

New dynamic, new future

HelioGreen Process – the three-pronged process to secure the future of gravure printing

Ansgar Wessendorf

17th September 2019 will go down as a milestone in the history of gravure. That was the day when Max Rid, the Chairman of Heliograph Holding, presented his strategy to secure a leading role for gravure in the future of decorative and security as well as packaging printing at the annual meeting of the European Rotogravure Association (ERA) in Munich. He mapped out three approaches to effectively address the challenge of chromium and to secure the competitiveness of gravure against other printing processes.

There is no disputing that gravure offers the highest reproducible print quality and unmatched print run capacity.

The technologies that it involves such as stylus and laser engraving (now capable of HD quality) as well as electroplating for gravure cylinder production are highly developed, precisely controllable and fully automated.

Kaspar Walter, a Heliograph Holding company, has been working hard on the long-term development of gravure forme production. “We are convinced that we can make forme production better, faster and more sustainable”, reports

Christoph Gschoßmann, the Managing Director of Kaspar Walter.

“The HelioGreen Process, consisting of the ChromeXtend, HelioChrome NEO and Helio Pearl initiatives, allows us to both fundamentally secure the investments of our customers whilst also redefining gravure forme production and the future of this printing process.”

Securing the status quo through long-term hexavalent chromium authorization

In the absence of any practically proven alternatives, hexavalent chromium-based electrolysis is the

only way to plate engraved gravure cylinders with chromium. However, gravure printing only accounts for around one per cent of all of hexavalent chromium’s industrial applications and, compared with some of the others, it is already operating at a very high level of safety. In Kaspar Walter’s view, therefore, it would not benefit from authorizations for other industries.

Based in Krailling just outside Munich, the company has taken the initiative with its ChromeXtend project and is applying on behalf of its customers to the European Commission for long-term approval for the hexavalent chromium process beyond 2024. The aim is to ensure that customers would not be running a commercial risk after the expiry of the current approval period if they continued to opt for gravure printing. The European Rotogravure Association (ERA) is supporting Kaspar Walter in its application.

“As part of the application for hexavalent chromium authorization that we are making on behalf of the whole gravure printing industry, we need to explain the electrolytic chromium plating process very precisely in all its details. There are considerable costs and a heavy administrative burden associated with this, which many of the affected companies simply couldn’t bear. We can draw on decades of



Source: Heliograph Holding

The HelioGreen Process is Heliograph Holding’s three-pronged ChromeXtend, HelioChrome NEO and Helio Pearl strategy



| HelioChrome NEO chromium plating of a gravure cylinder

Source: Heliograph Holding

experience and a detailed understanding of the chromium plating of gravure cylinders”, explains Christoph Gschoßmann. “This relates to both the systems technology of Kaspar Walter and Daetwyler Graphics and the chemical composition of the solutions as well as the control of the chromium baths, and extending to safety-related aspects such as workplace concentration.”

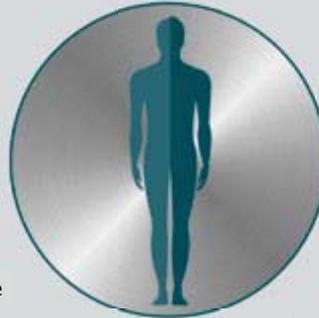
Approval specifically for gravure printing and embossing

In contrast to the current authorization process, in which gravure printing is part of a consortium made up of many industries, the new application focuses on the specific processes, measures and requirements of gravure printing. The application also covers the implementation of measures to reduce the exposure of people and the environment to toxic substances.

“However, it is important for its success that as many as possible

New standards in chrome plating

Reduced exposure during coating



Reduced exposure during dosing



Reduced exposure during maintenance



Exhaust air monitoring



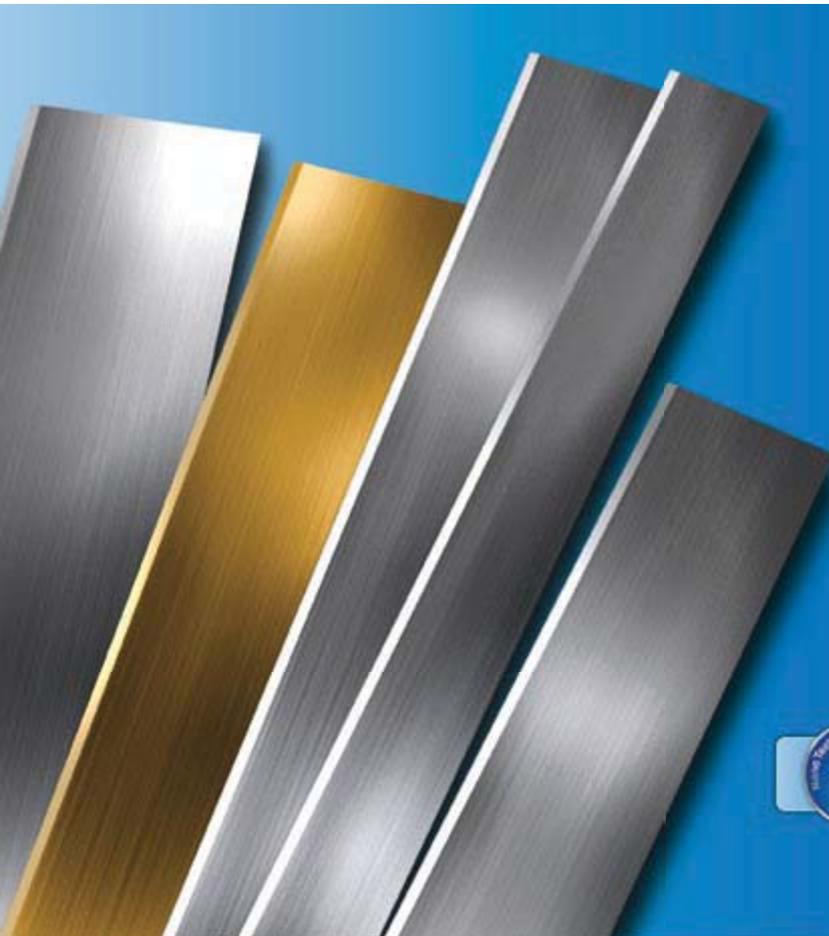
Reduced exposure during handling



Source: Hellograph Holding

from the gravure industry are involved in the drawing up of the authorization application”, continues Christoph Gschoßmann. “Over the coming months we will be using a wide variety of information channels such as the magazine

Flexo+Tief-Druck, the ERA, our own newsletter, seminars and events to provide up to the minute and detailed news about all our steps and measures. We will be writing to customers and cylinder makers across Europe to invite



THE SWEDISH DOCTOR BLADE



PrimeBlade Sweden AB

Sweden: Phone +46 565 101 09 | sales@primeblade.se

www.primblade.se

One year on from the first trivalent chromium plating of a gravure cylinder, the testing phase began back in 2015 at Huhtamaki Flexible Packaging Germany in Ronsberg, where a newly developed chromium plating system has been installed



Source: HelioGraph Holding

them to become involved in drafting the application. Here, the ERA, as the trade association, has an important role to play. Together with representatives of the ECHA we will shortly be visiting selected companies and cylinder makers around Europe, analysing their current position and then using the knowledge gained to draw up best practice proposals. The higher we can

raise industry standards in practice, the greater the chance that the European Commission will issue an approval with a long review period. Kaspar Walter is relying on cooperation and measurement data from the entire gravure printing and embossing industry for the preparation and pursuit of the approval”, according to Christoph Gschößmann. “We will be asking chromium plating users for assistance during the approval process both directly and via the ERA.”

■ monitoring of the functional extraction.

According to Kaspar Walter, these products can be used with virtually any commercially available system and would deliver significantly higher operational safety levels.

Alternatives to using hexavalent chromium electrolytes for plating

For a number of years, electrolytes based on trivalent chromium have been used for thin decorative coatings as an alternative to hexavalent chromium. In 2013 Kaspar Walter set itself the challenge of developing its own trivalent chromium technology tailored to the highly specific wear and friction requirements of gravure printing. It has named this initiative HelioChrome NEO. Its environmentally friendly plating process is designed to produce a metal surface with mechanical properties and a quality that are comparable with hexavalent chromium plating, allowing investment in electrolytic gravure forme production to be protected, since trivalent chromium salts have been shown to be less harmful for the environment and health. Their toxicity is below that of the copper

Key terms when talking about hexavalent chromium authorization

ECHA

The European Chemicals Agency (ECHA) is the authority responsible for the evaluation of applications or approvals for chemicals in the EU.

REACH

EU regulation covering chemicals, which came into force on 1st June 2007. REACH stands for “Registration, Evaluation, Authorisation and Restriction of Chemicals“. This lays down that approval committees are required for Substances of Very High Concern (SVHC). Annexe 14 lists these substances.

Hexavalent chromium oxide or chromium trioxide

A chromium oxide salt that is slightly soluble in water. Chromium trioxide is used as an electrolyte for the hard chromium plating of gravure cylinders amongst other things. Chromium trioxide is environmentally harmful and highly toxic. It is listed in Annexe 14.

Higher chromium plating standards

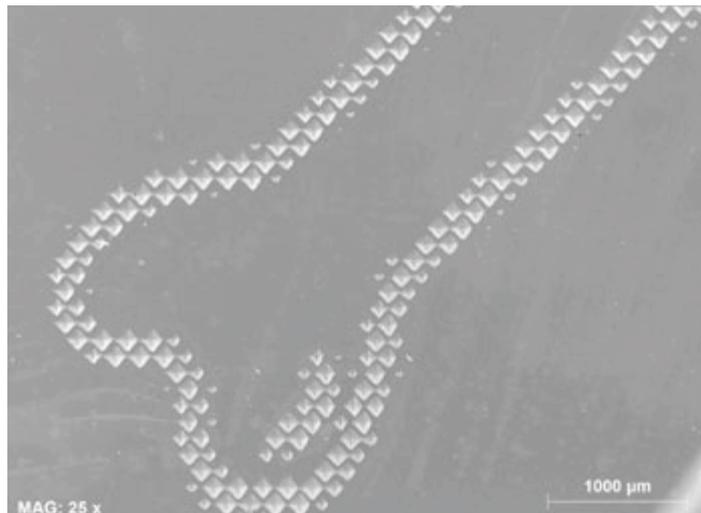
The ChromeXtend initiative and its component products mean that it is already possible for customers to raise their critical exposure and environmental standards during chromium plating so as to reduce the various risk areas by:

- using HelioChrome Wetting Agent FF during electroplating,
- using HelioChrome Rapid EC for electrolyte dosing,
- eliminating anodes containing lead through the addition of HelioChrome Reox III,
- using QuickConnect for the cleaner handling of HelioChrome rapid dosing,

bath and so there should be no need for REACH authorization.

From laboratory to industrial application

The development of HelioChrome NEO has been taken right from the laboratory to operational use. In contrast to decorative chromium plating, the challenges for the hard chromium plating of engraved gravure cylinders lie in its abrasion resistance and the coating speed. In principle, the procedure itself is unchanged. The aim is to offer a seamless transition from hexavalent to trivalent chromium-based electrolysis by adapting the technical parameters and equipment to the galvanic properties of the trivalent chromium-based electrolyte. The energy requirement of HelioChrome NEO is just 20 A/dm² at 40 °C, with the bath temperature being 20 °C lower than for classic chromium-plating. This results in lower emissions, energy costs and helps to protect the environment. Currently, it is possible to deposit trivalent chromium layers that are up to 25 µm thick. Deposition of a 6 to 8 µm thick layer, which is the



HelioChrome NEO cylinder surface (microscope image)

Source: HelioGraph Holding

norm for gravure printing, takes around 20 to 25 minutes, which is a similar speed to hexavalent chromium plating.

“There are no changes in workflow for the user, who only needs to switch the hexavalent chromium bath system for a trivalent chromium one”, states Christoph Gschoßmann. “The finishing of the trivalent chrome surfaces can be carried out on existing systems, so there is no need to invest in new

grinding and polishing tools, but the technique of the surface treatment does need to be modified compared to hexavalent chromium.”

Interim results from the beta test

Just one year after the first trivalent chromium coating of a gravure cylinder, the test phase began back in 2015, at Huhtamaki Flexible Packaging Germany at Ronsberg in

FAQs about chromium

What technical advantages does chromium offer printing?

Hard electrolytic chromium plating of engraved and lasered gravure cylinders offers effective protection against mechanical stresses imposed by metal, substrates, hard ink residues and other foreign bodies. Chromium deposits adhere well to copper, do not oxidize, even at high temperature, and are resistant to many acids as well as alkaline solutions. Chromium's low affinity (binding force) for other materials is its biggest advantage. A c. 6 µm thick layer of chromium repels ink during printing, ensuring the engraved cells empty fully. Good doctoring of the image and text-free areas prevents scumming on the forme cylinder. The stable printing of long runs is a further advantage of chrome.

Is metallic chromium harmful to the environment or health?

No. Metallic chromium is completely harmless. The electrolytically deposited metal provides the surface finish for household objects, furniture, machine and motor vehicle parts. The surfaces on which the metal is deposited contain absolutely no hexavalent chrome.

Are chromium trioxide and hexavalent chromium the same thing?

Yes, hexavalent chromium, for example chromium (VI) oxide or chromium trioxide (CrO₃), is a hexavalent compound containing three oxygen atoms. Trivalent chromium is completely different. It only forms trivalent compounds such as chromium (III) hydroxide and is less reactive.

Should one continue to use hexavalent chromium electrolytes?

Yes, within the framework of the currently applicable standards. Today, chromium plating in gravure printing already offers the highest safety standards amongst all its industrial applications.

Is the use of trivalent chromium electrolytes restricted?

No. The toxicity of trivalent chromium electrolytes is less than a copper bath. The currently used substances are registered and not classed as requiring authorization.

How is the use of chromium trioxide in gravure printing chromium plating baths regulated?

Chromium trioxide is listed by the ECHA in REACH Annexe 14. Its use is therefore forbidden by default but an authorization has been issued that allows its continued use. At present, gravure printing is covered by the CTAC upstream consortium. Although an authorization has been applied for, no final decision has been made by the European Commission. However, chromium trioxide may continue to be used without restriction until the final decision, since it is the first application since the regulation came into force.

If the authorization is issued, until when might the use of chromium trioxide be permitted?

Kaspar Walter is currently working on the assumption that it will be permitted up until September 2024.

the Allgäu, where a newly developed chromium plating system has been installed. Since then, different electrolyte formulations as well as system modifications have been tested and refined until the current position has been reached and, in the mean time, several patents have been filed for the new chromium plating process.

With a Vickers hardness of 900 to 1200 HV, HelioChrome NEO is very well placed to deliver cylinder surfaces that match the quality of classic chromium plating. This was confirmed through the abrasion tests carried out on the Kaspar Walter friction and wear test bench in Munich. The friction and wear properties of the layer have been established, as has the electrolyte and system management; and the suitability of the process is now beyond doubt.

The first real print jobs with HelioChrome NEO coatings and the new technology have already been successfully printed on Huhtamaki's gravure presses in Ronsberg. What currently remains to be done is to

establish the safety of electrolyte management during production and quality assurance for gravure cylinder production on an industrial scale.

An alternative?

Helio Pearl might offer a polymer-based alternative. It consists of a wear-resistant monolayer instead of the conventional combination of a copper and then a chrome layer. This layer is imaged at very high resolution by a new laser technology.

The complete forme production sequence is now reduced to a three-step process:

- Coating of any desired gravure cylinder with the Helio Pearl polymer layer instead of the copper and chrome layer.
- Grinding of the Helio Pearl surface,
- Direct engraving using a high resolution laser.

Christoph Gschoßmann is pleased with the results that have been achieved with Helio Pearl so far: "The initial printing trials have

been promising. The printing life of 100,000 metres on the press and the wear and resistance tests with doctor blade and ink lie within the desired target range.

The present position has been achieved after years of trials, which, since 2016, have been centralized in the specially equipped Kaspar Walter development centre in Munich."

Summary

Kaspar Walter's HelioGreen Process brand encompasses three parallel strategies designed to open up a new dynamic for the entire gravure printing industry. It is the new HelioChrome NEO trivalent chromium process and the patented three-step Helio Pearl production process in particular that should make gravure forme making a more economical, a more environmentally friendly and a safer investment for the future. All in all, this should fundamentally improve the competitiveness of the gravure process.

"Kaspar Walter's HelioGreen Process brand encompasses three parallel strategies."

ESA Electrostatic Printing Assist Systems

To avoid so called "missing dots", for perfect ink transfer in gravure printing.

Direct or indirect charging systems.

All systems comply with the latest ATEX explosion protection directives and can be used in hazardous areas.

We specialize in standard and custom-made solutions - **LET US WORK FOR YOU!**



SPENGLER ELECTRONIC AG
SWITZERLAND

Strehlgasse 5 | CH - 4105 Biel-Benken
www.spengler.ag | info@spengler.ag
Phone +41 (0)61 721 36 96

GRAVURE OF THE FUTURE



We are driving gravure forward.

By taking the quality and productivity of cylinder engraving to a new level and delivering innovative cylinder surfaces, we are making form manufacturing more cost-effective, environmentally friendly and future-proof for the long term. Further information: www.helioscope.de/en



BASED ON INNOVATION.



heliograph
HOLDING