

The Future of Gravure



Chromium Restriction



Since 2007, the REACH Directive has been in force across the EU and its aim and purpose is to ensure the safe use of chemicals throughout, not just the flexible packaging supply chain and its uses in gravure printing, but also many other industries.

Hexavalent chromium (Chrome VI) vapours in Gravure chrome plating is included within REACH because it is the most toxic form of chromium. The toxic waste produced from the plating bath during electroplating is deemed a hazardous waste material. Whilst Chromium Trioxide, proposed by lobbying groups and chemical manufacturers, is currently subject receipt to less severe sanctions from REACH, it is still identified as a substance of high concern (SHC). It is classified as carcinogenic and mutagenic and **their use is only extended until 2024.**

Chromium Restriction



De-risking Gravure with a Chrome free, green alternative

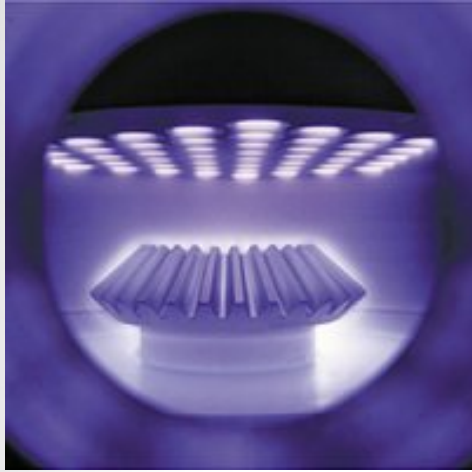
The use of a Diamond-Like Carbon coating process aids superior print performance and cost reduction over the use of chrome due to the superior micro-hardness of diamond-like-carbon, better ink release properties, its reduction of wear of gravure cylinders and when it comes to REACH, Diamond-like-Carbon is both chemically inert, and bio-compatible and as such is not subject to any current or future restriction of use owing to its green credentials.



Roto Hybrid DLC Technology



Diamond like Carbon Technology



Wide range of coating specifications

Due to their diverse properties, hard carbon-based tribological layers (DLC layers)

- have an extremely wide range of applications. Wherever low friction is important, such layers offer great benefits, as they can significantly reduce friction and thus wear.
- by specifically influencing the surface properties, gravure specific DLC can be precisely adjusted to the respective requirement profile and thus optimized application-specifically.
- can be adjusted in composition of components for best fit to technical requests

Diamond like Carbon Technology

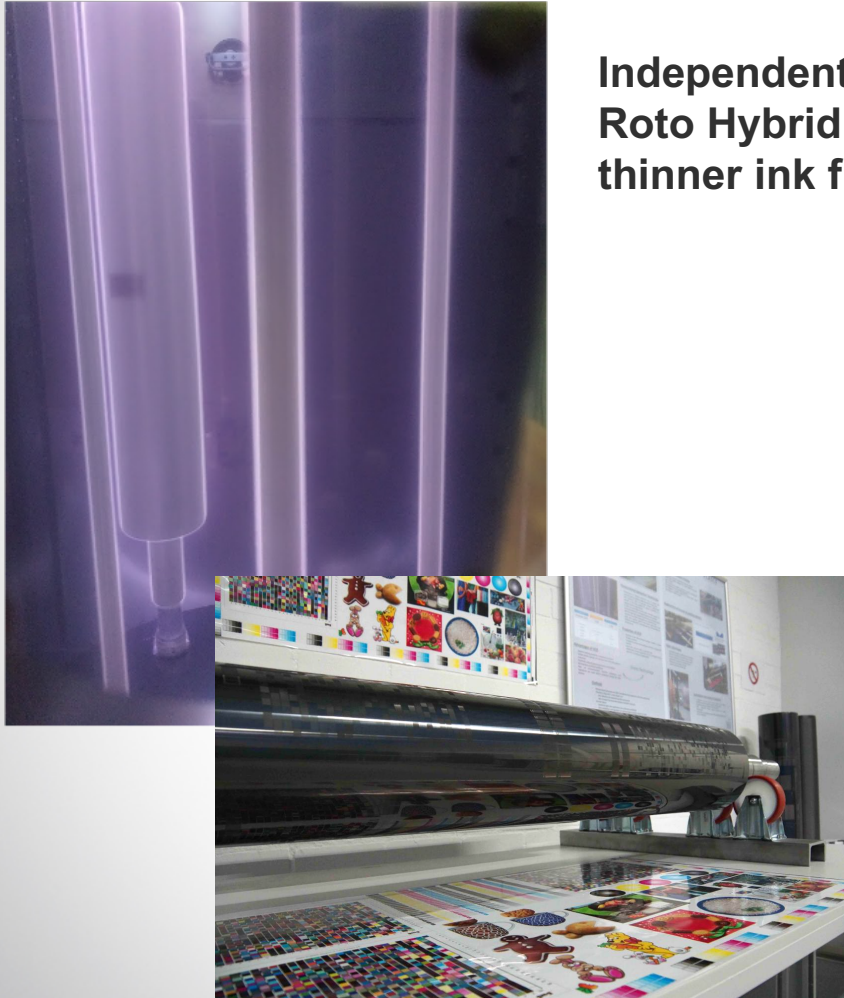


Independent RIT¹ & GAA² research strongly indicates that Roto Hybrid Diamond like Carbon technology can utilise thinner ink films whilst creating the optical density required

Roto Hybrid achieve this by using shallower engraving profiles laying down a smoother ink film than traditional chrome technology. These shallower engraving profiles if used just in chrome would cause lower percentage dots not to print but with DLC technology they print perfectly.

“If you envisage removing the peaks of the mountains in the ink film but the eye sees the same colour density.” Professor Eller, RIT & GAA

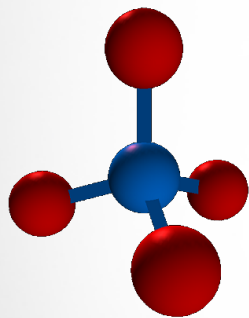
The research continues but it is believed with further optimisation 10 % ink-saving could be achieved.



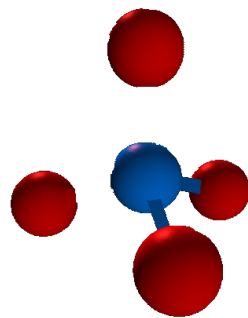
DLC Technical approach



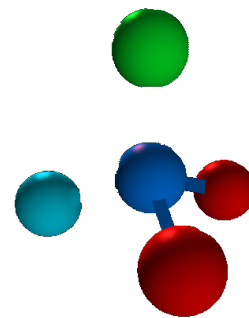
CARBON



PRECUSOR



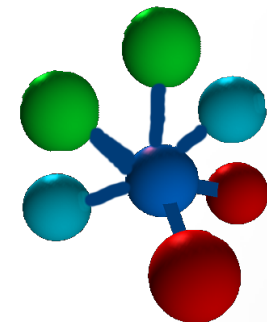
DECOMPOSING



ADDING



DIAMOND LIKE
CARBON COATING

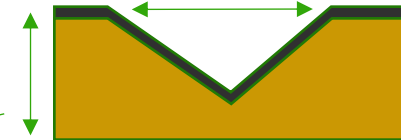
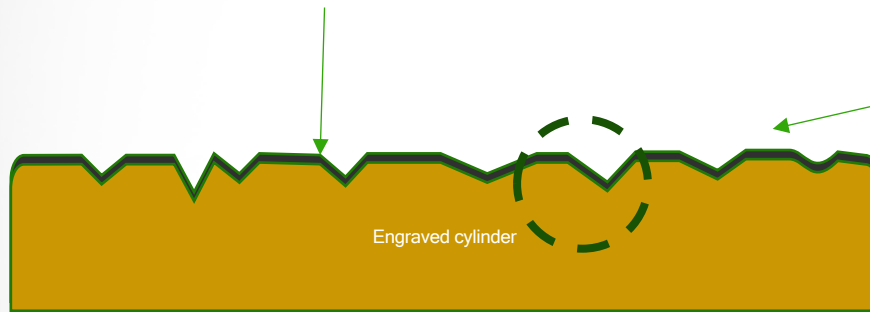


RECOMBINING

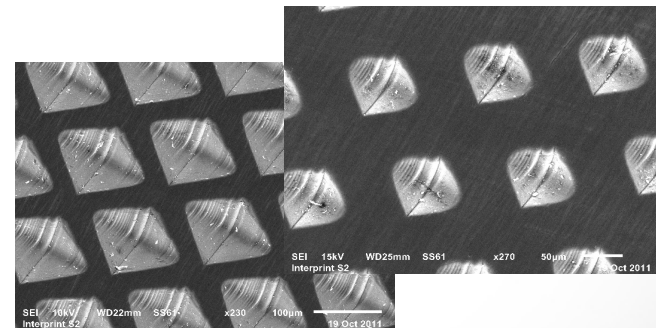
HOMOGENEOUS COATING



Diamond like Carbon Coating



1. DLC follows surface topography.
2. Higher useable cell volume.
3. Smaller cell sizes possible.



Enhanced replication of engraved features without the “dog-bone effect”

Surface Data



Schichtsystem / coating system	Material / material	Härte [HV] / hardness [HV]	Reibwert / Coefficient of friction	Schichtdicke / coating thickness	Oberflächenenergie / Surface energy	Verschleißwiderstand / Wear resistance	Farbabgabe / Ink release
DLC Type A	proprietary	2.000 - 3.000	0,05 - 0,10	1 - 8 µm	50 mN/m - 75 mN/m	++++	++
DLC Type B	proprietary	1.500 - 2.000	0,10 - 0,15	1 - 8 µm	25 mN/m - 50 mN/m	++	+++
Chrome	Cr III / Cr VI	1.000	> 0,15	1-5 µm	60 mN/m	++	o





The Future of Gravure Printing

Future proof:

- De-risking Gravure printing with a Chrome free, green alternative
- The **only** system currently available for long run Gravure printing after 2024

Superior safety features:

- RH DLC technology provides superior printed features

Better economics:

- Extended cylinder service lifetime, due to increased wear resistance of DLC coating, provides a clear cost benefit to customers