



The wide range of applications for direct laser engraving

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Hell Gravure Systems held its first Hell Laserday in June of this year at the company's headquarters in Kiel. The remarkable thing about this event was not the presentation of a "sensational" new technology, but the impressively high degree of maturity that laser direct engraving has already reached. Whether in packaging, tissue, decor, automotive, security or anti-counterfeiting, laser direct structuring is now a sought-after technology that is being used in more and more areas. In this context, three presentations offered highly interesting insights into today's practical applications of laser direct engraving.

With the innovative 'Plate on Demand' concept, Hell Gravure Systems aims to realise standardised, sustainable and demand-oriented plate production directly at the flexographic printing press

After years of intensive development, laser direct engraving has arrived in tool manufacturing for the printing and converting industry. Not only does it meet the most diverse and high quality requirements, but the single-stage and dry process is also sustainable and environmentally

friendly. It is therefore not surprising that the Cellaxy platform-based system solutions developed by Hell Gravure Systems for direct laser engraving of gravure cylinders and embossing rollers and the PremiumSetter for direct engraving of flexographic printing plates are attracting great interest.

Direct laser engraving takes the complexity out of the process

In his welcome address, Adam Rid, CEO of Hell Gravure Systems, emphasized the diverse and expanded applications of direct laser engraving for surface structuring of elastomeric and metallic surfaces. "Compared to complex craft methods and chemical processes with their numerous and costly production steps, laser direct engraving shortens and simplifies the workflow in the production of gravure cylinders, embossing and coating rollers, flexo printing plates and flexo rotary printing formes. The industrial process of laser direct engraving is stable, reproducible and sustainable".

Extended possibilities in cylinder production

4Packaging has been producing laser-engraved gravure cylinders for over 15 years and is thus considered a pioneer and trailblazer in



Source: Hell Gravure Systems

direct laser engraving. Today, the Dissen-based German prepress service provider has four Cellaxy laser systems integrated into the fully automated and highly standardized production process as a prerequisite for flawless, high reproducibility.

“Direct laser engraving with Cellaxy expands the application-specific spectrum in the production of cylinders and special transfer rollers for high-quality package printing and other areas of application”, says David Möller, CEO of 4Packaging. The Cellaxy device directly lasers into copper at a resolution of up to 2000 l/cm, enabling it to reproduce halftones with greater nuance and contrast than electromechanical engraving due to the finer tonal gradations. Another advantage is that the halftone screens are calculated helioconformly, so that electromechanically engraved cylinders and Cellaxy lasered cylinders can

be printed in combination (mixed operation). In addition, a contour sharpness equivalent to the quality of the etching process can be achieved. A special algorithm for optimizing the edge pads ensures smooth and closed contours in printing.

In contrast to electromechanical engraving, Cellaxy is virtually free to define a wide variety of cell geometries.

For example, direct laser engraved autotypical cells (variable-area cells with relatively low but equal depths) can significantly reduce ink consumption in gravure printing due to their excellent ink release properties, while at the same time achieving high ink densities or covering a large colour space (L*a*b* value). “We have found out that gravure cylinders produced with Cellaxy reduce ink consumption by 10 to 40% compared to conventionally produced cylinders, and are char-

acterized by high consistency in print. Other advantages of Cellaxy include high repeatability and low energy costs,” says David Möller. 4Packaging produces about 6000 gravure and special cylinders and about 1000 embossing rollers per year with its four Cellaxy systems.

Another area with great growth potential for Cellaxy is the direct structuring of coating rollers with e.g. tri-helix, hexagonal or elongated cells for the defined transfer of primers, coatings or adhesives in relatively large quantities on a wide variety of substrates. Particularly in the manufacture of sustainable flexible packaging for foodstuffs, appropriate coatings are increasingly being used to ensure certain barrier properties. However, for a perfect barrier properties, a homogeneous, even, areal coating application in sufficient quantity and without pinholes is decisive.

“Laser direct engraved gravure cylinders can reduce ink consumption by 10 to 40% compared to conventionally produced cylinders.”

– David Möller,
CEO 4Packaging –

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Embossing roll manufacturer on course for success and expansion

Founded in 2019, Gravion's start-up phase was anything but ideal due to the Corona pandemic and the Ukraine war. Founder and CEO Dietmar Buchholz says: "Of course, I would have wished for better conditions for our launch. But much more important was that we believed in this project and never lost sight of our goals. We are an independent, owner-managed company that focuses entirely on the production of embossing rollers for a wide variety of industries and applications."

From its now more than 200 customers from more than 30 countries, Gravion has received over 1000 orders and executed them via their SAP system. Since its foundation, the company has successfully implemented more than 500 new embossing designs. Gravion recently ordered its fourth direct laser engraving system, the Cellaxy V5 XL, from Hell Gravure

decors for furniture, flooring and automotive equipment as well as in the security and sealing sector. Touching textured surfaces conveys an exclusive brand image and sticks in the mind of the customers for a long time. The results of direct laser engraving of embossing designs produced with Cellaxy impress with excellent haptics as well as reproducible details for both large-area micro-embossing and background structures. Cellaxy uses its fiber laser to perform fully automated multi-pass engraving with an engraving depth of up to 4000 µm in a wide variety of materials such as copper, zinc, steel and aluminum. Both 2D and 3D embossing rollers are thus produced step- and seamlessly in best quality.

Direct laser engraving of elastomer flexo printing formes

Ferrat Sarac, Director Elastomer and Innovations EMEA at Sauer-essig Group, explained that a total

says Ferrat Sarac. This statement is also confirmed by this year's opening of the new production facility for direct laser engraving of elastomer flexo printing plates in East Butler, Pennsylvania/USA.

Just a few steps to a print-ready flexo plate

The three companies of Helio-graph Holding, Kaspar Graphic Solutions, Hell Gravure Systems and Glunz & Jensen, have jointly developed the complete solution "Plate on Demand", which enables efficient production of flexo plates on the press in just a few processing steps. At the Hell Laserday event, application specialist Dirk Bömelburg explained: "This novel 'plate on demand' concept enables simple, fast, space-saving, standardized as well as on-demand plate production directly at the flexo press." The manufacturing process up to the print-ready elastomer flexo printing plate involves only two or three steps and takes less than an hour:

"Gravion now has over 200 customers from more than 30 countries."
– Dietmar Buchholz,
Managing Director
Gravion–



The Cellaxy also enables direct structuring by laser in steel

Systems. "To date, we have invested a total of over four million euros in the Rheinfelden production site," says Dietmar Buchholz.

Gravion's expansion course continues and in May 2023 Gravion USA Inc. was founded in Canton, near Atlanta, GA. The first two Cellaxy V5 XL's for this location were ordered from Hell Gravure Systems in June 2023 with installation and production scheduled for the first quarter of 2024.

Implementing haptic effects through embossing are not only used for high-quality packaging (cardboard, aluminum, PET), but also for glass, paper, foil, plastic,

of four PremiumSetters from Hell Gravure Systems are used at the Vreden site for direct laser engraving of elastomer flexo printing plates and elastomer flexo round printing formes. The PremiumSetters are integrated in an automated production line that ensures a high process standard, reproducible production quality and very high productivity at a stable level. "At Vreden, we focus exclusively on this extremely successful and sustainable process for the production of flexo printing formes. Therefore, we have discontinued the complex production of photopolymer flexo printing plates,"

1. Cutting of the plate roll stock from Kaspar Graphic Solutions to the desired format. This step is not necessary if the printer receives ready cut raw plates from the supplier

2. Direct laser engraving of the elastomer printing plate on the PremiumSetter from Hell Gravure Systems

3. Subsequent plate cleaning on the Glunz & Jensen system.

■ Plate production according to demand

Direct laser engraving of a ready-to-print elastomer flexo printing plate is carried out in a single step

Source: Hell Gravure Systems

using just one device – the PremiumSetter. A high-energy fiber laser creates the three-dimensional relief in a single and simple operation with no specialist personnel required for this. “In times of shortage of skilled personnel, this is an increasingly important aspect,” says Dirk Bömelburg.

In addition, the PremiumSetter can be configured as a hybrid system, so that printing plates and sleeves can be produced with just one device. In terms of hardware, this could relatively easily enable print shops to produce the flexo plates they need “at the push of a button”.

With direct laser engraving, the focus is not on maximum output, but on demand-driven plate production. This means that the flexo plates are produced according to demand. With a resolution of 5080 dpi and a screen ruling of up to 80 l/cm, the PremiumSetter is capable of directly engraving a plate area of 1 m² in one hour. With two-shift operation, it would thus be possible to cover an annual plate requirement of about 4000 m². For print shops, the productivity of just one direct engraving laser is thus sufficient in most cases.

■ **Six elastomer flexo printing plates to choose from**

Kaspar Graphic Solutions was founded in Chicago in 1977 and is now headquartered in Inman, South Carolina. Under the brand name KARELDIRECT, the compa-



Source: Hell Gravure Systems

ny produces six different elastomer flexo printing plates for direct laser engraving at its site in Greeneville, Tennessee. They are designed for applications including dry offset, corrugated, coatings, flexible packaging and security printing. The extensive portfolio includes other products and services for the package printing industry and is distributed through Heliograph Holding’s international network of subsidiaries and distributors.

This process offers many advantages for producing elastomer flexo plates. These include a lean, solvent-free two-step (engraving and cleaning) manufacturing process, HD quality, high printing speed, improved ink transfer through micro-structuring, stable printing of highlight tones through undercut, short setup time, excellent register, and a wide range of customized rubber (EPDM) compounds for various printing applications. The EPDM material is environmentally friendly and features exceptionally high mechanical and chemical resistance.

■ **Integration into the print shop**

The systems for producing elastomer flexo printing plates require only a small footprint. After direct laser engraving, the automatic cleaning system removes the remaining rubber dust and other dirt particles from the plate within a short time using a soap solution (water and commercially available soap) and a brush system, and then dries it with hot air.

If a company does not have its own prepress department for preparing the print data, it is a perfectly feasible solution to leave the generation of the data with classic prepress service providers and merely outsource the plate engraving. The laser can be supplied with the required engraving data via a web-based interface.

■ **Short ways to print with „Plate on Demand“**

“Plate on Demand” means shifting the production of flexo printing plates to the print shop. The associated major advantage for all involved in the process is the rapid availability of the plates at the

Direct laser engraving in the Cellaxy opens up new possibilities in the production of gravure cylinders as well as anilox and special rollers.

“With this novel ‘plate on demand’ concept, simple, fast, space-saving, standardised as well as on-demand plate production can be realised directly at the flexo press.”

– Dirk Bömelburg, Application Specialist at Hell Gravure Systems –

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press thanks to the two-step production workflow. Once the motif has been approved, the printer produces the required flexo plates, which are then ready for printing within a very short time. This eliminates transport from the pre-press provider to the printer, as well as a large proportion of the

without having to take the job off the press.

“‘Plate on Demand’ with its just two steps to a print-ready flexo plate shortens and simplifies ‘time to market’ in flexo printing. This in-house production helps to save costs and noticeably increases the available production times of

tions for this technology is far from being fully exhausted.

Other advantages of direct laser engraving are sustainability, resource conservation and energy efficiency compared to complex chemical processes and costly handcraft methods. Furthermore, direct laser engraving reduces the

At its site in Vreden, Saueressig uses a total of four PremiumSetters from hell Gravure Systems for direct laser engraving of elastomer flexo printing plates and elastomer flexo round printing forms



Source: Hell Gravure Systems

production steps that would otherwise be necessary for the photopolymer process. This in turn reduces costs and protects the environment.

Defective flexo printing plates often result in ongoing production being interrupted and continued at a later date, as it often takes too long to procure replacement plates. In contrast, an internal two-step process for producing elastomer flexo plates makes it possible to provide replacement plates within a very short time

flexo presses,” concludes Dirk Bömelburg.

Conclusion

Direct laser engraving is now a mature and field-proven technology that is successfully used in tool manufacturing for printing, coating and embossing. This high-precision process enables the structuring of a wide variety of surfaces and is characterized by high reproducibility. At the same time, the wide range of applica-

production of rollers and cylinders to just two process steps: Laser engraving and cleaning. This results in significant savings of resources and energy.

Overall, direct laser engraving is a convincing option for companies that want to optimize their manufacturing processes while making them more environmentally friendly. Ongoing development and research in this field promises even more applications and potential for the printing and converting industry in the future. ■

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