

Key words:

Computer-to-plate
Direct engraving
Prepress
Flexographic
printing
Laser exposure
Packaging printing

Laser technology for special photopolymer plates and sleeves

New dimensions for computer-to-plate in flexographic printing

At drupa 2000, Hell Gravure Systems GmbH caused quite a stir with the launch of its HelioFlex F2000. Speed, easy menu-driven operation and low running costs were just some of the key selling points of the system that drew tremendous interest from prepress businesses, roller manufacturers and plate producers. In the meantime, Hell has completed successful market trials of its Alpha and Beta prototypes.

Hell Gravure Systems GmbH presented the *HelioFlex F2000* at an open-house event in Kiel. The exciting program of events attracted more than 40 potential customers from Germany and abroad. The visitors particularly appreciated the fact that, in addition to the Hell presentations, the program of events also included an introduction to the associated prepress work and gave HelioFlex users the opportunity to voice their opinions. A visit to the factory and a practical demonstration on the HelioFlex F2000 rounded off this highly successful event. With the impressions of this exciting demonstration still fresh in their minds, the visitors were invited to continue their conversations until midnight on board the 42-meter long schooner, the *J.R. Tolkien*, as it sailed around the inlet near Kiel.



This discussion forum of a very special kind let the Hell guests try out their sea legs.

Hell's history

For more than 60 years, the founder of the company, *Dr.-Ing. Rudolf Hell*, focused on developing machines for optimizing the prepress stage. In 1952, the first *Klischograph* revolutionized prepress technology. In 1958, the *Vario-Klischograph K181* followed and featured a sealing facility - although the technology was still only designed for letterpress. In 1964, the *Helio*



Practical demonstration on the HelioFlex F2000 by Hans-Helmut Siebke, Flexo Application Manager at Hell Gravure Systems.

Klischograph K193 represented a true innovation in the production of engraving cylinders. The unit was equipped with six engraving heads, and the system featured its own scanner. A further innovative boost came in 1970 with the first laser scanner, the *Chromagraph DC 300*, which mainly assisted the offset prepress stage. With the *K202*, *K406* and the *K500* models, the range of HelioKlischographs was extended and augmented. At *drupa 2000*, Hell presented the *HelioFlex F2000*, which actively extends the company's range of prepress products for flexographic packaging printing.

Ever since its foundation in 1947, Hell has remained loyal to Kiel. In 1971, the company evolved into a GmbH (limited liability company) and in that same year, sold shares in the firm to *Siemens AG*. In 1990, Hell and Linotype merged to form *Linotype-Hell AG*. In 1996, the company was taken over by *Heidelberg Druckmaschinen AG*. Since 1997, Hell has been trading under its original name as *Hell Gravure Systems* - a Heidelberg Group company.



Host facilitator:
Horst Löscher,
Sales Manager
Hell Gravure
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Ulrich Knehaus,
Member of the
Management
Board of
Hell Gravure
Systems

Introduction: HelioFlex F2000

Jan Breiholdt, Product Manager, and *Peter Ressel*, R&D Project Manager, provided extensive explanations of the new unit's design. They also went into the technology of the fiber laser system used in the machine and the advantages it offers. The experience gathered from the development, production and technical support of more than 1,000 HelioKlischographs is vital for Hell's successful penetration of the flexographic printing market. The HelioFlex F2000 has been based on the *K500* fully-automatic engraver for packaging gravure, of which almost 100 have gone into production all over the world since it was first launched onto the market in November 1999.

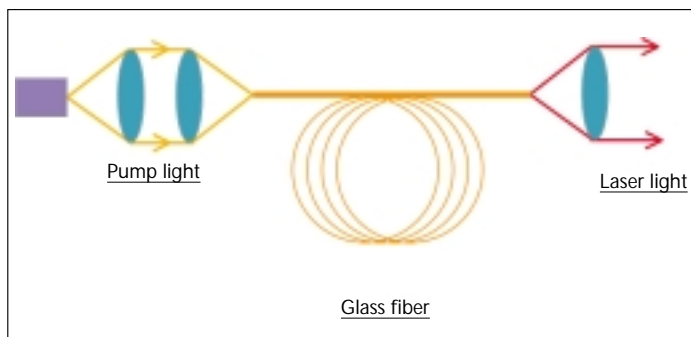
The HelioFlex F2000 features state-of-the-art laser technology, and is designed for the digital laser exposure of specially-coated photopolymer

plates and sleeves. As one might expect from Hell, the next logical process stage, *direct engraving*, had already been included as an option in the development work even at this early stage. Open architecture, ease of use, tremendous productivity, low energy / maintenance costs and fast commissioning after installation were key points that the Hell development team had set as their targets. One year after the launch at drupa, a high-performance platesetter has been unveiled that meets the development team's targets head-on. The platesetter is also well able to hold its own against any other systems that are already established

on the market. The full system comprises the basic unit (platesetter) with electronics, PC, laser, compressor, separate filter unit with vacuum, dust extractor and activated carbon filter. Because of the low rated value and minimal heat generation, the system does not require any expensive water cooling equipment. The core of the F2000 is the innovative, high-power laser head, which delivers excellent beam quality with maximum depth of focus and an amazing exposure speed. This is achieved using an eight-channel fiber laser. Each channel has an output of 7.5 W, giving a total of 60 W.

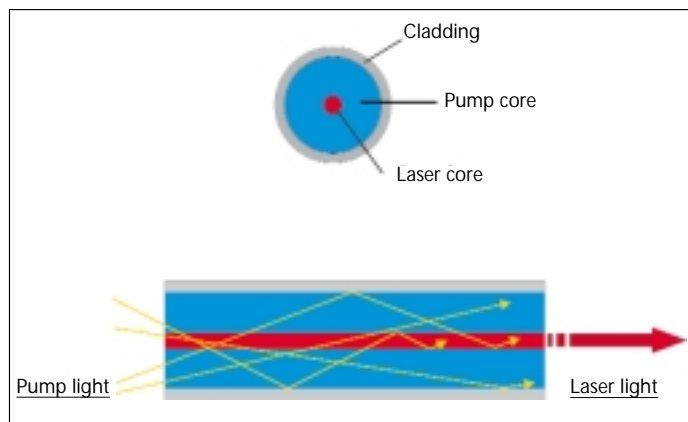
How does the new laser system work?

Laser diodes used as a pump source generate a laser light of more than 900 nm. The laser light is injected into a glass fiber. When the light



The principle of the fiber laser in the HelioFlex F2000.

passes through the glass fiber, it is bundled in the laser core. The result is a top-quality laser light of 1,100 nm. The extremely high beam quality generates an impressive depth of focus of 300 µm. The glass fiber is surrounded by cladding. As shown in the illustration at the top right, the pump core takes up the majority of space in the fiber.



Cross-section of a glass fiber.

HelioFlex F2000

- Technology: Fiber laser, 8 channels à 7.5 Wt
- Total output: 60 W
- Wavelength: 1,110 nm
- Efficiency: 50%
- Screen: 30 to 60 l/cm
- Resolution: Max. 2,540 lpi
- Depth of focus: 300 µm
- Plate/sleeve format: 1,600 x 1,200 mm, 80" width possible
- Plate thicknesses: 0.76 to 4.70 mm
- Plate material: All photo-polymer plates with LAMS coating

the plate or sleeve awaiting exposure via a touch-screen panel, while the rest (processing, calculation of exposure time, etc.) is done by the computer, which starts the exposure process once the entered data has been confirmed.

The powerful workflow solution *Nexus* from *Artwork Systems* is recommended for the front-end and RIP. *Nexus* runs under the Windows NT operating system.

Full-area exposure of 1 m² of plate material takes just twelve minutes. This must make the HelioFlex F2000 the fastest unit on the market in its class. The writing head skips image-free areas in fast crossfeed mode, thereby shortening the exposure time more, since hardly any full-area objects occur in practice.

During sleeve exposure, the rpm speed is adapted to the diameter of the sleeve / cylinder being exposed. In conventional systems, it is normally the laser power which is adapted. This means that the full capacity of the laser is used all the time, and when small sleeve diameters are used, even greater productivity is achieved.

F2000 – the new software product *Nexus* from *Artwork Systems*. He explained how this powerful software could make the production process more efficient, more controllable and more cost-effective. The *Nexus* system runs on an open platform and uses standard formats. It is geared specifically to the indi-



Christopher Graf, Managing Director, Artwork Systems

vidual requirements of each customer and his workflow. The major advantage of *Nexus* is its modular design. The system can be integrated into an existing workflow with complete ease, and can be expanded at will. *Nexus* is an entirely software-based workflow management system that uses standard hardware. *Artwork Systems* is therefore able to cover the entire prepress stage, supplying everything from front-end systems and workflow management to powerful comprehensive solutions. The software

features extensive communication tools and adapts itself expertly to the flexographic needs of the job (*more information on Nexus can be found in Deutscher Drucker No. 46/2000, pages w2 and w8 ff.*).

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Initial practical experiences with the HelioFlex F2000

Following the completion of its in-house tests on the HelioFlex F2000, Hell launched its external market trials with three well-known users, who reported on their experiences. *LaserFlex GmbH* installed an alpha version of the HelioFlex F2000 in November 2000. *Uwe Bögl*, Managing Director of *Laserflex GmbH*,

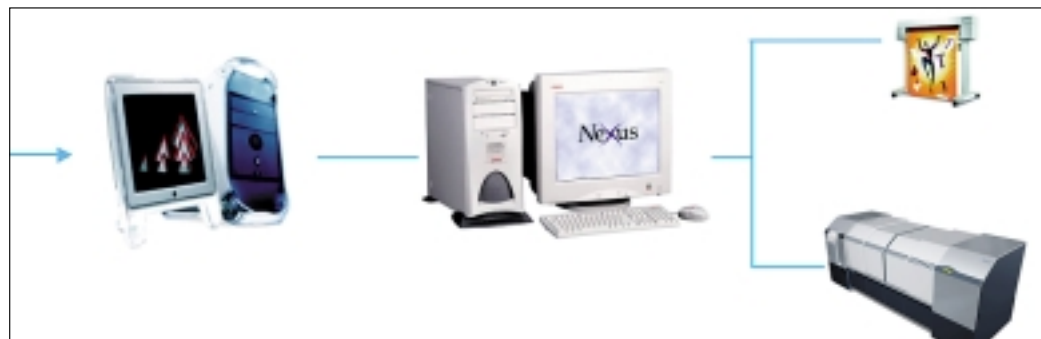
The laser core, which is just a few micrometers thick, isn't just the core, but also the active part. In contrast to conventional systems, the unit is relatively insensitive to vibrations, since it works without the complex mirror system found elsewhere. The efficiency of 50% – a lamp-pumped YAG laser achieves just 3% – boosts the system's advantages and cuts costs thanks to the lower energy consumption.

Productivity advantages

The HelioFlex F2000 offers amazing levels of productivity. The data is prepared offline in the prepress stage, so that the platesetter is used solely as an "exposure unit". The operator enters the specifications for

Prepress solution

Christopher Graf from *Artwork Systems* introduced the ideal prepress solution recommended for the



Nexus, the workflow management system recommended as the ideal prepress solution for the HelioFlex F2000.

gave three key reasons for this decision:

- The machine is designed for a rounded form (sleeves)
- The high laser power is reflected in the high productivity
- The F2000 can be upgraded to use more powerful lasers, and is therefore already equipped for direct engraving.



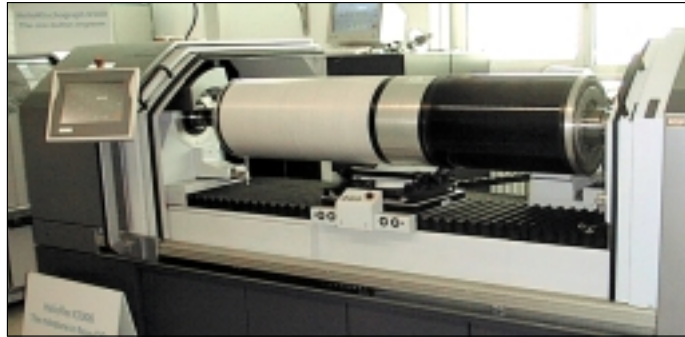
Uwe Bögl,
Managing
Director,
Laserflex GmbH

At Laserflex, the F2000 is being used together with two CDI twin-beam units in daily production - with great success. The anticipated boost to productivity has been confirmed, says Uwe Bögl. In addition to the short exposure times, he also highlighted the low energy consumption. The water cooling system required for the YAG laser consumes a lot of energy. Sometimes, the power of the YAG laser has to be reduced in order to allow the heat that has built up to dissipate, says Uwe Bögl.



**Andreas
Kotthaus,**
Technical
Director,
Flexpunkt
GmbH

Flexpunkt GmbH in Halle / Westphalia, has been using a beta version for the past twelve weeks or so. Andreas Kotthaus, Technical Director, spoke of tremendous stability in production, and also confirmed the rapid commissioning of the unit, plus the productivity characteristics mentioned earlier. The daily production of digital plate material at Flexpunkt currently runs at around 15 m². The integration of the F2000 was a relatively straightforward operation, since the company already had experience of a digital workflow in the form of a *Misomex Imager*. The latest company to join the F2000 user group is *Sächsische Walzengravur GmbH* in Frankenberg. Product Manager *Wolfgang Hantke* praised the extremely quick and problem-free installation and

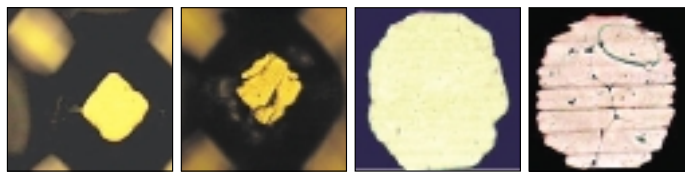


HelioFlex F2000 with concepts for the future of laser engraving.

commissioning of the unit. He was also impressed by how simple and user-friendly the F2000 is. Because the unit has only recently been commissioned, it is still in the internal trial stage / integration phase, and this must be completed before the unit can be put into full production.

CtP quality depends on plate material and laser

Not originally included in the program, but nevertheless extremely



From left to right: 1. Fiber laser without "laser tracks", 2. YAG laser with tracks of unremoved LAMS, 3. Fiber laser with optimum LAMS removal, 4. YAG laser with sub-optimal LAMS removal.

relevant, *Manfred Hornschuh* spontaneously presented the interesting results of his investigations into the behavior of the individual LAMS



Manfred Hornschuh has been involved in the development of the flexographic industry for almost 30 years.

materials when they are exposed with different types of laser (see figure). How the LAMS layer is removed depends on the type of material, the application technique, the tolerance of the laser-sensitive LAMS layer, the process technology and the adjustment of the laser. There is only a relatively narrow window available for the optimum removal of the LAMS. The quality of the removal depends on the laser. During removal, the tracks overlap in the edge area. If LAMS residues remain in the center of the tracks,

these residues will block the UV light used in the main exposure. This then results in poor polymerization which can have dire consequences for dot sizes in the high-light area due to the dot surface splitting. These dots can break up at some point depending on the printing form load.

Without doubt, the laser-specific depth of focus has a considerable influence on the quality of the LAMS removal. For example, while the

YAG laser has a depth of focus of just 60 µm, the fiber laser's depth of focus is 300 µm. If these values are set against the variability of the plate thickness between 1.08 mm and 1.15 mm, the delivery tolerance of 20 µm and the foam adhesive strip tolerances of +/- 50 µm, then contrasting these values clearly shows how high the printing form or production reliability really is. Added to this is the fact that the compositions of the photopolymer plates and the LAMS layers vary from supplier to supplier. From this information, one must be careful not to draw the wrong conclusion that the CtP process has contributed to a drop in the quality of printing form manufacture when compared with conventional photopolymer plate production.

The speaker merely wanted to demonstrate that the reliability of CtP production has become more critical as a result of the influences of the material tolerances men-

tioned. These tolerances affect conventional plate production to a lesser degree. When the removal of the LAMS layer varies, the cause for this can confidently be traced back to the focussing of the laser beam, which plays a key role in the ultimate plate quality where YAG lasers are used. The digital plate exposure process, even with the most popular YAG lasers, has undoubtedly given flexographic printing an innovative boost, and has helped improve print quality.

Development in the flexographic-CtP market

At the open-house event on June 19th, everyone marveled at Hell Gravure Systems' high standard of technology, and were impressed by the technical expertise of the flexographic team. Hell is investing its many years' experience in the field of gravure cylinder manufacture into flexographic printing with good results. Hell's success in developing the F2000 is reflected in the system's low energy requirements and speed. The people at Hell have already considered the future - the F2000 can be upgraded to more powerful lasers and is already equipped for digital direct engraving. The future will show how well the promising Hell imager will fare on the market. Since drupa 2000, the range of CtP systems available for flexographic printing has changed - or rather, has been streamlined.

Dipl.-Ing. Peter W. Dohms

CtP market overview

Because a few suppliers such as Misomex are no longer on the market, and others have joined forces as a result of mergers and strategic alliances, the current status of CtP systems is set out in a table to facilitate a clearer overview. This latest snapshot can be found in the yellow section of this issue.