

Decorative innovation via organic inks

Guy Massé summaries how using organic screen printing inks can help innovation by providing solutions for high quality decoration.

For a long time, manufacturing for surface decoration of glass was a difficult and limited process. This resulted in useful but classic and conventional designs. Designers found that process constraints limited their ability to create packages and showcase products. With the range and quality of organic inks today, there are endless possibilities when enhancing and designing product images.

Since the beginning of organic inks for the decoration of glass and ceramics, printers have enjoyed the benefits of switching from enamels to organic solvent-based, UV-based or thermoplastic inks. Users have benefited from an increased high gloss level, saturated intense colours, heavy metals-free formulations and the ability to reduce lehr temperatures.

In addition to offering cost savings to printers, organic inks for glass also offer innovative special effects, while increasingly meeting the durability requirements of several diverse markets within the glass printing sector.

FLAT GLASS

In the flat glass industry, the decoration of gaming machines, furniture, appliances, shower doors, mirrors and mobile phones is in high demand in regard to special products like phosphorescent inks, pearlescent or glitter effects, matt and frosted finishes, as well as metallic effects. Solvent-based mirror-like inks for printing on the reverse side or chrome inks have become increasingly popular.

Traditionally, an acid etching process is used for frosting shower glass. Organic screen printing inks can create special frosted effects as an alternative to the expensive glass etching process. These inks also meet the water-resistant requirements for this application.

COSMETICS

The cosmetics packaging industry is very image-conscious. With the use of organic inks, glass containers can be decorated in innovative and creative ways.



Screen printed touch panels and cover glass.

One of the major trends in beauty package decorating is the surge in 'flankers', products introduced in the same bottles as existing products in the line. Identifying the brand with a consistent image, this is a cost-effective way to create an attractive package, while minimising the risk of launching another product. The burden of innovation is thus switched from bottle shape to container decoration.

No matter what the package material and shape choice, beauty brands are benefiting from the innovation potential of organic products. Beside the latest spray decorating techniques, the screen printing process offers interesting special effects; fluorescent, phosphorescent, pearlescent/glitter effects, metallic inks, relief varnishes and of course, matt/textured and haptic varnishes. All these different products and decoration possibilities help to meet current design trends, including eco-friendly appearances, technological themes, whimsical and vintage looks and of course, the look of luxury.

ADVERTISING SPECIALITIES

The advertising specialities industry is also looking for special effects such as metallic, glitter or matt and frosted finishes for bar ware including mugs, drinking glasses, ashtrays etc. Organic inks have a great advantage with this application when compared to decorations with ceramic inks.

BEVERAGE PACKAGING

If mineral water bottles, soft drinks or beers constitute a small and event-driven market for high quality decorative innovation, it is not the case for liquor and especially the vodka market. Organic inks can bring great creativity to this industry, yielding wonderful results.

In this area, everything seems possible: Intense fluorescent colours, invisible luminescent and phosphorescent inks, compatible with a clubby atmosphere and its UV black

lights; thermo-chromic inks used as freshness indicators or touch-reactive (body heat) interactive prints; pearlescent, OVS (Optical Variable Shade) glitter effects; metallic and chrome inks; matt, textured, haptic, soft touch finishes etc.

Windows on frosted glass bottles can be easily produced using organic inks. To create a special 'transparent window' effect on an acid matt glass surface, it is possible first to print an organic mask onto the glass surface and then use a special etching process to obtain a clear transparent window on a matt finish. The manufacturer can also simply print this transparent clear window varnish effect directly onto the etched matt glass or matt-coated glass surface during the decoration process. Compared to the masking and etching process, this special decoration technique is much more economic.

ORGANIC SOLUTIONS

Organic inks provide the following special effects to create distinct and special decorations.

FLUORESCENT, LUMINESCENT AND PHOSPHORESCENT INKS

Under daylight exposure, fluorescent systems will appear intensely coloured, with bright and pure shades. These substances absorb UV light or the short waves of the visual spectrum - or both - and convert them to a visible radiation, reinforcing the normal colour. Using 'daylight fluorescence', such products are more simply termed 'fluorescent inks'. They are available in UV or solvent-based formulations and satisfy most indoor and short life outdoor applications.

However, due to their chemical nature, fluo pigments and thus inks present a poor light fastness and do not resist to temperatures up to 90°C over long periods (oven temperature has to be decreased at the minimum possible for printing with solvent-based formulations). Printed bottles

have to be protected by an opaque film during storage.

Some of these substances have the property of exhibiting fluorescence only under UV exposure, thereby producing vivid colours in the visible spectrum. The fluorescent effect is negligible when the excitation is switched to the visible region in the form of artificial or daylight illumination. Using 'ultra-violet fluorescence', such products are incorrectly termed 'optical brighteners' for the blue fluorescence, 'invisible inks' or 'luminescent inks'. Hardeners have to be properly selected to avoid possible quenching occurrence and thus loss of luminescence.

In phosphorescent systems, there is an appreciable delay between absorption and emission of light, creating an afterglow. Phosphorescent inks are thus characterised by their ability to absorb and store light energy and release this energy for a long period in darkness.

PEARLESCENT INKS AND VARNISHES

These inks contain pearlescent or nacreous particles, mica platelets coated with titanium dioxide (silver whites) and/or metallic oxides (metallic pearls and interference pearls). The pearlescent effect is produced by the specular reflection of light from the many surfaces of the platelets with parallel orientation at various depths within the coating film. Light striking the platelets is partially reflected and partially transmitted through the platelets. A pearly lustre effect is produced by the dependence of reflection on viewing angle and the sense of depth is created by reflection from many layers.

Screen printed beverage bottle.



OVS (Optical Variable Shade) inks contain colour shift pigments, changing in shade depending on the light angle.

GLITTER AND POLYESTER GLITTER INKS

The brilliant and sparkling effect is produced by the specular reflection of light from the many surfaces of the platelets, with parallel orientation at various depths within the coating film. Light striking the platelets is partially reflected and partially transmitted through the platelets.

More transparent than coated micas, these sequins provide more chroma, more depth and a more important sparkle effect. Polyester glitters are made of opaque tinted metallised polyester particles.

METALLIC INKS

Metallic colours have been available for a long time. More recently, interesting advances have been introduced such as mono-component, stable, UV silver inks, solvent-based mirror inks and UV chrome inks.

Now, organic screen printing provides quality results as far as brightness is concerned, nearly equaling the brightness achieved in hot stamping or direct printing with gold and silver paste. However, this process is far more economic and organic inks provide a perfect alternative.

Mirror inks are used for second surface decoration of glass. While drying, the metal pigments are aligned parallel to the substrate's reverse side. Viewed through the transparent material from the first surface, the pigments create a mirror-like effect. Depending on the optical surface condition of the glass, mirror inks can attain a quality near that of conventionally produced mirrors.

Recently developed UV chrome inks are suitable for printing on the first surface of the glass. In comparison with second surface solvent-based mirrors, the gloss level is slightly lower but on dark high gloss surfaces, impressive chrome effects can be achieved.

THERMOCHROMIC INKS

On absorption of thermal energy, thermo-chromic inks transition from a coloured state to an uncoloured state. The ink is composed by micro-capsules which change colour reversibly when heated to a specific temperature and back to the original colour as the coating is cooled down.



By playing on the transparency levels, screen printing helps to realise added-value effects. The inks are printed on the rear of the covers.

The only way to change from one colour to another is to mix a thermo-chromic colour with a regular one.

By mixing different thermo-chromic inks with different temperature ranges, it is possible to attain an ink with three shade moves. These thermo-chromic inks can be proposed in UV-based or solvent-based formulations.

RELIEF VARNISHES

The printing of thick, tactile layers can have different functions:

- As a graphical effect, often referred to as 'high built', in order to highlight specific areas or to print water drops or other raised patterns.
 - As a readable text (Braille) or tactile warning symbols.
- Besides the clear varnishes, a combination of effect pigments with relief varnishes can be interesting. This combination is described best as 'tactile print finishing'. Colourful glitter pigments, flip-flop, pearlescent effects and many others can be used to achieve high impact graphics.

MATT, TEXTURED, TACTILE (HAPTIC) VARNISHES

There are even more possibilities with organic screen printing products for matt, textured, touch effects for creative design. The screen process is the ideal technique for haptic effects, as high layer thicknesses are possible. The screen process can produce a large number of different tactile effects, such as gloss varnishes with a smooth surface and structure varnishes with different degrees of roughness, ranging from very fine to very coarse. Other examples are bottles with an anti-skid surface.

There is a real expectation in decoration solutions from the different segment of the glass industry. Encre Dubuit is confident that screen printing organic products, less technically limited than enamels, can help designers and printers to find high quality decorative innovation. This is why the company's R&D laboratory will continue looking for original solutions to embellish the glass substrate. ■

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