

DIGITAL PRINTING AND A CIRCULAR ECONOMY

Due to its technical and economic benefits, digital printing and, in particular, inkjet, has gained traction as a viable printing method for a wide range of applications. Nicola Penhallow, Publisher of *Specialist Printing Worldwide*, recently interviewed Dr Thomas Lehnen of Siegwerk. She asked him about the advantages of inkjet printing and its ability to support the ongoing sustainability imperatives in the packaging industry



Dr Thomas Lehnen, Head of Water-Based Inkjet Business at Siegwerk



NP: As inkjet printing continues to grow, there has been an increasing interest in how it can support greater sustainability. Where are we currently?

TL: To answer this, let's first look at the general advantages inkjet has to offer and address current key trends and challenges in packaging printing. With its print-on-demand (POD) nature and inherent all-around flexibility, inkjet printing enables businesses to address market forces. These include shorter print job lengths, reduced working capital and reduced inventories. It also allows converters and brand owners to differentiate via the customisation, regionality and seasonality of their products. Furthermore, POD enables a very short time-to-market, cost-effectiveness and a reduction in supply chain redundancy. By digitalising printing and integrating product decoration in a digitalised supply chain, processes can become leaner and more environmentally friendly. In-line printing during production or late-stage customisation, occupy the two extremes of integrated printing. Less resource

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consumption and higher resource efficiency are the results – important economic and ecological advantages.

In industrial printing, single-pass inkjet has already taken its place as one of the most widely used digital-printing processes, especially in the packaging and labels market. Single-pass inkjet allows for high print quality at a favourable total cost of ownership. Over the last few years, inkjet has already proven its capacity to adapt to many markets and cope with very diverse challenges, including the demands for sustainability.

NP: So, there are numerous proven benefits. Can you give some more details on the ecological ones?

LT: Sure. From a sustainability perspective, inkjet printing offers distinct benefits, as it is suited to print variable data on demand, without the need for repetitive elements. Therefore, fewer set-up and production materials are needed – no cylinders, plates or adhesives – and, subsequently, less waste is created. The on-demand character of inkjet

printing makes decentralised and market-orientated production economically sensible and hence reduces the CO₂ footprints of inventory, obsolesces and transportation. POD is a clear ecological benefit compared to the production cycle of conventionally printed materials.

With its ability of direct-to-object (DTO) printing, it also supports the reduction of labels, energy-intensive shrink sleeves or



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in-mould labelling (IML) processes. In addition, DTO simplifies the decoration of more sustainable, but non-flat, packaging materials, such as cups, bottles and secondary packaging that are produced from moulded pulp. This material only solidifies after shaping. This contactless or 'non-impact' printing method also allows for the down-weighting of corrugated material as there is no crushing of flutes during printing. This reduces the resource consumption of paper boxes, without compromising quality.

Over the years, inkjet has not only proven to enable packaging producers to achieve overall leaner processes and more sustainable products, but also reduce the overall amount of packaging waste. All in all, inkjet printing has a very good carbon footprint, with water-based inkjet being the most promising technology. In other words, water-based inkjet provides printers and brand owners with additional ecological advantages, putting them in a good position to address the requirements of a circular economy.

NP: You mentioned water-based inkjet as the most promising technology here. Can you explain why?

LT: The water-based inkjet technology is especially suited for flexible substrates in applications with high demands on product safety and regulations. These include indirect food, pharmaceutical and hygiene packaging. Low volatile organic compound (VOC) emissions during printing and a very low CO₂ footprint of the printed films, render water-based inkjet the ideal candidate for the green transformation of packaging printing. This favourable ecological footprint is achieved by the very thin ink films and the avoidance of critical raw materials, such as mineral oils, carrier resins, reactive acrylics and photo initiators. Besides, water-based inkjet inks can reach up to 80% renewable content, supporting the ambition of designing fully bio-compatible printing solutions.

A continued development of pigmented and food-compliant, water-based inkjet inks has already expanded former water-based inkjet capabilities from document printing, small office/home office (SOHO), décor and textile printing, into corrugated, folding carton, labels and flexible packaging. There are growing opportunities for water-based inkjet, especially in the flexible packaging sector. Renowned market experts report a compound annual growth rate (CAGR) of more than 40%.

Despite the promising market dynamic, there are still some challenges to overcome. Let's not forget, forming high-definition images by jetting pico-litre drops of aqueous particle dispersions, using high-precision microelectronics, is anything but trivial. Inkjet needs to be on par with gravure and flexography. This is exactly where the industry is focusing its research and development efforts.

NP: What is Siegwark offering in terms of water-based inkjet?

LT: We see pigment-based ink systems for single-pass, piezo, DOD inkjet as the most promising technology for digital printing on an industrial scale. Siegwark's water-based inkjet inks for packaging, are designed for all kinds of absorbing and non-absorbing substrates and are suitable for a wide range of applications. Being at the forefront of technological progress, we design solutions to answer the market's growing demand for performance and sustainability. In addition, we also provide complementary, water-based primers and overprint varnishes, suitable for the specific print conditions and end-use application. ■

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