

A GROWING NEED FOR CUSTOMISATION

Dan Kamben, R&D Chemist Project Leader at IKONICS Corporation, discusses the advantages of hydrographic film and compares it to other print and customisation methods



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The hydrographics industry is estimated to have emerged in the early 1980s in Japan as a method of transferring images to dimensionally challenging substrates. For those unfamiliar with the process, an image is printed onto a water-soluble film which is then floated on a water bath with the image facing upwards. Once the film starts to soften and becomes more pliable, a solvent mixture (activator) is applied to the film surface. The activator is used to soften the ink on the film and to help with adhesion to the substrate. The substrate is then slowly pushed through the film. The hydrodynamic force of the water bath allows for the image to wrap effectively around the substrate with minimal distortion. The residual film is then washed from the substrate surface and the image is left intact. While not every complex substrate geometry is possible with this technique, it certainly reduces the challenges associated with film wrapping or the time associated with applying an image by hand.

THE GRAVURE METHOD

The popularity of hydrographics has really blossomed in the last couple of decades. Industries such as power sports, automotive and outdoor sports have been instrumental in working towards commercialisation. Traditionally, most hydrographic images were printed using the gravure method. This method is capable of producing relatively high-resolution prints with a high throughput rate. The downside is the significant cost associated with the purchase of engraved



Game controller with customised graphics

gravure cylinders. Each colour requires its own cylinder and these can cost thousands of dollars apiece. The minimum run length from most printers is also typically in the 250–500m range. While this method can be a highly effective way to image

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thousands of pieces, setup costs are high and customisation of high quantities can be problematic. This printing method also results in an ubiquitous offering of image types, making it more difficult to stand out from the competition.

THE INKJET OPTION

In the last 10–15 years, the use of inkjet printing to image blank hydrographic film has started to gain some traction. This has been driven mostly by the demand for customisation. Another key driver that is

emerging is the protection of the intellectual property surrounding the artwork due to the ability of in-house printing. It is well known in the industry that a vast majority of the gravure printing is done outside of the USA. This has led to the state-side use

of protected art by those unaware of the infringement. Inkjet printing has been able to provide solutions to all these problems while still maintaining a reasonable cost structure.

AN IKONICS DEVELOPMENT

In late 2019, Ikonics developed a blank hydrographic film to improve upon the current film offerings in the marketplace and to capitalise on the growing need for individualising and copyright protection. Initial development used standard pigment-based printers. This produced stunning



Hydrokon on water's surface prepared for dipping



Imaged substrate after removal from water bath

image quality but required extended drying time and the use of a fixative layer to avoid image degradation during the activator application. Gravure-printed film has the fixative layer applied as a last pass so there is no additional processing step for the user. The additional steps required for pigment-based printers still made this method viable, but more research was necessary to find out if there was something that could further streamline the process.

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LATEX PRINTERS

The latex series of printers were also tested during development and instantly became a better fit. One of the biggest advantages with the latex printer is the ink system is

based on a pigmented water-based polymer. When heat is applied to the polymer 'globules' that are suspended in water, they coalesce and form a continuous layer. This layer acts in a comparable manner to the fixative layer on gravure-printed films. This eliminates some of the image distortion or bleeding that can be seen with pigment-based printers when the activator is applied. Latex printers offer another advantage in that they incorporate onboard dryers.

These dryers help transform ink droplets in a continuous coating on the film, but also benefit the film itself by quickly removing water absorbed from the ink during printing. Freshly-printed film can then be dipped

immediately. No ovens or extended air drying are required and the fixative layer can be eliminated.

POLYVINYL ALCOHOL

Polyvinyl alcohol serves as a binder in the formation of inkjet media and contributes to the pore structure for the formation of high-speed, inkjet image quality. Coupled with the fact that certain polyvinyl alcohol grades are cold/warm water soluble, this polymer makes a great fit for both the hydrographic process and high-quality, inkjet printing.

FURTHER DEVELOPMENTS

Ikonic's made some additional modifications to the construction of the film which were felt to need improvements. The company used a 4ml PET (polyethylene terephthalate) carrier instead of the traditional paper carrier. This has been proven to be much easier to load into the printers and provides more dimensional stability along with added humidity resistance. Ikonic's also included a fluorescent indicator that gives a visual cue to the operator when all the residual film has been removed from the surface of the dipped substrate.

CONCLUSION

The inherent shortcomings of inkjet versus gravure printing in this application are being overshadowed by the many benefits inkjet can provide in customisation. With ever-increasing inkjet-printing speeds and

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development in polymer-based ink systems, some of the issues associated with production demand are slowly being eroded by technological advances. Gravure printing still holds a distinct advantage with the ability to offer more specialised ink colours or effects, but this may also be changing. Some printer manufacturers are now offering ink systems with metallic flake and pearlescent effects that are popular with hydrographic users. I look forward to watching the use of inkjet printing in this industry continue to develop as it should provide more creative freedom and offer greater opportunities for growth. ■

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