are typically customized to fit operational specifications.

The stability and dependability of screen printing equipment, systems, and processes make them cost-effective for large manufacturing facilities engaged in long runs or complex graphics reproduction jobs. From a production management perspective, maintenance, repairs, replacement parts, and new components are economical and simple to implement or install. This increases output, accelerates adaptation timelines, and reduces downtime for screen printing systems.

To remain competitive in today's marketplace, commercial printers must minimize costs while maintaining high quality and image repeatability over long production runs. The reliability and versatility of screen printing make it the intelligent choice for printing on glass. Moreover, the color vibrancy and superior durability of screen-printed images make them effective in complex glass printing applications.

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