

Drivers for direct digital

From printing stadium cups, water bottles and gifts, to high-end cosmetics applications, the range of applications suited to digital direct-to-shape printing is expanding. Technology is driving this change, as much as demand, as those involved in the market tell *David Pittman*.

With demand for direct-to-shape (DTS) printing increasing significantly as more and more brands target sustainable, innovative and high-impact packaging, digital printing is a key enabler in this growth.

This, as Justin Noble, head of product management at Xaar, notes, 'is allowing printing directly onto the primary packaging and the ability to print high-quality, high-resolution images, reliably and at speed onto a variety of packaging substrates.'

This, he concludes early on, 'means that digital inkjet is most often the print technology of choice.'

Xaar's ImagineX platform is exemplified by Mr Noble as having helped develop practical printhead innovations that address and overcome some of the long-standing roadblocks in the application of inkjet in DTS printing. This ranges from improving traditional print speeds, to the use of ink and fluid viscosities at around 100cP to add embellishments for the latest in personalisation and tactile, high-end packs.

For example, Xaar's Nitrox Elite GS3 is a small drop variant printhead with claimed 'improved print uniformity and drop placement', creating high-definition images for direct to packaging printing. The ImagineX platform also now includes printheads capable of printing aqueous inks – Aquinox (*read page 4 for more*) – so allowing printing with a variety of water-based fluids.

'From its ability to print glass bottles at speed with different limited-edition designs and a tactile finish as seen by Becks Beer, to printing the latest beer can designs, inkjet and Xaar's printheads are helping to meet the growth in demand for DTS printing,' states Mr Noble.

LabelSaver from O&PM Europa integrates inkjet with robotics to create a 'self-moving printer' for label-less production. It can be used to print high-quality colour directly onto objects including metal paint cans, plastic containers and bottles. As an example, LabelSaver can print at a rate of 500 jerry cans per hour in full colour, with 360-degree coverage. The system is also capable of printing on inkjet receptive coatings for flexible packaging and films.

For Dursun Acun, managing director at O&PM Europa, there is big potential for digital DTS. 'Demand is strong when the customer is aware what it means when they set up a business case. Until now, digital DTS is not known worldwide in my opinion, and labels still dominate.'

Having initially been developed in response to the proliferation of SKUs and increased demand for short-run labels, which has driven small manufacturers to look for more economical ways to label their products, LabelSaver continues to be developed. Whilst the current version of the system requires priming and coating units, Mr Acun asks, 'What would it mean when these two units are no longer necessary? The cost of the machine is reduced by two-thirds and it opens up a whole new world within a world.'

LSinc is seeing demand for such technology increasing year over year, driven by market demand for more embellished packaging, personalised products and greener packaging options.

So says Sydney Willis, the company's sales and



Printhead developments from the likes of Xaar are helping to overcome the barriers to adoption of inkjet in DTS, and allowing brands like Becks to embrace creativity and produce limited edition designs, printed directly onto glass bottles

marketing director, 'Our primary markets include bottling, packaging, cosmetic and promotional products. All of these industries are experiencing pressure to become more environmentally friendly. Shrink labels present a real problem for recycling, so bottlers and others that use this material are looking for ways to achieve the "full wrap" look without the plastic material.'

Evolution of revolution

Helical printers can provide an option here, as exemplified by Perivallo360m, which can print around the contours of a shape so allowing full decoration from the neck to the base of a contoured bottle. PeriQ360 can likewise print on cylindrical or tapered shapes, although four at a time using its quad-spindle print bed. Both systems allow tactile effects to be achieved by increasing the horizontal resolution of the ink.

Directly addressing the latter of the two examples given, Ms Willis says, 'In a retail environment, brand owners want their products to stand apart from their competitors. Our technology can be used to create tactile effects that encourage consumer touch and increase perceived ownership leading to purchase.'

She goes on, 'In the promotional products space, the emphasis is on more personalisation and faster turn. Here, direct-to-object printing enables both with the ability to do variable data, four-colour images and run lengths as small as one. Digital eliminates the time-consuming make-ready steps involved in traditional screen printing.'

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Helix from Inkcups is designed to print full-colour (CMYK+WW and varnish) images on straight-walled and tapered cylinders. This printer has been designed to balance speed and image quality, using patented software that places 7pL drops of ink precisely along the vessel at high speed. The Helix printer also features a quick-change tooling fixture that adjusts for straight or tapered parts, as well as a programmable tilt that stores the exact specifications for each cylinder position. When partnered with ArtPrep artwork preparation software, Helix can handle large quantities of artwork for daily production. Double Helix is a UV cylindrical printer featuring two print fixtures for double the printing volume and can simultaneously print full-colour graphics. With a printable area of 8.6in height, this system can print on items up to 12in in length with a diameter of 2-4.5in using design techniques such as spot varnish, tip-to-tip printing, mirror print, contour print, etc.

At Velox, pressures on turnaround time and demand for greater



IDS 250 from Velox is a high-speed, industrial-grade direct-to-shape digital decoration system, suited to a wide range of rigid packaging containers

flexibility are driving its development, as is the need for high quality when digitally printing direct. This has led it to develop a new technology to achieve photorealistic accuracy in images, fine graphic elements and ultra-sharp text and lines when digitally printing onto plastic tubes. Specifically, the new micro-pixel drop shape control technology regulates each drop when printing digitally direct-to-shape so permitting high-quality production at scale. Each drop is regulated as it hits the substrate, creating drop diameters that are claimed to be up to 60% smaller than were previously possible with Velox's ink technology, while allowing other drops of the same volume to spread and cover large areas. With the cosmetics and personal care markets having the highest demand for package decoration with extremely small text and fine details, as well as sharp and accurate photorealism, Velox notes that customers testing micro-pixel drop shape control have reported the level of accuracy and sharpness of even the smallest text and fine elements, like thin lines, as 'comparable to analogue printing'. Intended for extruded plastic and laminated tubes, the drop control technology is claimed to deliver exceptionally photorealistic accuracy in images, fine graphic elements, and ultra-sharp text and lines. This is alongside high ink efficiency and with no impact on Velox's high decoration speed of 250 containers per minute (cpm) on the largest diameter and length tubes.

Merav Sheffer, the company's head of marketing, states that this technology provides the mandatory high quality required in cosmetics, personal care and pharmaceutical tubes markets. 'The advanced deposition architecture allows the use of specific conditions for different types of plastics, making it possible to decorate the entire surface of a tube including the cap and body on nearly any type of material/substrate or in any colour.'

'The ability to accurately print on selective areas and apply the colours so precisely on the designated area according to the design, provides smooth gradients, high quality photorealism, seamless 360-degree decoration and interesting interactions with the substrate. Additionally, the 14 colours and embellishments available in the system provide an ultra-wide colour gamut and accurate colour matching up to 95% of the Pantone Plus book, so colour mixing is no longer needed.'

Tasty treats

Demand is also on the rise in other areas, as Katrin Hoffmann, who handles marketing at DTM Print, notes in relation to Eddie. Eddie prints directly onto foodstuffs using edible inks. Notable areas of application for the technology are bakery and confectionery items, and sweets. The recently released Eddie Platform Kit is designed to allow bakers and pastry chefs to print on even larger food items up to 50.8mm tall. Compatibility with a wide selection of the acrylic food trays that are designed for use with Eddie, with more tray designs to be added, and a

manual feed option means an even wider variety of items can be printed, from specially shaped confections and sweets up to a height of 27mm and 120mm width or multiple items in one run, such as bottom-shaped chocolate filled candies, mints, macarons, marshmallows and others.

'Demand is growing and growing,' Ms Hoffmann notes. 'All across the UK and Europe, we have high demand from semi-professionals and hobbyists in those markets, especially those in e-commerce. And those businesses are also linked to the events and catering market, as suppliers for events and caterers look for sweets and baked goods that can be individualised by printing on them. What started out as mainly private orders for bespoke or special themed treats for family anniversaries and celebrations has led to more and more corporate orders for corporate events, merchandise, company gifts, etc. We are now seeing a lot of customers using custom 3D printed cookie/biscuit cutters in combination with direct-to-shape printing. First design and print your cookie cutter with a 3D printer, then bake the cookies and afterwards print on them with Eddie. You can make a cookie look like a like real object – a baseball, a flag, company or school/university logos. The final product is completely custom and worthy of a high price tag.'

Digital inkjet is most often the print technology of choice

This is now going up another level, as since Eddie is the first-ever NSF-approved device – a requirement for almost all commercial kitchens in the US – pastry chefs at many large hotels are now using the system for special event printing, including corporate events, weddings and anniversaries, and to make customised drink toppers for champagne and cappuccinos.

Such developments in digital DTS are opening up creative potential, as Ms Willis details. 'Demand is growing for increased automation of feed and delivery systems, expansion of the colour gamut for specialty applications, and the ability to helically print items that are not axisymmetric like ovals, rectangles, and items with a handles like coffee mugs and growlers. We follow all of these trends and make decisions on future product development based on our current clients' needs and the demand in each of our target markets.'

'Digital solutions are a perfect fit for certain markets such as beverage cans, tubes and more,' says Ms Sheffer. 'Currently, beverage cans, craft breweries and new edge drinks like hard seltzer, cannabis and others, use shrink sleeves and labels as this is the only option available for

1) Using technology such as the LSinc Perivallo360m, it is possible to achieve the look of shrink material by printing direct to the object

2) Printing on to drinking vessels has been one of the early areas where digital direct-to-shape printing has gained traction, but the technology is increasingly applicable to high-end packaging and consumer products





Even a high value market such as whiskey can benefit from the digital direct-to-shape revolution

decoration as no direct-to-can printing solutions cover the quantities they require.'

With Velox offering direct-to-shape printing at up to 500 cans per minute/250 tubes per minute, coupled with 'near-zero' set-up time, Ms Sheffer notes that small and medium-sized drink brands can now not only decorate cans faster but also reduce the printing costs and 'significantly' save plastic by avoiding single use plastics.

'The benefits of mass production direct-to-shape digital printing also apply to other verticals,' she adds,

'such as tubes and aerosols where brands can easily make product variations and brands can create dedicated marketing campaigns for seasons, events or special promotions. The ability to print any quantity in a shorter supply time suddenly makes printing on-demand attainable. These benefits have a strong pull from the market as for the first time, direct-to-shape digital technologies provide the quality and speed that fit the demands of the packaging industry.'

According to Mr Noble, DTS printing will continue to become much more relevant for brands, as the ability to print a variety of inks and fluids, reliably and at speed, will draw their interest.

'New packaging processes and solutions that meet consumers' demands for more sustainable and creative packs will be enabled by OEMs and the digital technology that they integrate. This will allow greater flexibility in the creation of new packaging, making it more relevant to the local market, with limited edition designs and personalisation becoming much more cost effective. Designers will also embrace the opportunities offered by digital printing and use this ability to add personalised, high-resolution graphics to differentiate their brands.

'Overall, DTS will see sustainable, creative, and innovative designs will become a reality and help revolutionise many packs that we see today,' concludes Mr Noble. ●



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