

# Hard Goods

## Small Format Flat Bed Ink Jet Printers

Blair Allen from Direct Color Systems talks to TEN about the different printers available for the direct to substrate printing process

### Feature Sets



Direct Jet White

An efficient and quality, digital, direct to substrate printing process has long been a goal for many different industries and markets. For the most part, this type of printing has always been performed in a non-digital manner through the means of screen printing, hot stamping and/or pad printing. For many reasons, there are a great number of benefits to achieving this process through the means of a digital device. A few of these reasons are: 1) the ability to do away with making any screens, dies or stencils, 2) significant reduction in the volume of caustic chemicals and inks, 3) speed and economics in order to produce samples, prototypes and short to medium production runs.

For the last few years there have been a few small format, direct to substrate, flat bed ink jet printers available on the market to print onto hard goods. These printers typically all have an Epson engine internally and a platform and firmware designed around them. Some may even come bundled with a RIP (Raster Image Processor), the software that drives the printer. However, within these delivery systems are various feature sets and specifications that set each printer apart from others. What we will attempt to do in this article is to list the primary feature sets and add some explanation as to why they may be helpful to an end user who would purchase a printer of this type.

### • Micro Piezo technology vs. Bubble Jet technology

The primary reason that an Epson engine is used in this type of product vs. a similar sized HP or Canon engine is due to the print head technology.

Epson utilises a Micro Piezo technology vs. the Bubble Jet technology found in HP and Canon printers. The Micro Piezo printer head consists of several tiny nozzles and is controlled by a piezoelectric crystal that rapidly flexes when current is applied. This pushes the ink droplets through the nozzle, thereby creating the image. Epson claims that this technology is much more precise than the Thermal technology as the amount of droplets can be intricately managed. In a bubble jet printer, tiny resistors create heat, and this heat vaporises ink to create a bubble. The expansion that creates the bubble causes a droplet to form and eject from the print head.

Even though many of these flatbed printers utilise Aqueous (water based) inks, the specialised type of aqueous inks utilised print substantially better with a micro piezo head rather than a bubble jet head. Of course, any printer using a solvent based ink would have to use the micro piezo head only since solvents don't all vaporise like water.

### • Size - Dimensions and Height

Each printer will have a printable area size that will define the maximum print size. This also usually pertains to the maximum substrate size that you can run through the printer. Most sizes will centre around those page sizes offered by Epson. Additionally, most have up to a 4" (100mm) height allowance for thicker products.

### • White Ink

White ink has been available in limited quantities for specific applications for a few years now. Very few printers of this type offer a white ink option. White ink will allow you the ability to print spot white colours onto different coloured backgrounds as well as make your colour reproductions much closer to the required target when using it as a white under-base when printing to non-white substrates. It will also give the user a much greater level of opacity on second surface images printed onto clear media.

### • Solvent inks vs. Aqueous inks

Epson engines have been primarily designed for Aqueous or water based inks. Therefore, many of these printers offer only an Aqueous solution and primarily utilise a pre-coating or pre-spray on most hard goods that will be printed with the printer.

Those that do offer a Solvent ink solution have modified the ink flow mechanism such that it supports the Solvent ink solution. This Solvent ink solution may also be able to print onto various substrates without a pre-coating, depending on the type of solvent ink used in the system.

### • Ink Supply System

There are three main types of ink supply systems used in these printers. One is a CIS or continuous ink system. This solution allows users longer periods of time between filling or exchanging ink and avoids the issue of filled, multiple chamber cartridges using up one colour prior to others and wasting a lot of ink. The down side to a CIS systems is cleaning the system or maintaining constant pressure in the system when printing various different height materials. The second system is a refillable cartridge system. The downside is a limited amount of ink in the cartridge chamber. The upside is the ability to easily and readily swap out an ink cartridge with a wash cartridge and purge the heads on the printer. You also do not waste ink in any chambers as you can refill cartridges as needed. The third system is a sealed, pre-filled cartridge. If the cartridges have a combined chamber design, then users must face the risk of wasting ink in another chamber when one colour runs out. However, if the cartridges are all individual cartridges, then there is no problem of wasting ink. You don't have the convenience of the CIS system in terms of filling, but you have a very manageable system in terms of ink control and maintenance.

### • RIP vs. Epson Driver

Some printers come bundled with an Epson driver. While the Epson driver is

an excellent driver and tried and proven for Epson applications and inks, it doesn't have much flexibility when it comes to all the various components that end users would need to have control over if they want to put an image onto a variety of substrates. However, if the substrates are pre-coated, with a print receptive layer, then they will act very similarly and the Epson driver will work fine assuming Epson inks are used or a very close colour match to the Epson inks.

Rips can greatly enhance the capability of an end user through maximising the quality and number of substrates one can print to. Some of the components of a RIP that can be useful to end users include:

Custom Print Profiles (settings that are optimised for individual substrates)

ICC Colour Profiling (the ability to profile different inks on white and other colours as well)

Ink Volumes (the ability to manage the total amount of full colour ink or white ink)

White Priming function (the ability to automatically create a white priming job)

Resolution Settings (the ability to choose different resolutions for quality and throughput)

### • Pass to Pass Repeatability & Tolerances

One area that is very important to quality output will be pass to pass repeatability/registration and tight tolerances in the table flatness and the Y axis motion control. If you submit a job twice on the same substrate without removing the substrate, you should still have a sharp crisp image on your media, just darker due to the second pass. Without this pass to pass repeatability, you can't be certain of where the image will land on your substrate. If white ink is an option on your system, this repeatability will also be mandatory to be able to prime an image and not have a white outline show through next to the image. Along with this repeatability, you want to insure that the bed of the printers is very flat. While there is approximately +/- .030" of variability, when you are outside of this range, the image can get blurry and out of focus. Another tolerance area to be aware of is the Y axis motion device. You want to be able to print a series of fine lines across the width of the table and still be able to see the same weight in each

line. Without this capability, small text and fine detailed graphics don't stay sharp and crisp.

With the right feature set for their needs, the end user now has the ability to print directly to a vast array of substrates in a fast, simple, effective yet high quality manner. Imagine:

1. Putting logos and photos directly onto an acrylic or crystal award with quality comparable to high quality screen printing.
2. Adding colour to many engraved jobs on engraving stock.
3. Printing out logos, images and fine text on many different metal types with or without the standard clear coating supplied by vendors.
4. Making ad specialty products out of mirrored acrylics or glass mirrors.
5. Printing directly to injected molded plastic or metal parts and/or ad specialty products.
6. Adding instant images to leather goods.
7. Imaging onto ceramic tiles.

Not only will a printer with these capabilities open up the ranges of products shops can produce, the marketing capabilities surrounding this new technology are significant. The ability to react to customers' needs and requests in a very timely manner with the exact same quality you would be offering in a finished product is sure to land incremental new business for the owners of this equipment.

This type of printing application will be easier to learn if an operator has a good grasp of colour printing and a base knowledge of graphic files, graphic manipulation and file importation. A good quality RIP gives the end user almost unlimited capabilities but the novice user will certainly opt for the pre-set print modes in order to avoid some of the obstacles faced by any new user of a dynamic colour system. Additionally, a basic understanding of inks and what their appearance looks like when printing with either too much ink or too little ink will certainly help an operator when faced with any new substrate that he or she has no prior experience of printing on.

However, with that said this new technology makes printing a full colour logo or photograph far simpler than when compared to screen printing. In fact there really is such a large difference that there is little comparison. As

a result, this new technology is creating quite a stir in the market place!

Our thanks to Blair Allen for writing this article. Direct Color Systems are based in the USA. Identify Engraving Systems are a UK distributor of their products.

### Enquiry Card No. 107



Pad Printing Equipment



Screen Printing Press