DIRECT COLOR SYSTEMS: The Millennium 590

By J. Stephen Spence

"The Millennium" by Direct Color Systems is not a new printer but it was new to me. Although I had seen it at all the shows and knew basically how it worked, etc., I had never gotten the opportunity to actually play with the printer until this test drive. Needless to say, some of the observations I had made at the shows were correct and some were not. One thing became abundantly clear from the very beginning: there was a lot more to this machine than I had imagined.

This is a Millennium 590 like the one actually tested. My first impression had to do with its size. It's small. When not in use, the 14" x 12" footprint doesn't take much desk space. Even when fully extended and operational, the space required is only about 22" wide and 12" deep.

Being able to make name badges is only part of the equation to success. Being able to market what you can make is equally important. DCS offers a variety of very affordable sales helps, including samples, flyers, counter displays and more.

This review will attempt to present the printer, its capabilities and its limitations, in a way that will assist you in determining if this is the right printer for your shop.

First, the printer is really two or three printers in one. It is capable of printing two types of ribbons: sublimation and resin. Each has its own applications, cost factors, advantages and disadvantages. It is also capable of encoding data onto a magnetic stripe on the back of a card, allowing it to be read by magnetic readers much like the machine that reads the stripe on the back of a credit card. This can be used for security and a host of other applications.

Some readers read barcode information using infrared and optical technology rather than magnetic. The Millennium is capable of printing this information as well as using what is called a resin ribbon. This makes the printer ideal for printing all kinds of ID cards, secure entry cards, and a host of other applications requiring some degree of security or the electronic transfer of information via a card or name badge.

Think about how many applications you use every day with an encoded card. If you attend a tradeshow, it is likely your ID card is used to swipe your personal data at each booth you visit. What about the library card in your pocket? Is it used when you check out a book? I have a Wild Card that records my every visit to the local grocery store to obtain special prices, etc. Membership cards of all kinds such as AAA, Frequent Flyer cards, car rental cards and many more, all use one of these technologies.

As time passes and sublimation continues to mature, we are sure to see a variety of highly specialized printers being made for specific applications. This might be for the purposes of specific applications such as encoded data or to increase production time. The shop of the future may have two, three or more different printers being used for various jobs where high output is required (production speeds) or where operators are minimally trained and simplicity is the key. In that sense, this printer

is far ahead of its time and is fairly simple to operate, even by a novice.

Once the job has been designed and saved, almost anyone can open a job and produce a product that is of high quality and consistent with previous runs of the same job. Graphically skilled operators are not required for the day-to-day operation, and a number of shops do run multiple machines in this way, printing as many as 10,000 badges per day. Behind the scenes of such operations, however, is someone who does generate color-accurate layouts, tests the output and does trouble shooting on production machines when things go wrong.

HOW THE TEST WAS CONDUCTED

First, a 590 printer was shipped direct to me from stock along with a supply of ribbons and pre-cut blanks.

Second, a factory representative visited my shop to offer a day of training much like what would be offered to any new customer. She answered questions, performed demonstrations and did an excellent job of software training in the course of about eight hours. This training, included in the cost of the system, is clearly a value of $1,000 or more, and is an intricate part of one's success using this machine.

Third, the printer and adequate supplies were left for me to test on my own for as long as I needed. Magazine deadlines limited this to about a week.

This may not have made the test as extensive as some I have conducted, but in all fairness, I think most of the points of interest were easily established very early into the testing period.

HOW IT WORKS (SUBLIMATION MODE)

This printer is fully capable of printing true sublimation badges and other products up to 3.7″ in length and 2.5″ in width but the maximum printable area is slightly smaller and restricted as to its position on the badge (3.3″ x 2.1″). It is done differently than any other sublimation system I know. Rather than printing a transfer and then using a heat press, this little printer does everything internally by using a thermal print head to supply the necessary heat and pressure and a special ribbon containing the necessary sublimation dyes.

Those who are familiar with the old Seiko 4101 sublimation printer will recognize that some of the technology used in that old standard has been borrowed for this printer. In the original Seiko printer, full color was achieved by running three separate panels of sublimation embedded dye under a thermal print head. Each color was applied separately, making a full-color image. Black was always a problem with this system since it was obtained by piling 100 percent of each color on top of each other, hoping to achieve an image so dense it appeared black.

More often than not, it came out a dirty brown rather than black. That issue is confronted in the Millennium by adding a panel of black to the three-color mix. This gives the user the option of overprinting an extra layer of black when needed. Honestly, I found it was usually not necessary except when printing on gold or silver metal, where I found it did make some difference.

To go one further, after laying down the three or four necessary colors on the substrate, it then lays down a clear overcoat covering the entire printed area. This is not intended to reduce scratching since sublimation printing is always sub-surface anyway and therefore will not scratch under normal applications. Rather it is intended to help protect the sublimated dyes from UV light, which is about the only enemy of a sublimated product. Time did not allow for any actual testing of the coating.

My experience with sublimated products intended and used in interior applications is that all the talk about UV is more of interest to the purists than customers. Products produced with this system are not intended to be used in exterior applications in the first place, but just to add to the quality of the product, the clear overcoat is there and should generally be used. The overcoat is visible to the naked eye but is not the least bit obtrusive. I can't imagine anyone objecting to its presence, but if they do, the overcoat can be omitted from the job.

The way the printer handles the product is incredibly precise. After picking up the badge or other product from the hopper, it is positioned under the print head. The print head is then lowered into position, and the badge, along with the first panel of the sublimation ribbon, is passed under the

Although multi-talented, the real contribution of the Millennium is to the name badge and ID badge industry. It can crank out a bunch of badges in a very short period of time.

Best known for its ability to print ID cards like this one, the Millennium is capable of doing a great deal more, including magnetic encoding, barcodes, signs, key tags and traditional name badges.

The 590 model can print signs up to 2.6″ x 10″ using a resin ribbon. It is perfect for making wall signs, direction signs, desk easels and plates for a wide variety of award, ad-specialty and commercial applications.

One very popular product for sublimators is the brushed gold or silver metal name badge. The 560 and 590 models can make these on aluminum or real brass in a matter of seconds.

rigid print head. Once through, the print head retracts, allowing the badge to be moved back to its starting point. The same process repeats itself for the second color, then the third, fourth and fifth, if all options are selected.

The first pass lays down the yellow portion of the image; the second lays down the magenta, and the third lays down cyan. Using these three panels and a white substrate, millions of high-resolution colors can be generated. If selected, the fourth pass will overprint black, and the fifth pass will lay down the overcoat. It is always amazing to see how precisely the printer moves the card back and forth so many times, yet my testing produced a failure rate due to misalignment that was negligible. Even then, most of the failures were from my monkeying around with the machine or sending a job with the wrong settings.

One point about using the additional black panel that should be understood: It would be easy to always select the extra black panel to deepen the black image in a job. Unfortunately, reality isn't that simple. When used with text or simple clipart, this feature always worked well, but when a bitmap was included in the mix, the black panel couldn't isolate the bitmap, so it looked for anything that looked like it should be black and overprinted it.

The inability to discern true black from almost true black left some bitmap images looking very strange. To avoid this, run a test both with and without the additional black panel and compare. There will be times when the output actually looks better by sacrificing some intensity in the black to achieve a truer color across the board.

One final word about black. Black is often a problem child when working with sublimation. Depending on the system being used, it can be too thin or too dense, or it can tend to vary off toward green or magenta. From day one, good sublimation has always been judged by using black as one of the most critical elements. When comparing the output of the Millennium's black to that created with and without the black panel, there was a visible difference.

The difference, however, was obvious only when two samples were compared side by side. When separated or mixed into a pile of samples and viewed one at a time, even the black created using the normal print sequence was quite acceptable. It was weaker when used on substrates other than white and was weakest when used on gold metal, but even then, 98 percent of my customers would have found it quite acceptable.

HOW IT WORKS (RESIN RIBBON MODE)

There was a significant difference in the output of the resin mode and the sublimation mode. These are two very different methods of printing, and how the printer handles them is important to anyone considering the machine.

Resin ribbons are, in my opinion, used to achieve at least two things:

- The ability to print metallics. True metallic gold and silver can be printed using the Millennium. Metallic colors do add a great deal to a finished job, and many customers want a metallic on their badges.
- The ability to print badges that are only one or two colors without bearing the higher cost that full-color sublimation demands. The downside of this is that badges must be run through the printer once for each color being printed. The plus side is that when printing a two-color badge, the 1,000 yield ribbons will reduce the cost considerably over a sublimated badge.

The printer works basically the same way with resin ribbons as with a sublimation ribbon. The difference is in the ribbon. Because the resin ribbons are continuous color for their entire length, the printer is no longer limited to 3.3″ length. Now, the length can be extended to 10″ x 2.6″ making it a candidate for printed multi-color wall signs, directory strips, etc (actual printable area is slightly smaller). Products 3.8″ or longer must be hand-fed one at a time into the machine, but they can be printed. Registration issues can be considerable when very tight or hairline registration is required, but the average wall sign with a logo and some text can be done quite easily.

Smaller products, however, such as name badges, ID cards and the like, should be loaded in the hopper, (100 pieces per load) making the machine capable of printing a single-color badge every few seconds. Allowing for set-ups and mid-run maintenance of the printer, the printer should allow the printing of about 350 badges per hour or about 3,000 per day with a single machine. Sublimated badges are slower, depending on how many passes are actually required. Still the potential is close to 1,000 badges per day if everything goes smoothly. Beyond its ability to print a nice-looking badge, the jewel in the Millennium's crown is its ability to produce a lot of very consistent products in a very short period of time.

Unlike the sublimation-printed images, resin images do not require any special overcoating for UV protection, since they are, for the sake of explanation, a thin layer of plastic adhered to the surface of the substrate. This makes this type of printing reminiscent of what a hot stamping machine would produce but with markedly more quality and the ability to change text, logos and images (even photographs), on the fly—something hot stamping has not successfully accomplished. Also, unlike traditional hot stamping, there is no visible indentation where the image is placed, and the image is much more resistant to scratching than hot stamping.

MIXING SUBLIMATION AND RESIN TECHNOLOGIES

Since this printer is capable of printing both resin metallic images and full-color sublimation on the same name badge, the printer is unique to the sublimation

the need to learn several different programs—one for the mechanical engraver, Corel for the laser, etc.

It also includes a mail-merge-type feature that automatically inserts a name, title or any other text into a given space. Although Corel 10 does offer this feature, the results are unpredictable at best. With ColorByte™ 5.0, the space is specified, and the text is fitted into the space. Long names are automatically condensed to fit the space.

ColorByte™ is very similar to CorelDraw but has made a conscious effort to eliminate as many of the fancy commands as possible. This is a meat-and-potatoes graphics program that has just enough frills to allow the users to do almost everything a CorelDraw/PhotoPaint® user can do, but do it faster, simpler and with fewer crashes. We did find some bugs in the version we used and did experience a few crashes but all in all, it performed very well—at least as well as Corel 9 and better than Corel 10.

The ability to edit both graphics and bitmap images within the same program without jumping back and forth was a convenience. Over all, the program handled both bitmaps and vector graphics very well, allowing a good variety of editing capabilities. Future versions of the program will hopefully offer even better bitmap-editing capability.

One thing I found confusing about the print driver was its inconsistency to use the same system of measurement as most software. In some places, such as sizing the product to be printed, sizing was done in 100ths of an inch (a 3″ badge was entered as 300) while when sizing text, it was done as a decimal (a 1/4″ letter was entered as .25) and still in other places, measurements were made in inches. It wasn't a big deal, but I would have preferred they pick one and stick to it.

Interestingly, some other printers are beginning to use this approach as well. Although there must be some logic to this, I still don't like it. Secondly, I didn't like the fact that when entering text for the first time, it automatically comes in to the graphic at 1″. This defaults to the last size text used; it seemed a bit strange. The same was true with the grid, which when first used is automatically set to 1″.

Still, even with these minor nuisances, the software and driver did perform very well. For someone who does not know Corel or AI, this is a fairly easy package to learn, and if all the output devices use the same package, it means only one program has to be learned. For hardened Corel or AI users, the printer can be driven using these programs as well. Testing proved the output and end results to be equal between Corel and ColorByte™. Since both are filtered through a proprietary print driver that actually talks to the printer, I found nothing sacrificed in order for the user to work with their favorite graphics program(s).

The print driver that comes with the system is clear and straightforward. It allows a wide variety of adjustments to be made as each job is sent to the printer. A bit overwhelming at first, all the adjustments really aren't as complicated as they first appear, and with a couple of hours with a qualified trainer, they should present no problem. Since the settings are saved with the job file when using ColorByte™, each time a job is pulled up, the settings are automatically made so repetitive jobs should be very consistent. The days of having to write everything down and file it with the customer's hardcopy files are gone. Just call up the job and send it to the printer.

ADJUSTMENTS, ATTACHMENTS & MAINTENANCE

Most adjustments are actually done through the software but there are some exceptions. It is important to understand these and to set them properly.

INSTALLING RIBBONS

Ribbons come on two hubs, which fit into the printer in only one way. This makes it impossible to load a ribbon incorrectly, and although there might be times when an extra hand would be helpful, a few changeovers should make this task almost second nature.

Ribbons should be stored in a cool, dry place that is abundantly clean since dust and dirt is the number one enemy of this system (more about that later).

INSTALLING ATTACHMENTS

There are several attachments that come with the system. These are designed to change the size (width) of the feed hopper and the print path. Remember, the print head is rigid and will not move, except for up and down. The path through which the substrate must travel to get to the print head is preset for 2 1/4″ to 2 1/2″. When substrates 2″ or less are sent into the printer, attachments or shims must be added to the hopper and print path to keep the substrate moving down the straight and narrow. These attachments consist of small carefully formed metal pieces that fit neatly into the hopper and print path of the machine.

I found them a bit clumsy to install at first but after a few trials (and errors), found it much easier. Because of my large fingers, I found the use of some needle-nose pliers to be of great assistance, allowing me to quickly and easily make the two necessary changes when switching to a narrower substrate. The entire process, after some practice, took less than a minute.

MAINTENANCE

Beyond the obvious items such as keeping the machine clean and protected from abuse, the general maintenance for this printer is really limited to one thing. Inside the printer is a cleaner roller. This very soft, tacky 2 3/4″ wide roller is designed to help remove any dust, lint and grime from each substrate as it passes through the printer. Hair, lint and dust that could effect print quality are picked up by this roller and collected until it is cleaned by the user. The roller removes easily and can be cleaned by holding it under running water (a daily cleaning serves to both clean and condition the roller) and by using masking tape to dab the collection of dust and debris from the roller.

The instruction manual says to perform this function every 50 imprints. Inexpensive to replace, it seems this would be a good part to keep on hand. In high production applications, rather than stopping the operation to clean the roller, just switch out the roller with a clean one every time the hopper is replenished (50-100 badges depending on thickness). While one hopper worth of badges is being printed, the second cleaning roller would be thoroughly cleaned and made ready for the next switchover. With the next change-out, the rollers would again be swapped out and the process repeated until the job was done. Reportedly, these rollers can last for several years when properly cared for.

THE PRINTER DEMANDS A CLEAN ENVIRONMENT

Perhaps the thing that was most impressed on me while testing this printer was the necessity to keep the printer and all substrates absolutely clean. Unlike sublimation systems that work at 350 degrees or more, the sublimation temperature of the print head in this system (about 250 degrees) will not overcome oily fingerprints, dust, dirt or lint. Even with the cleaner roller working properly, any lint (like that from a sweater) or dust that gets past the cleaner roller will definitely have an effect on the outcome of the product.

When testing the device the first time, I wore a black sweater vest. Although one could not see the fibers in the air, fibers from that vest managed to find their way onto badges instantly as they were taken from the sealed packages. Some were picked up by the cleaning roller but some were not. The stray fibers were actually embedded into the badge and over coated to become a permanent part of the finished product—a definite lesson about having a clean work environment with this machine.

Carelessness here will result in lost badges, costly remakes and needless frustration. Badges and other substrates arrive from DCS in plastic wrapped packs to keep them clean. Once opened, however, it is easy to leave them lying around where they can collect dust that, unless cleaned off properly, *will* cause problems.

WARRANTY AND SUCH

The warranty that comes with each machine is one year, with an additional year available at extra cost. The way they perform service is first by phone. DCS does not offer on-site service. When a problem arises, DCS will work with you to solve the problem, shipping parts via overnight. A new machine (within 90 days) that cannot be repaired using this method will be replaced. After the 90-day period, the machine should be returned to the factory for service. Our machine worked perfectly right out of the box, and no problems presented themselves during the test period.

From all appearances, most actual mechanical repairs should be made by factory personnel and not field reps anyway. The tolerances are too precise for a shade tree mechanic to mess with. By the same token, those things that would most likely go askew are fairly simple to repair by the end user. Like so many things, most problems encountered using this device will be more software related than hardware related. Downloading a new version of the software, correctly setting the print driver, etc. should solve most problems that might occur.

GENERAL CONCLUSION

I enjoyed working with the Millennium very much. Although the resolution of the print head is only 300 dpi, it rivaled images sublimated in other ways at much higher resolutions. Unlike traditional sublimation that tends to spread out (migrate) when printed, the image produced by this thermal print head is very crisp and sharp. Photographs were outstanding—especially small ones.

The ability to print with metallic film is a really nice capability that many customers will respond favorably to.

The printer is actually made by Fargo exclusively for DCS to their specifications. It is well engineered. Although there might be a higher-tech way than using attachments to change the size of the print path and hopper bin, the system is simple and effective.

The greatest concern for many will be the cost. At $4,000 for the Model 560, $5,000 for the 590 without long-plate capability and $6,500 for the 590 with long-plate capability, it clearly is not for everyone. Careful consideration must be given to how long it will take this machine to pay for itself. Even with a cost of about $1 per badge or less, $4,000 to $6,000+ is a serious investment and should not be an impulse purchase.

Shops that produce large numbers of badges or similar products, or shops where production is very high or where products are needed quickly would be well advised to check out this system. Shops that would like to add this system, but do not have high production demands might consider developing a market to offset the investment. One entrepreneur in California uses his machine to make the full-color plastic inserts used in the handles of draft beer fountains.

Others have developed ad-specialty markets such as the fella that does 1,000 key tags a month or the company that is doing 3,000 pocket calendars that must be personalized. Small signs, ad-specialty products, key cards and much more can turn the printer into a real moneymaker. One feature of this printer that is especially enticing is its ability to produce samples very quickly and easily.

According to the manufacturer, the cost of the printer can easily be offset by selling only two badges a day for $6.50 each. This will, reports Blair Allen of DCS, provide adequate income to pay for a three-year lease. Selling four badges per day will produce a net profit of nearly $3,500 per year.

Those fast-service sign shops and fast-print shops should find this device to their liking as well. Because basic designs for ID and name badges can be easily created to allow the insertion of text, photos, magnetic stripes and even optical reader strips, a wide variety of products can be offered to corporate customers who might otherwise never buy more than a one-time product. This promotes business, expands capability and allows even marginally trained personnel to produce high quality products on the fly.

To find out more about The Millennium 590 and other Direct Color System products, visit their web-site at www.directcolorsystems.com or call (860) 829-2244.

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