



It is a great time to be a buyer, since the range of good choices allows you to get a piece of equipment almost tailor-made to your specialty.

In today's graphics industry, digital technology — driven by inkjet — has become the technology of choice. Once an industry upstart, wide-format digital is now considered mainstream, although changes in technology, materials and markets continue to expand its range. To help us learn more, we talked with Scott Crosby, Holland and Crosby Ltd; Jeff Edwards, Océ Display Graphics Systems; Kim Magraw, Supergraphics; and Rick Scrimger, Roland DGA Corporation.

SGIA: *What do you see as the three most significant developments in the wide-format industry in the past few years, and how have they changed our industry?*

Scrimger: First, proliferation of printable media. The growing number of applications addressable by inkjet is enabled by printable media. While ink technology is also pushing the boundaries of what's "printable," growing inkjet into more far reaching applications.

Next is metallic ink. From an application standpoint as well as a technological breakthrough in terms of jetting, metallic inks help us go beyond just CMYK for print possibilities.

And third, LED curing offers the greatest combination of safety, reliability and material compatibility the industry has

ever seen. As the cost continues to decline, capabilities improve and users seek to move from PVC to other materials, it could become the dominant technology in the durable graphics industry.

Crosby: Speed of production — flatbed digital presses printing at over 7,000 square feet per hour — has put serious pressure on the analog market. Digital print production was traditionally considered for runs fewer than 100 units. That number has now shifted to 500. With run counts going down and targeted marketing increasing, digital has become the most cost effective solution.

There also have been developments in regards to the durability of inks. With improvements to ink chemistry, digital inks are now able to stand on their own without having to spend the time and money to over-laminate. Full-width print heads eliminate the banding that was inherent in flatbed digital printing. This has provided a better quality print without the banding that was most notable in solid colors.



Scott Crosby, Holland and Crosby Ltd



Rick Scrimger, Roland DGA Corporation



Jeff Edwards, Océ Display Graphics Systems



Kim Magraw, Supergraphics

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Magraw: Speed is number one. With speeds now hitting thousands on several printers, this provided the digital print industry again with a tool to compete with screen. Also, faster printers can mean more production. For a lot of companies, the faster printing has tied in with a downturn in pricing of projects. Resolution is so good on most printers, and this has made for a much more level playing field and opened up the industry to even small shops. The new norm is 1,000 dpi-plus, where years back, we were selling a standard 360 dpi. We still run the large banners in resolution of 360–720 but all interior now we would typically run at, or near, 1,400 dpi.

Flatbeds are the biggest industry change in the last four years. The hybrid, roll-to-roll and flatbed options have changed the industry and our substrates. It's still early for this equipment and I expect better, faster and quicker developments from flat to roll-to-roll. Nothing really new that we would not have reported five years ago, but these are the constant changes that affect printers' workloads.

Edwards: The three most significant developments in wide-format printing in recent years include: Grayscale piezoelectric drop-on-demand printheads, flatbed (or rigid media) printing systems, and alternative, environmentally friendly colorants. Grayscale printheads have enabled printer manufacturers to radically change the print quality expectations of our customers without adversely affecting ink consumption; no longer are mediocre images "good enough" for customers. This has also seen the useful working life of many printers extended by several years since they are no longer falling out of favor for image quality reasons.

Similarly, flatbed or direct-to-rigid media printing has really changed the industry, especially for screen printers. The image quality and versatility of many flatbeds available today enable them to be used for the most demanding backlit and point-of-purchase (POP) applications, while reducing the cost and waste of mounting and lamination. At the time of publication, we will have placed more than 3,000 flatbed printers in the market, many being used for very non-traditional applications. Finally, new colorant technologies that move away from solvent bases have been a very significant development. Whether it's UV-curable inks, latex inks or even solid colorant technology, these emerging colorant technologies feature a reduced environmental footprint and various (although different) application benefits.

SGIA: *What do you see as the most*

significant change in roll-to-roll, flatbed, and super-wide printers, and why?

Crosby: For roll-to-roll, UV inks have made significant improvements in resolution and ink adhesion. On flatbeds, speed of production has enabled digital production to be more cost effective on a wider range of projects.

Magraw: Roll-to-roll has the ability to print two-millimeter vinyl on the first shift, reload and print .030 styrene on the second shift. The advancement of materials is great and the speeds have increased. Even now with the new sustainable plastics, we will see even more substrates. Flatbed has opened the door to so many new accounts, projects and materials. Every day we see something unique, again a machine that provides creativity and artistry. This really brings together the crossroads of commerce and art. In super wide, our biggest changes have been resolution and speed. Our 16-foot-wide VUTEk has better ink, five times the speed and three times the resolution.

Edwards: The most significant high-level changes in all these categories have been the general increase in print quality and production capacity. If we get a little more granular, roll-to-roll has moved from oil and solvent ink technology to eco-solvent and latex in an effort to improve the environmental footprint. While these ink technologies haven't done a lot to expand the application versatility, they are much more pleasant to use than the high solvent printers we lived with for the previous ten years.

Many flatbed printers have become very high-quality printing systems capable of closely-viewed POP and even backlit applications, leading to an explosion in the flatbed population worldwide over the last four years. Some manufacturers have integrated very high nozzle counts into their systems for incredible printing capacity, albeit at a very high cost. Super-wide printers have generally trended from solvent ink systems to UV ink systems in recent years, for a variety of environmental and stability reasons.

Scrimger: Quality-at-speed. I think there used to be a gap between the quality on some very large format or production printers. That's changed, and printing quality at speed is now a reality.

In roll-to-roll, after many years of advancements in speed and resolution, printer development seems to be focused more recently on adding quality and capabilities with ink technology. Additional colors, including metallic, white, orange and green, have given users the ability to

accept more types of jobs, and offered print buyers the ability to get more creative with their designs and requirements. New hardware has been designed to leverage these capabilities with features like ink circulation systems and multi-channel print heads.

For flatbeds, print quality has taken a major step forward in the past couple of years. Not that long ago, the mere ability to print on rigid substrate was a novelty, and users were willing to accept some trade-offs to get it. Now, users expect quality close to what they have been getting from their roll-to-roll devices and from flatbeds, and the adoption of high-resolution grayscale print heads has started to deliver it. With the proliferation of devices, there also has been a greater level of specialization, as manufacturers target different applications. For instance, there seems to be a much greater awareness of the fact that the needs of the short-term, low-cost outdoor sign industry are very different from those of the high-end POP display industry. That has also driven the development of more special features, like white and clear ink.

For super wide, the story here is the development of high-speed UV printers for banners and fleet graphics, and its rapid adoption as a replacement for older, hard solvent super-wide printers.

SGIA: *One current development that seems to be “mainstreaming” into a growing number of wide-format devices is UV-LED curing technology. What are the advantages and limitations of this type of curing technology, and how do you see it changing the equipment we use?*

Edwards: My answer will not surprise anyone familiar with our printers. At the moment, I think LED curing is interesting and definitely bears watching, but has insufficient payback for the printer manufacturer and our customers. UV emissions from traditional mercury-vapor lamps are very broadly distributed, affording ink designers an excellent assortment of photo-initiators and pigments. Comparatively, UV-LED sources tend to emit very narrow band UV, restricting the possibilities when designing inks.

In some cases, they also lack the power required for optimum cure dosing. We have recently seen a system from a major manufacturer augmented with additional offline UV curing to make up for this “energy deficit.” In recent years, Océ has continued to develop traditional UV-curing lamp systems and have succeeded in reducing the heat signature at the media by

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more than 50 percent, while increasing the amount of UV energy available for curing.

The increased capital cost of UV-LED curing (hidden in the product cost of course) would have a five- to seven-year payback were we to implement it in our flatbed products today, with almost no payback in terms of usability. It just doesn't make any fiscal sense to do so.

Scrimger: Since they operate at lower temperatures and emit across a narrower band of UV radiation, LEDs have lower fire and burn risk, as well as lower risk from skin exposure. They also allow a greater range of media choices, since they will not damage or distort plastics and other heat sensitive materials. Printers with LED curing systems will also use far less power than traditional UV curing systems, and are less maintenance prone since the lamps last longer and their output does not change with time. At any given output level, LEDs are currently more expensive than traditional lamps, but like many developing technologies, costs have started to come down already and will continue to do so.

Crosby: Advantages include: Quicker, better cure, environmentally friendly, better resolution. As far as limitations, UV inks tend to be more brittle than solvent- or aqueous-based inks, which can cause problems with cutting and creasing.

SGIA: *While some of the markets served by wide-format digital technologies offer excellent opportunity and comfortable margins, a number of others have become commoditized and offer diminished opportunity. Where do you see the most opportunity in the markets wide-format serves, and how can companies position themselves to take advantage?*

Edwards: The opportunity is in creating products, not merely printing square feet of media. It is not enough to simply offer printing services that are as good (and as inexpensive) as your neighbor and hope to survive. Our most successful customers use the capabilities of their products to fuel their imagination for new products and services. They continually ask themselves, “What can I do with this thing?” Finding specialty applications where you can add real value or demonstrate unique

knowledge or skill is key.

We have hundreds of customers using the unique application versatility of our flatbed printers to do just that. I visit dozens of customers per year that have had imagination for a “product” in which the calculated margin per square foot is in the \$75–100-plus range! I can't tell you what they are doing, of course, or they would never let me in the door again. Suffice it to say, the most important consideration in an equipment purchase should be the new capabilities a candidate system provides. Doing what you already do less expensively is fine, but it won't change the declining margin trend in your business.

Scrimger: Printable media is driving new applications. Niche and specialty applications will offer a unique selling proposition versus the competition. Companies that embrace these will have an advantage compared to those that don't.

There is also an opportunity to breathe new life into commodity products by offering new features, like metallic printing that add impact and appeal for viewers. We also have seen an explosion of large-format devices being used for package prototypes and short run labels. In most cases, inkjet can replace costly manual processes, offering a cost saving to the print buyer while maintaining good margin for the provider.

Crosby: The biggest opportunities for companies to succeed in the wide-format industry come out of their ability to provide value-added services to the equation. Print production should be the result of the service and not the service itself. If you are only able to offer print production, you run the risk of being commoditized. The roll-to-roll market is one in which price per square foot has become the measurement used to determine value. The marketplace is left to assume that all other aspects of the project are the same from one printer to another and therefore, the only differentiating factor is the cost per square foot. Nothing can be further from the truth, but we have to educate the marketplace to demonstrate the value-added portion of the project.

Magraw: There will never be a shortage of niche special markets. Companies make

their own decisions to enter commodity markets, and not search for unique markets. You do not have to go far to see some of the new creative ideas, from custom tabletops and furniture, to direct print fabrics and unique displays with different materials. More and more, I see large runs done digitally from fleet markings, where the market now appears to be digital to liquid clear cote.

Three years ago, one hundred-plus trailers still could have been done with screen and clear cote. You must be very good and very organized to prosper within commodity markets. Most companies are not, and barely squeak by with a profit, yet continue to try and compete. The newest markets are going to be for those printers that invest their time in trying new products, and bringing in new products. Every good company should have an idea engineer. The most success will come from mixing traditional printing items, posters, vinyl, wallpapers and new unique wall covering products, or window applications.

SGIA: *Do you see the wide-format digital industry as being over-saturated with players and equipment?*

Scrimger: No, there has already been some consolidation, and players have disappeared, but others seem eager to take their place. Competition forces us all to raise our game, and I have seen the effects of that as each manufacturer tries to stake out their own position and offer something differentiated. Walking around the SGIA Expo, it is actually remarkable to me how few of the devices I see are functionally identical and just competing on price or specs as they would be in a true commodity market. It is a great time to be a buyer, since the range of good choices allows you to get a piece of equipment almost tailor-made to your specialty.

Crosby: The world of digital print equipment has allowed every person that would like to get into the printing business the opportunity to be able to print anything and everything for anyone. Whether you're a screen shop, litho shop, sign painter or just some guy with extra space in your garage, you can now offer signs, posters and banners to the world. With pricing on digital printers ranging from \$25,000–3,000,000, it's a game anyone can enter. The big difference to the unsuspecting consumer is one of quality and timing. For the small runs of one to 10 prints, it's not much of a factor and therefore, this end of the marketplace is very saturated. For the bigger production runs, there are far fewer players, and therefore, not nearly as saturated. Here there is greater financial

commitment required and as a result, fewer companies buying in.

Magraw: Yes, the market has reached a solid position. It is at what I would consider a point of saturation. I am not so sure there is enough marketplace now that existing print companies can feed the equipment market. It used to be they constantly had to bring new companies into the mix, convert photo labs, etc. Now the market runs on its own power. It is not just the low-priced equipment that is making the market more saturated. There are a lot of fast, large-format, high-end printers. We have seen some consolidation in the past three years, and we will see more. The sign industry has long been well known for two, three or four companies to look at one job and all offer radically different prices. There is so much more than just print involved in most projects: Removals, installs, fulfillment, etc. We will maintain a level of normal market saturation, nothing more or less, and I base that upon the fact that the equipment, materials, manufacturers will do well off the existing size of the current market.

Edwards: There certainly are a lot of players, despite the recent flurry of amalgamation. In recent years, we have seen the emergence of Canon/Océ, Hewlett Packard, FUJIFILM, Agfa Graphics and other significant brands in wide-format. These large companies offer multi-national or even worldwide distribution and service, as well as a wide variety of products, services and expertise. So, from a manufacturer's perspective, I would say that the market is maturing into a more professional state. Some segments are certainly under more margin pressure than others: Banner printing is a good example of a service that has completely commoditized. In the flatbed segment, our customers are using the high-quality they can produce as a means to hold margins on existing products and, more importantly, create new ones. On the whole, given how much wide-format output is still produced by analog means, I would say that we are certainly not over-saturated from a digital printing equipment perspective.

SGIA: *As customers see print quality today as an expected given, what do you think digital graphics printers can do to differentiate themselves in the current market?*

Crosby: One area for a digital print press to stand out from another is in material handling. No matter at what speed your press runs, the material handling part of the process plays a huge factor in overall efficiency. Improving feeders, loading and

unloading substrates and minimizing bed changes are just a few areas to differentiate one press from another. Finding ink that is more flexible after curing would be an area to gain an advantage.

Magraw: Mix unique with standard. You have to add services so when the opportunity arises, you are prepared to offer a true, sellable item. Effective differentiation means management software, inventory tracking, great departments, creative, file prep, printing and finishing. People will become more of an asset. With today's speeds and costs of materials, mistakes become very costly, very quickly. Work on developing a wide range of products and know how to show those to clients, from wallpapers and fabrics, to substrates, you can not just say we can do this, you need solid items to show, and your sales team has to know the products. In the current market, I am still surprised at the number of sales people that do not really know their product lines, inside and out. To keep great customers still requires great customer care.

Edwards: We certainly see this as important. A few years ago, we added both flexible media cutting and rigid media cutting tables to our portfolio to give our customers the tools to do just that. Today, more than 35 percent of our flatbed customers purchase a digital cutting solution for rigid media finishing when adding a flatbed. But this is only one expression of a broader advantage. The real issue is expertise. Despite recent price trends for some of the products produced by wide-format technology, we are still involved in a knowledge-intensive industry. The more expertise print service providers can develop in the applications they offer, the more successful they can be in differentiating their services.

Buying the right piece of printing or finishing equipment is not enough, print service providers must continue to develop the expertise required to see these powerful tools utilized in creative and unique ways. I would argue that choosing a vendor that demonstrates that commitment to knowledge development is as crucial as selecting the right types of capital investments. If vendors offer nothing more than sales and service support, they may not be offering enough.

Scrimger: Just as the type of material used in print will address a certain application, so will the "use" and finishing of the print dictate what can be done with that print. Education is a crucial element of success. I constantly meet users who have been using their equipment for

years, and don't realize that it is capable of far more. This is an understandable phenomenon, since most users buy a device to solve a specific problem, but the more applications that can be satisfied with a given device, the faster it will pay for itself. This also applies to how final products are made (or finished). Depending on how you turn the print into a product should be a differentiator.

SGIA: Inkjet print head development has been critical in the growth of wide-format digital printing. How have recent changes in print head technology affected the industry in the past few years, and what do you see as significant future developments in the next few years?

Magraw: More heads will mean more speed. In the future, I still see full-width-array (single pass) as the new technology.

Edwards: The most significant print head development in the last few years has undoubtedly been the introduction of variable-droplet (grayscale) print head technology. It has dramatically changed the image quality capabilities of wide-format printers of every type, while simultaneously reducing ink consumption significantly. In the coming years, the availability of print heads with per-nozzle-costs a fraction of today's could allow for the development of significantly more productive printers with affordable price points.

The current suite of print heads with per-nozzle-costs exceeding \$2 each make highly productive systems prohibitively expensive. If future print head prices trend downward, manufacturers will be able to increase nozzle density and coverage and dramatically change productivity. Only then will the bulk of wide format graphics still produced by analog means finally convert to digital production.

Scrimger: Grayscale (variable dot size) printing from grand-format devices and flatbeds has been driven by head development, and has resulted in much higher quality off these devices than we thought we could get just a few years ago. I think that trend will continue at the high production end of the market. Head technology is also enabling the use of a greater range of ink formulations, and I think there will be more differentiation between heads designed, for instance, to run aqueous textile inks versus UV curing sign inks. This differentiation already exists in the market, but we still have a lot of instances of inks being adapted to existing print heads, and making tradeoffs as a result. In the future, there will be more ground-up developments of head and ink

systems that are optimized for specific applications.

Crosby: Changes in head technology have allowed presses to produce higher resolution prints at greater speeds, which has given digital printing a much bigger window of opportunity. In the future, resolution will have to continue to improve (towards photographic) without sacrificing speed. The other area of improvement will need to be relative to maintenance and head cleaning to make the process quicker and less costly. Heads will need to stay clean longer, with a more automated way to self-clean on the fly.

SGIA: What is one outdated assumption about wide-format digital printing that you wish would go away?

Edwards: That it's easy! Our customers invest vast resources in equipment, knowledge and personnel to do what they do. The notion that anyone with the available garage space and a few thousand dollars can immediately and easily replicate their efforts is ridiculous.

Scrimger: I'll give you two. First, third party inks don't harm the ink delivery system of a given printer. Too often we hear about inks that haven't been engineered for a given system wreaking havoc with the printer — usually necessitating costly repair. And second, there is one universal printer or technology that will solve everyone's problems and fit every application. When shopping for equipment, the best advice I can give people is to start with the primary applications they need the hardware for, and work backwards to find the best technology for that application. Don't fall in love with technology for its own sake and realize after you've bought something that it doesn't fit your business.

Crosby: That digital is only for short run quantities (less than 100).

Magraw: That it cannot hit the color. Challenges with hitting colors are becoming more and more of an assumption of the past.

SGIA: Where is wide-format digital printing going? Do you see significant changes in the technology over the next three to five years? How will our industry be different in five years?

Scrimger: UV printers will get cheaper, and more broadly adopted as a result. LED curing will become the standard for UV printers. There will also be a greater shift away from PVC and other materials viewed as environmentally harmful, which will help drive the adoption of UV and other technologies that allow printers to work with a greater range of materials. Some of the technology developed for ultra-high

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speed inkjet presses in the commercial and transactional printing markets will eventually make their way down to the wide-format and grand-format markets, starting with grand format. That will probably mean full-width arrays of print heads, and will require some new thinking on media transport, curing technology and a host of other issues.

Textile printing also has become mainstream for display graphics as well as décor and short-run apparel. On a corporate level, I expect continued consolidation among the current players, but the entry of new brands into the market as well. Ultimately, the one thing we can bank on is that things will change. Especially looking out five years.

Crosby: I see digital moving to take a bite out of small format litho. Xerox, Fujifilm and Kodak are all developing presses that handle variable data, short-run, small-format work. It's only a matter of time before their sheet size and thickness capabilities expand to handle 85 percent

of what has traditionally been the small format litho business. In large format, I don't think the changes will be great. There will be small improvements in inks, heads and resolution, but I don't think we'll see another jump in print speed.

Magraw: Significant changes and faster printers. This has been the same for 20 years. Flatbed will see the best changes for us in the next two to five years, and then full-width-array heads. The best changes are new substrates and materials, and costs of materials — those items that can most effect our bottom lines. There is a right material for every job, and it has to be chosen carefully and with all costs and responsibilities considered.

Our industry will become more competitive in the near future because there are a lot of great print shops with great people. As some shops expand and hire different people with different industry experience, we will see a lot of changes at shops as they move in different markets. We may not have a lot of new printers, but

just expansion of existing sign, photo and other types of print companies. We will see more expansion into other product lines.

Edwards: From a market perspective, we will likely see a few smaller players fall "off the map" or be integrated into larger brands over the next few years, although most of the obvious acquisition targets have already been taken. From a product perspective, I think we are in a period of evolution, not revolution. We will continue to see steady advances in application versatility, productivity and automation and the continued conversion of analog, wide-format capacity to digital. Then again, perhaps there is some not-yet-known development lurking in the wings that will change everything!

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