

## Textile Imaging: Is it Ripe? Or Just Hype?

*Tales from a few early adopters provide food for thought*

By Lynn Wasnak

Digital printing on textiles. Can it really bear fruit in terms of new revenues? Or is it just another case of peachy forecasts "impear-ing" good business judgment?

If you're among the many print-for-pay graphics producers going bananas trying to figure out various fabric-imaging options, you're not alone. R&D in textile imaging is moving fast on all levels, whether you're talking about short-run production of fabrics, strikeoffs and samples for fabric design, or the production of digitally customized fabric products, ranging from T-shirts and table clothes to trade-show backdrops and soft signage. There is bound to be some cross-pollination of technologies from one level to another.

At the 1999 Big Picture Conference, Stewart Partridge of Web Consulting noted that despite all the talk of how huge the digital textile printing market is, and how much money everyone's allegedly going to make, "It's not just a question of buying a machine and away you go. Not everybody can go out today and find the machine or process that will print digitally what they want, the way they want, at the speed they want." Currently, textile imaging options range from under \$20,000 to well over \$250,000. Some of the major options are listed in Figure 1.

But output is just part a small part of the story. Finishing requirements, fabric coatings and backings, consumables costs, color-consistency, fade resistance, washability, and shrinkage problems can vary considerably from process to process. For example, on the ColorSpan and Accuplot inkjet printers, colors are printed initially in muted tones then "pop" only after the imaged fabrics are run through a fabric steamer. Fisher Textiles has just announced a new fabric-coating designed to prevent the need for fabrics to be run through a heat press twice to prevent shrinkage.

The options can all gets pretty confusing. Haunting the Internet for ideas, Jack Campbell of Graphics Touch of Bradenton, FL has looked at e-stat equipment, the Texjet inkjet system, and various superwide piezo-inkjet systems. He's also checked out at a machine made by Sieren<sup>1</sup>, working with Dupont inks, that looks like a big, flat plotter. "Which way to go?" is the plaintive question he posted on a web-site. This question may be yours, as well.

The short answer is, it depends--on your application, anticipated volume, your budget, and your tolerance for the unknown. Although electrostatic elbows out inkjet in terms of throughput speeds, it's still a transfer technology, requiring additional finishing equipment and processing steps. Some users believe that the color consistency of direct-to-fabric inkjet printing is superior to electrostatic and inkjet dye sub. But others see inkjet dye-sub as a good way to put older, lower-resolution inkjet printers back into service. Even through it's now possible to create inkjet dye-sub output at resolutions up to

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1440 x 720, fabric textures are 'forgiving' in terms of resolution, so older 300 dpi machines may be perfectly acceptable for many textile projects. It also pays to size up your competition for fabric printing, before blowing up to \$50,000 on a heat press. The good news is that the range of heat-presses engineered for digital imaging is expanding. (See p. xx)

Obviously, established digital-printing service bureaus are well-positioned for textile imaging--they have the equipment and expertise, and probably older machines to put to work. But entry-level fabric-printing systems are beckoning newcomers too--including photo studios, fine artists, and craftspeople who may be buying their first wide-format inkjet printer as a means of creating certain fabric-based products. To help sort out what's really happening beyond the realm of sales brochures, we've talked to just a few pioneers in digital textile printing for short runs of promotional applications. Here are their strategies, problems, and suggestions.

### **From vinyl graphics to textiles**

Ellen Westnedge's father was in the printing business, and her grandfather was in textiles. Since childhood she's loved sewing and knitting. So it seems almost predestined that she'd be heavily involved in the fledgling business of digital textile printing. As president of Carolina Digital Graphics in Asheville, NC, she's been producing vinyl banners, flags and trade-show graphics for years. But this spring her company became the first in the US to own and operate the Dutch-manufactured Texjet 152, a direct-to-fabric inkjet printer. She's not worried about finding a market for her goods. "I have quite a big client-base from doing vinyl graphics, and basically, anything that can be done in vinyl can be done using this application," she says.

If vinyl does the job already, why switch to cloth? "It's easier to store, for one thing," says Westnedge. "I can wrap up my trade show display in my suitcase and go. The images can be washed, drycleaned, and reused. Plus, when you print on flags, they've got at least a 90% bleed-through to the other side, to give double-images with one pass. We're doing things for large trade shows on very thin, sheer material that can be seen from both sides, so all they have to do is put the image up on a frame, and change it out whenever they want to."

The Texjet uses a dispersed-dye process, like dye-sublimation, but without the transfer paper. Heat is used to "tattoo" the inks onto the fabric, using either a Sublifix 200 finishing machine for rolled goods, or the Peko 1030 flatbed heat press for flat objects such as carpet tiles.

"It's heat only, no steam," Westnedge explains. "As the heat expands the fibers of the textile, the inks are soaked in, and when it cools, the fibers close up again. That's what gives the image its longevity."

What about the learning curve? Using the PC-based machine is easy, she says. Just prepare the file the normal way, send it through the RIP, and load your designated fabric. But color-matching is something else, admits Westnedge. Just as colors reproduce differently on different types of inkjet media, so do inks on different weaves of fabric. "We print color bars for each of the fabrics, so we can show them to clients and they can choose." Currently, she uses synthetic fabrics only, which need no pretreatment. But the Texjet can also print on pretreated cottons. Material costs vary, but average \$4 to \$5/sq ft. Double-sided fabrics, with an interfacing, run about \$15/sq ft, and sueded fabrics for

gaming tables and the like are higher. Though the Texjet is capable of carrying a maximum 80-in. width bolt of fabric (up to 220 yards long), the maximum print width is about 60 in.

What does she like best about direct-print to fabric? Certainly, the flexibility of digital permits easy customization of short runs, or even one-of-a-kind name changes. She believes direct print gives much more consistent color than e-stat dye-sub transfer--not only side-to-side, but from the beginning of the print to the end. But, "it's an investment of \$150,000, minimum," she says. "And it's not suitable for super-high-volume production."

### **Full-service and coatings, too!**

Kevin Grouwinkle is vice-president, sales and marketing, at Affordable Signs & Graphics (ASG) in Elk Grove, IL, a wholesale supplier of large-format prints, screen-printing, and finishing services for smaller sign shops nationwide. ASG has chosen to offer full-service, cutting-edge technology to smaller shops, "because a lot of the people we deal with have decided not to get into the digital market yet." He says ASG gives their clients the advantage of always having access to equipment three to six months after it's introduced, which can be a plus for those bidding against sign shops with two-year-old equipment.

For fabric applications, ASG is using a 72-in. ColorSpan DisplayMaker Series XII thermal inkjet printer. ColorSpan has developed a line of inks and paper-backed fabrics for use with the machine (July/Aug '99, p. xx) and is adding features to make it easy for print-for-pay shops to switch from textile printing to paper or vinyl printing and back again. Although ASG has experimented with Encads and other solutions, Grouwinkle believes the ColorSpan is the machine of choice for direct printing to fabric. He says its high resolution delivers more ink, leading to more brilliant colors and better design rendition.

Instead of purchasing pretreated fabrics at \$5 to \$6/sq yd, ASG is experimenting with pre-coating their own cloth, using an Axiom PS 1000 liquid laminator. "By coating our own inkjet materials, we can be a little more cost-competitive, and offer something no one else has," he states. Liquid laminates can also be used to protect the fabrics for outdoor use. The cost for this UV protection is about \$.05/sq ft. ASG presently guarantees the UV protected- liquid laminated fabrics for one year, outdoors.

Grouwinkle contends that direct-printing to fabric is much simpler than dye-sub. "Heat has a tendency to be very inconsistent. If you don't maintain constant temperatures, you have to worry about the quality of the transfer." But taking media that's already been coated and printing on it? "That's a no-brainer," he says. It's durable, too. And the resolution is mind-boggling. For software, ASG uses an Onyx Postershop RIP. "There's no question that color correction has 90% to do with your software," he says, noting that color problems are no as challenging as they once were.

### **T-shirts to dye-sub for**

One hot market for inkjet dye-sub is shaping up to be apparel. Earlier this year, a three-company alliance of Hanes Printables (fabric), Sawgrass Systems (ink), and Fisher Textiles (marketing) created what could be called the Ultimate Dye-Sub T-shirt. First in a new line of Digital L'ink apparel from Hanes, the SofLink T-shirt uses a patent-pending

fabric-knitting process that combines a 100% cotton underlayer (for comfort) with an image-receptive micro-polyester outer shell. The SoftLink T-shirt readily accepts Sawgrass Sublijet dye-sub inks, but remains an incredibly soft, comfortable T-shirt with near-photo-quality images that stand up to repeated washings.

This new alternative overcomes some of the drawbacks associated with digital imaging only on polyester T-shirts or use standard image transfers. Customers found polyester T-shirts too transparent and not "breathable" and standard direct-transfer techniques left a thick paint-like coating on the shirt.

Fisher Textiles' Jeff Cheatham says this new form of T-shirt printing isn't direct competition for screenprinting, but an add-on. "It's great for guys on the Internet, with short runs, and for people who really want to show graphics. I think it will be popular with certain industries, like NASCAR, which really go wild with screen-print."

According to Hanes Printables VP Patrick O'Sullivan, the product wasn't engineered to wick sweat away from the body, "But, in all the wear-testing we did, no one complained about the comfort of the garment." Early next year you'll see Hanes Digital Link T-shirts for children, sports shirts, fleece wear, and even boxer shorts. Hanes will also make the fabric available in bolts, to the cut-and-sew world, so others can make their own garments.

Wholesale costs of the SoftLink T are higher than the typical \$3 Beefy-T shirt usually offered at T-shirt transfer shops--somewhere around \$5 to \$6. Some printers are concerned about the ink costs, which may seem expensive at first. (The low-end Sublijet start-up kit costs about \$650.) But Liz Pendleton at Sawgrass says that compared to screen-printing, the savings on set-up time, burning films, and the vast number of color-possibilities help balance it out. "We figure it's less than \$.02/sq in. to print with these inks. At a tested yield of 330 8 x 10-in. images for the start-up kit, at small format we think \$1.30 is the most you're going to spend, and with larger formats, the price-per-square-inch drops," she says.

The first man in the country to print a commercial run of Hanes' SoftLink T-shirts is Fred McBroom, proprietor of All-American Graphics in Defiance, OH. As president of the Cleveland Browns Backers' club, McBroom was looking for something unique to wow the members. The minute he heard about SoftLink, he wanted them, and scooped up nearly all of Hanes' first samples to produce an initial run of around 120 shirts in late July.

He got into this product by necessity. After 14 years in the screen-print business, McBroom had to sell his silkscreening equipment because the toxins were affecting his health. "At first I was buying transfers and having someone else do my silkscreening stuff, but the turnaround took too long...a week to ten days. With this, if a customer comes in, I can have the shirts done this afternoon." He's using an Epson Stylus Color 1520 to run the transfers, pops the shirt with the transfer into a heat press at 400° for about 15 seconds, and poof! He's got a shirt. "The colors are there and they're beautiful," he says. "People who saw them at the Browns game loved the colors. The business is coming in." He's already working on shirts with mascots for area schools, which he will sell for about \$15.95 and up. "I haven't done a cost-analysis yet," he admits. "The ink is expensive and I don't know how much ink I'm gonna use. But I think it will come down in awhile, when they start making more of it."

Other dye-sub-printinable sportswear products have been introduced by Conde systems, which has built entire turnkey systems for dye-sub printing.

### **Sailing Away with E-Stat Dye-Sub**

Chuck Davis, partner with his son in Greeley, CO-based Regal Computer Graphics, has spent his lifetime innovating in the arena of digital print. An engineer who worked with digital pioneers such as 3M, Tektronix, and Nippon Steel's subsidiary, Synergy, he naturally focused on digital when the time came to launch his own company. He modified his initial electrostatic 3M 9512 Scotchprint system to print on fabric. He also builds his own heat presses. So it's no surprise that innovation extends to the products he prints, as well...such as spinnaker sails for high-end sailboats.

"We got tied in with a company called North Sails Graphics. We print the sail and shape the graphics. They integrate it into the sail," he explains. So he may not have to stitch a sail, but there's still plenty of complexity in the project. The sails are made of a lightweight, coated polyester, almost as delicate as tissue paper. Fitting the graphics is a challenge. "The sails are 3-dimensional, so we have to fit a 2-dimensional image to a 3-dimensional surface," he explains. He prints on transfer paper with standard dye-sub toners from Hilord Chemical Co., and then processes the long pieces (a small sail in production currently was 30-ft. tall by 20-ft. across) in his custom-designed rotary heat press.

How does his dye-sub hold up in the great outdoors? According to Davis, it's not as bad as some folks say. "The dye isn't going to last forever, but it's clothing dye, basically. Like hanging a T-shirt out in the sun, it will last about the same length of time." One of his spinnakers is in its fifth season. "It doesn't look as good as the day we made it, obviously, but it's still a very attractive spinnaker," he says. However, part of the durability may be related to the special windproof coating on the sailcloth, which may increase its color-retention.

Though he's not ignoring inkjet, for now electrostatic is the only feasible route, Davis thinks. Slower inkjet speeds mean longer turnaround time, and he likes the 400 sq. ft./hr of the 9512. Though inkjets could be run overnight, to Davis that's too risky. "What if you do a big graphic and a jet goes out? You come back in the morning and you've wasted \$4000 worth of material. You can't afford to do that," he says. While sails are unusual, and rather lucrative (one sail costs about \$10,000 and up) it's not a business-sustaining product. The market is too small. "Most of the guys who buy these are putting \$1 million or more into their boats."

So he's pursuing other options. He's excited about a new opaque banner material with a light-blocking layer that keeps colors from washing out under backlighting. And he admits his business, to date, has been five years of trial-and-error. "I call it R&D, but I think my son looks at it as 'time-of-little-salary'" he laughs. But in the process of trying a lot of things and new products, "We're starting to find our way through the maze, and find some things that will be good for us. We don't have any sales force at all, just word-of-mouth, and we see a tremendous amount of interest," says Davis.

### **Artistic scarves and pillows via inkjet**

After 30 years in the photolab business, Uosis Juodvalkis got so interested in digital typestyles(?) that he sold his photolab and migrated into digital. He and his wife, an artist, began collaborating experimenting with inkjet printing on all kinds of substrates. You name it, they tried it--watercolor paper, old paper bags, tissues, glassine, and finally (and most successfully) fabrics. Oddly enough, at the same time they were experimenting with fabric, Uosis' former brother-in-law, owner of Jacquard Products in California, started developing dyes and fabrics for inkjet printing. With a small sample kit from Jacquard, (a little steamer, a set of dyes, and some fabric) Uosis' new company, Practical Imaging, got its start in the fabric printing business. At present they offer three options, he says. "We'll print from your design, we'll make a design for you, and we have our own line of natural-fiber scarves and fabrics."

The silk scarves are printed on 300 dpi Encad NovaJet PRO and PROe thermal-inkjet printers, using acid dye inks from Mile High Engineering (?) or Jacquard Products (?) which are durably set by processes of steaming and washing.

But much of their technology is 'homegrown.' Until a few months ago, no major manufacturers offered inks suitable for producing wearable fabrics. All of the fabric inks were aimed at proofing. New inkjet fabric inks are expected shortly from Japanese companies and DuPont. But at present, he says, acid dyes aren't available in forms that will run through higher resolution printers, or through piezo printers.

Still, Uosis really likes the result they're getting. "Digital allows you much more freedom and flexibility, compared to screen print," he says. "Fine gradations, many colors, and brilliance are easy to get, digitally." But the process of direct printing to natural fabric brings a host of problems, such as the critical cost of damaged goods. "Until we learned to manage the printers, we were getting three pieces of crap to one good piece." This was due to the interrelationship of printer head, fabric thickness, and how smoothly it runs through the printer. "Every time a printer head comes close to the surface of the fabric, a few inches later it deposits a blot of ink. So the first seven feet of an eight-foot scarf looked great...and then you'd get a blob." To use up the wastage, says Uosis, "We now have a full line of silk pillows, made from the scraps of our scarves. Who knows, we may wind up being pillow manufacturers rather than scarf manufacturers!"

Color management is a large issue, because the colors are altered considerably by the steaming process. "Steaming intensifies each color to a different degree, and of course washing it washes out some of the dye and changes it back down to something very different from what you see at the printer itself." Another problem to watch out for is fabric composition. Many bolts billed as 100% silk simply aren't. "We had some rolls of very nice 'silk' that has, every quarter inch or so, a polyester thread that won't take the dye." His remedy? Sample everything first!

Then there is the problem of mounting the fabric. A paper backing is required to give the fabric sufficient stiffness to feed through the printer. Though he generally uses pre-mounted fabrics from Jacquard, for small experimental projects he mounts fabrics himself, by ironing the fabric onto freezer paper. Contact paper is also a possible backing, if it's first applied to flannel, then ripped off, to remove the aggressiveness of the adhesive. "There are a lot of solutions. You just have to ferret them out," he says.

And don't forget the processing hurdles! In this new business, Uosis had hoped to avoid the wet, messy environment of photo processing, preferring clean office surroundings. The printing portion meets this requirement pretty well, and even steaming isn't too complicated. "But washing has been a major headache," he admits. "Long lengths of fabric just won't go through a washing machine. They come out at the end of a cycle looking like a bucket of snakes. Everything is tied together into ropes, and you spend a good half-hour trying to undo it. We've gone back to handwashing, in tubs, like the Middle Ages." But perhaps the most frustrating problem in the whole process is the finishing of salable high-end scarves. "If we were in China, we could get these scarves hemmed for \$0.50 apiece, all day long. But to find the right people in the US to do hand rolling or high-quality machine edging is very very difficult."

After all his trials, Uosis says the advantages to direct-printing via inkjet are the low start-up costs, ("all those old Encads can get a new life") the natural fabrics (a better fit in the fashion field than polyesters), and the one-of-a-kind capability of digital. However, no turnkey system is available yet, in Uosis' opinion, to bring the technology directly into artists' hands. This means that some entrepreneurs may find ways to develop service-bureaus for art-related projects. "Designers are not technicians. They won't want to get their hands dirty that much," he says. For those contemplating such a business, here is Uosis' Wish List:

- **A washing machine built like a photo processor.** This type of machine would take fabric through several water baths, dry it on the way out, and roll it up on a nice tight roll, ready to cut and sew.
- **Printers that don't require fabric to be mounted on paper.** Fabrics don't "push" well. There's a need for a printer that would pull fabric through.
- **Heavier deposits of ink.** Even though only one side of the fabric is printed, it has to look good from both sides. It has to be really thin silk to penetrate so both sides look good.

Marketing the textile products has presented another learning curve for Practical Images to conquer. Without previous involvement in the apparel business, mistakes are inevitable. At a New York Gift Show this summer, museum stores liked the scarves, but general gift stores felt they were too pricey. "I misjudged the show on price point," Uosis admits, but feels the next show on his schedule, geared to designers and high-end boutiques, will be more receptive. But Uosis is clearly happy to be a pioneer in digital printing on textile. "I love the hands-on aspects of this. It's not an administrative job for me anymore. The real challenge will be to retain the hands-on aspect as this grows."

### **Dye-sub carpets: learning from the ground up**

Scott Poulin, art director at Banner Impressions of Boston, MA sees a viable market for the company's newest venture: dye-sub transfer printing on carpet tiles and mats. Using a Raster Graphics 5442 e-stat machine, they print onto dielectric transfer media, and then sandwich it through a heat press with the carpet to complete the transfer. "It's a low-to-moderate volume process," says Poulin. "Our cut-off would be in the 500 to 1000 print range. Beyond that, it's more cost-effective to do the job offset."

He expects the carpet tiles will be used to display logos or other images at trade shows, P-O-P environments, or even corporate lobbies. While the process sounds simple

enough, it hasn't been particularly easy to develop. "We've been playing with it for about two years," says Poulin, who adds that the biggest problem was finding the right sort of low-napped polyester-based carpet. "We're limited to the size we can do right now. The manufacturer we're working with makes 18-in. square tiles, and we're looking at somebody else who does 36-in tiles, but beyond that, it gets pretty difficult. You need a bigger heat press to do it."

Banner Impressions is currently using an Astechnologies heat press with a 3 by 4 ft. bed. "Originally we tried to run it through a roller-type heat press, which we use right now for fabric rolls. That wasn't ideal for carpet. We'd either get a bad transfer or bad registration. The carpet wasn't in contact with the heat long enough. So a flatbed is pretty much a requirement for this type of thing."

Color comes through differently on carpet than it would on a dye-sub banner. "It's not as intense as you would get on fabric. It's difficult to get really high contrast. The toner only goes onto the surface, so the white from below the pigments comes up through and affects the look."

Poulin says they are considering the possibilities of direct printing on fabric, but he doesn't think inkjet is quite there yet. "Some superwide inkjets will print on mesh and treated canvases. The canvas can work, but the coating makes it very stiff. Whereas with dye-sub, the only requirement is that it be a polyester-based fabric. Once you have polyester fibers, you can make just about anything."

While he admits the print quality of inkjet is superior to e-stat, the speed of e-stat dye-sub is more important to them.

Their dye-sub carpet was just introduced, so it's too soon to see how it will sell. But test carpet they showed on the floor of their own trade show booth got a great response. After all that R&D, "It's basically ready to go," Poulin says.

### **"Voodoo magic" sells**

In less than two years, Dye Into Print, Inc. of Clifton, New Jersey has already churned out more than 1000 jobs of dye-sublimated fabric for clients nationwide. Typical jobs are banners, flags, tablecloths with corporate logos, and more. This is a 55,000 sq.ft. printing plant, with several electrostatic printers, two giant heat-press machines and 75 people in the finishing department alone. "We're totally vertical. This is not a one or two printer operation. We can turn in as little as 24 hours if we have to. It's a very flexible operation for people who don't want to make an enormous investment in equipment, learning curve, and support staff," says president Danny Schwartz.

Asked his secret for growing a dynamic dye-sub business such a short time, he's quick to cite the "voodoo magic" aspects of this craft. "What you see is *not* what you get; it's not that easy," he says, then goes down the list of entry barriers:

First of all there's the equipment expense. He's presently using electrostatic processes, both Xerox and Raster Graphics, although he hasn't ruled out inkjet in the future. "New machines can run anywhere from \$65,000 to well over \$100,000 per machine. Software can run anywhere from \$20,000 to \$40,000. Then you have the cost of supplies...the inks are very expensive and the paper is expensive. Plus, the biggest factor in the business is the waste factor. Because you don't see what you get the first time out, you have to constantly make proofs and keep color-correcting. You can waste tremendous amounts of paper."

On long runs, the toners tend to dissipate, so the color on piece #1 varies compared to piece #50. Schwartz solves this problem by constantly checking color, even in the middle of a run. If it's OK, he goes on. If it's not, the toners are adjusted, color rechecked, and *then* it goes on. Also, the toners have to be repeatedly agitated. "If you start to run at 9 am, by noon you have to shake the toners to make sure there is no sediment, to make sure you'll get the same quality."

The learning curve is a minimum of six months, he says, using people who really know what it's about. "When we started this business, believe me, we had plenty of problems the first five or six months. More than once we thought 'What do we need this for? We'll throw in the towel.'" says Schwartz. "But then we said, 'No, we're going to hang on...we'll see this through,' and all of a sudden, we came out of the tunnel!" Printing by inkjet, you actually see what you're getting, but dye-sub is intrinsically a challenging process. The color black comes up as a brown, and the intensity of the brown tells you the intensity of the black, but you can't know for sure until it comes out of the heat press machine. And every substrate acts differently. Each has to be catalogued, with its own color codes, its own dwell time, heat time, everything else. "There is no 'standard', Schwartz says."

To track the color, they run a daily Pantone process color chart to keep in the art department. Sometimes it's run morning and evening, especially if printing full colors or bleeds. "Everything is numbered," Schwartz explains. "So if we're looking for a particular red, our reference point is that morning's run, to say 'OK, we can get this red.'" Schwartz is the first to admit he got his knowledge and insight the usual way: "We picked a lot of brains. Everybody has his own system, and you've got to build the system that's best for you. Best for us is that we are constantly proofing. Constantly. It takes a little longer, it's a little more costly, but we get no returns or redos."

The essential factors his customers want are quality, delivery, and price. "We put the whole thing together start to finish. Somebody called in who needed 25 two-siders with liners. No problem. With that they get the flagpole, sleeves, grommets--they get a finished banner, ready to hang."

Schwartz calls dye-sub "the poor man's screenprinting. If you had to pay for screens to get these multitudes of colors, it's very prohibitive. Whether we run one color or twenty colors, our price doesn't change."

"We're looking to be the largest dye-sub supplier in the country. The minimum order we like to take is \$100." He says their mix of small 'onesy-twosy' print shop clients, and larger shops with 10 to 200-piece orders averages out in the long run. They pride themselves with on-time delivery. And Schwartz protects his clients. "If we do a job for somebody, shipping to someone else, and the third person tries to come in direct, we don't take the orders." However, he *will* work with end users who have not come through an agency or broker to begin with.

Direct printing on textiles is a long-range possibility for the company, but they're waiting for technology to be perfected. A veteran of the apparel business, Schwartz *does* agree that direct textile printing is a wonderful feature for strikeoffs. "In the past, with a new fabric design, they would put it on paper, print it out, and color the inks by hand. Then the computer was used to print it out, but you still don't get what it's going to be like on the cloth. Now if they can print 20 or 40 yards, two things happen: One, I actually would be able to see the cloth. Second, I would actually be able to make a sample in the

cloth, and if I liked it, then I would order it from offset. Inkjet will be just a proofing thing, because the equipment doesn't produce fast enough."

He says he's always open for equipment and new technology, but he's also very careful about performance claims. "For example, someone says a machine turns out so many square feet per hour...yeah, it turns out those square feet, but not in continuous tone. Not in full bleeds. It turns it out in black and white!" To get to reality, Schwartz says, "I believe 50% of it, and maybe 25% of it happens. Everybody's looking to sell their equipment, but there really has to be a reason for us to spend \$60,000 or \$100,000." For example, unless somebody gets within three inches of the fabric, they're not going to see the difference in resolution, he says. Most banners or flags are at least 15 to 20 feet away, so 300 dpi is fine.

The future of the dye-sub business, in Schwartz' opinion, will break down to relationships." There will be a handful of manufacturers who make the investment in equipment and learning curves, and they will supply all the other people. It's going to be what they call strategic alliances, strategic partnerships. Because you really can't be all things to all people. That's been the downfall of many companies. Be good at what you do. If you're the best, everybody will find you," he concludes.