Evolutionary stages of direct laser engraving

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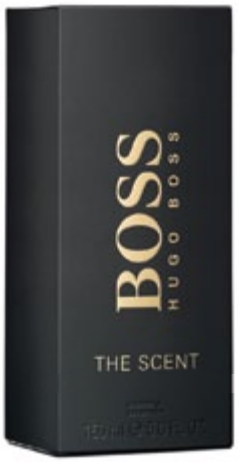
The development of direct laser engraved elastomer flexographic printing forms has been remarkable. Now used in all kinds of applications, they match the quality of digital photopolymer flexographic printing forms.



Direct laser engraved elastomer flexographic printing forms can be used for printing and surface finishing on all kinds of products

Some market players still regard direct engraving as a crude, primitive technology. This view dates back to a time when elastomer printing forms were only used as rotary forms for linework applications such as print marks, and for full-area white and varnish printing. The reason for this restricted range of applications was that laser systems used to have a limited wavelength, which meant they were unable to reproduce the finest linework and screens.

From niche existence to high-end technology

Nowadays, IR (infrared) fiber lasers with a wavelength of around 1064 nm are used for high-quality direct laser engraving. They can reproduce screen rulings of up to 80 l/cm and the finest of lines down to < 10 µm. This rapid development is not confined to the lasers, though. A great deal of progress has also been made with engraving materials. To maximize quality, it is vital for the laser and material to be in perfect harmony. Close cooperation between material suppliers and leading manufacturers of laser systems ensures the right product is always available for their customers. The demands a high-quality flexographic printing form needs to meet are clearly defined.

The printing form must minimize dot gain in the highlights, reproduce vignettes cleanly with the maximum tonal value range and transfer a homogeneous layer of ink with even coverage. Alongside these visual prerequisites for high-quality flexographic printing, other key market requirements include run stability and durability. Today's directly engraved printing forms meet all these demands to the full. Current engraving materials accurately reproduce the finest of screen dots and line elements in every detail. A key factor in achieving this result is optimum absorption of the laser energy, which enables targeted removal of the material with tolerances in the low single-digit µm range. Besides lasering the material accurately in every detail, good ink transfer is also a must for high-quality flexographic printing. In recent years, the surface tension and surface finish of materials have been continuously optimized for this purpose. The smoothness and printing density results now achieved are comparable with those of photopolymer printing forms.

"The applications of direct laser engraving extend beyond those of conventional flexographic printing."

Elastomer printing forms exhibit outstanding ink transfer properties. Using a laser, however, it is possible to influence the surface structure and further optimize ink transfer in line with the relevant application. Fine screen dots, clean vignettes, and high-resolution line and surface structures require excellent modulation and thus a sufficient number of pixels. Consequently, a standard resolution of 5080 dpi has established itself for high-quality elastomer printing forms.

When it comes to economic considerations, elastomer printing sleeves in particular cost far less than photopolymer equivalents. The resistance of today's EPDM materials to solvent/water-based and UV inks, together with their high mechanical resistance, ensures long service lives in production. This in turn is reflected in excellent profitability. Direct laser engraving is suitable for a wide variety of applications. Direct engraving has been well established for many years in conventional flexographic printing, but it has gradually branched out to cover a number of additional applications that offer significant potential.

Offset coating/varnishing

In offset printing, spot coatings/varnishes are increasingly being used to enhance the decoration of packaging. These were predominantly applied using plotted blankets and photopolymer flexographic printing plates in the past, but direct laser engraving is now opening up completely new surface finishing options for offset print products.

The ground elastomer surface results in outstanding transfer, and an exceptional gloss level is achieved with both dispersion and UV coatings/varnishes. Moreover, EPDM flexographic printing forms exhibit excellent long-term resistance when printing these types of coatings/varnishes. In sophisticated designs, fine details need to be reproduced to create interesting visual and tactile effects. EPDM printing plates for coating/varnishing are available with both aluminum and high-strength plastic substrates. In addition to their impressive technical properties, EPDM printing forms for this kind of surface finishing are available at an extremely attractive price.

Dry offset

Metallic printing plates coated with a polymer are normally used in dry offset printing. The print quality of the available printing plates used to be limited due to restrictions in the manufacturing and printing process. Thanks to directly engravable EPDM flexographic printing plates with a metal substrate, however, it

Source: Hell Gravure Systems

The new PremiumSetter D1000 from HELL Gravure Systems is designed for direct laser engraving of flexographic printing plates

is now possible to reproduce the finest screen resolutions. The engraving resolution is up to 5080 dpi. This big improvement in quality is making dry offset printing more competitive when compared with IML (in-mold label) technology, which is used to finish cups with offset-printed labels.

Flexible packaging

Although photopolymer flexographic printing forms are the undisputed number one in flexible packaging, direct engraving offers an extremely attractive alternative. Hybrid operation is possible with direct engraving systems. In other words, both printing plates with conventional plastic substrates and endless printing sleeves can be produced on the same machine. Screen resolutions are similar to those of photopolymer printing forms. Resolutions of up to 80 l/cm can be achieved, depending on the printing method and material used.

"One big advantage of direct engraving is that the printing form is available fast."

Hygiene products

Elastomer rotary printing forms have always been used for printing on products such as napkins, diapers and kitchen roll. The designs are often continuous and the printing materials have a very coarse texture. Robust EPDM flexographic sleeves combine good ink transfer with an exceptionally long service life.

Improvements in laser technology have led to a significant increase in quality for hygiene products, too. The screen ruling is no longer restricted by the laser technology, but rather by limitations in the printing process.

Special applications

Even embossing forms can now be made using special hard elastomers – a far cry from packaging printing and a highly cost-effective solution for small batch sizes, where the embossing form is not subject to excessive mechanical stresses. The high-quality resolution of the engraving process also provides access to security printing markets and technical print applications such as printed electronics.

The smart solution for in-house production

One big advantage of direct engraving is that the printing form is available fast – in under an hour, depending on the size. This is of particular benefit to printers making their own printing forms in-house.

The equipment consists of just a few units with an extremely small footprint. The engraving system is easy to operate and does not require a great deal of specialist knowledge.

To sum up, direct laser engraved flexographic printing forms are now used in all kinds of sectors. They have quickly made the transition from niche product to well-established high-end application.