the status of printing in the United States

Today's print service providers face many challenges thanks to advancing technology and shifting lines of responsibility

by Frank Romano

Someday, when we look back at 2003 and try to identify the trends that shaped the year, we'll no doubt see one or two specific driving forces that will have brought us to the next step. Reflection on these kinds of things is always easier as time passes and we are able to more clearly see the results of change, but for now we must look back even as we are in the midst of digesting these changes and figuring out what lies ahead. Whether digital printing, CTP, workflow, or the economy, those of us in the graphic arts industry have had no shortage of topics on which to dwell this year.

For more than 30 years, Michael Bruno published an annual status report on printing in the U.S. This article will not presume to do the comprehensive overview he did, but will offer comments on some of the issues at the forefront of today's industry.

The small printer

The heart of the printing industry is the small printer, and they make up the majority of all firms (more than 80 percent). The Printing Industries of America (PIA) defines quick printing as short-turnaround commercial printing and copying. Quick printing was just a $10 million-per-year business at the start of the 1970s. Today these companies generate more than $2 billion in annual sales. The National Association of Quick Printers (NAQP)—now Print Image International—counts 25,000 to 30,000 quick printers in the United States. The definition of "small" depends on many factors. A $5 million printing firm has been described as small, as have $10 million firms. Most common is to use $2 million as the dividing line, which translates into fewer than 20 employees.

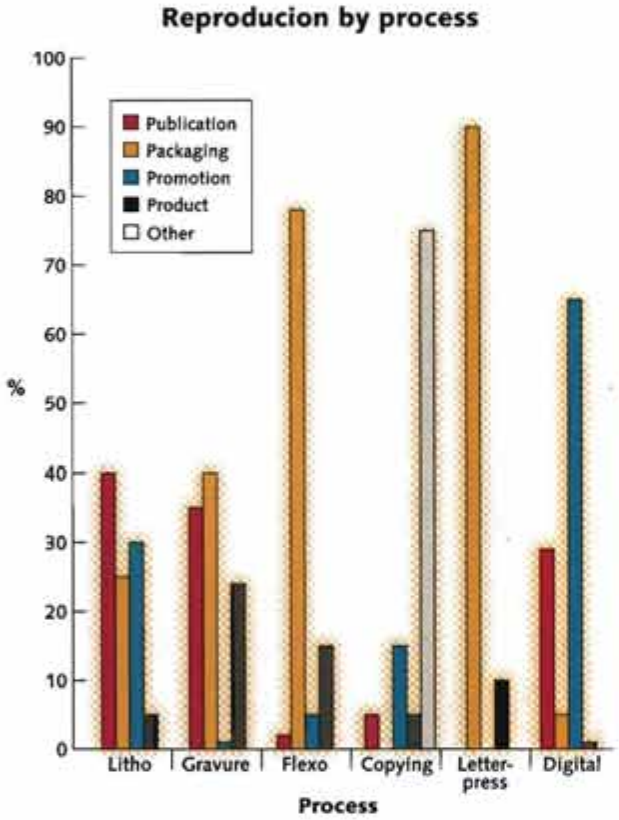
"Small printer" can mean the firm has a small press (offset duplicator)—while others say a GTO is a small press. Experts typically define a small press as one with 11x17-inch or smaller capacity. Press size has traditionally been an indicator of a firm's nature, which is why many printers define themselves by their press ("I'm a 40-inch house," for example). One very large commercial printer claimed it was a quick printer even though it had almost 500 employees. The franchise segment of the quick printing industry continues to contract. In January 2003, there were about 3500 franchise printshops, 184 fewer than the previous year.

At one end of the reproduction services chain is the copy center. At the other is the so-called commercial printer. In the middle is the quick printer. There is a significant overlap in terms of services provided between these segments. The term "instant printer" or "quick printer" arose in the 1960s as the camera-platemaker and offset duplicator allowed printers to offer while-you-wait services. These firms evolved into black-and-white and color copying as well and split into two markets: franchise and independent companies. Quick printers typically operate from a single storefront location and have fewer than 10 full-time employees. The average annual revenues of these companies fall between $600,000 and $800,000, but extremes abound and actual sales figures per year can range from

$100,000 to $30 million. As part of their changing business strategy, they are pursuing corporate business instead of waiting for the customer to walk through the door. Quick printers' dependence on walk-in business has decreased from 100 percent to 11 percent. Quick printers aren't necessarily quick. Their typical turnaround for jobs is longer than 24 hours.

Reproduction processes

No printing process seems to disappear completely. Litho replaced letterpress but letterpress is still around. Digital will not replace litho, but it will take volume away. The following figure provides estimates of reproduction volumes by process:



It is only today that several forces are merging:

- The move to shorter runs by print buyers
- The move to tighter schedules
- The move to target marketing
- Equipment cost and performance coming into harmony

A major trend will be the growth in hybrid printing: combining gravure and offset litho, offset litho and toner, flexo and inkjet, and more.

Digital printing grows

It is no longer a case of whether printing firms will implement digital printing; it is now "which technology?"

Most of the revenue from digital printing has come from black-and-white systems. Printing a B&W print from a B&W printer is less expensive than printing a B&W print from a color printer. Newer digital color printing systems charge less of a premium for B&W, often making B&W printing on a color printer as cost effective as B&W printing on a B&W printer. This single trend will spur the growth of digital color printers in the commercial market. Many jobs are B&W with occasional color pages—and cost-effective B&W printing will encourage the use of more color. Over time color printers will print everything. When a supplier can print B&W on a color printer at the same cost as on a B&W printer, the market will truly take off.

The fact that digital printing devices print on smaller sheets with limited imposition alternatives makes them less appropriate for documents longer than 24 pages. With online finishing, digital printers can saddle-stitch and perfect-bind, but most commercial printers may not always have such consistent volumes, so offline finishing is most common. Also, an entire copy of *Time* magazine would not be cost effective because more expensive paper would have to be used. Signature-based digital printers that are at least 4-up (four 8.5x11-inch pages on one side of a large sheet, or eight of those pages on both sides) will enable providers to handle larger multipage documents more effectively, but for one-off books, the current page orientation is effective.

Digital color printers have been sold to these market segments:

	Market Share	B&W	Color
Premedia and large printing companies	40%	85%	15%
Medium-size printing companies	5%	75%	25%
Small printing companies	5%	65%	35%
Corporate and in-house departments	50%	70%	30%

The printing industry is, and will continue to be, the major market for digital color printing. It took a few years for sales of digital printing to take off, but in the late 1990s the market began installing digital color in increasingly higher numbers. As of the end of 2003, just over 50,000 digital color printers (at speeds of 30- to 40ppm or greater) have been shipped around the world.

The saddest part of this growth has been the very limited use of variable-data printing. Experts have talked about it in 1993 and every year since; yet, it is still a miniscule part of what we print digitally. Localized, addressable media are the future of advertising and we need more cooperation among vendors and users to move variable-data printing aggressively to the market. The digital color printing industry may be divided into the following levels:

Level 1—Desktop printers (3- to 6ppm)
Level 2—Copiers with RIPs (7- to 9ppm)
Level 3—Intermediate digital copier/printers (11- to 30ppm)
Level 4—High-end digital printer/presses (30- to 130+ppm)

These devices may be sheet-fed or web-fed and most apply toner-based technology, which creates a new page image with every impression. This distinguishes digital color printing from traditional offset printing where every impression must be the

same. Although Direct Imaging (DI) offset presses are called digital presses, they do not have the variable-data printing capability because they use a static printing plate. Their advantage is in making the plates on the press and thus reducing press makeready.

DI presses cannot produce one book at a time or personalized direct marketing, two of the major growth markets. But digital color printers can handle very short runs (under 500 copies) cost effectively and provide quick turnaround because they do not require the setup phase. In the preceding list, HP Indigo and Xeikon roll-fed machines would be in Level 4; sheet-fed machines would be in Level 3. Level 4 includes devices for so-called industrial-strength markets, where volumes and job characteristics require devices that are heavy-duty, faster, and more appropriate for printing plants. There are definable application markets:

	DI	Digital Print
One-at-a-time books	No	Yes
Personalized direct marketing	No	Yes
Very short runs (under 500 copies)	No	Yes
Short runs (501 to 2000 copies)	Yes	Yes
Moderate runs (2001 to 5000 copies)	Yes	Some
Long and very long runs (more than 5000 copies)	Yes	No

Digital color printers are applicable in the first four markets and overlap with DI presses at Level 4. DI presses are applicable in Level 4 and overlap with conventional offset printing, which would be Level 5. Each level has its own market dynamics and, in most cases, products from different levels do not compete with each other, nor do DI presses present a market threat. All statistics and predictions show that toner-based printing will dominate over the next decade, with inkjet affecting the wide-format, desktop, and high-speed document markets.

In most cases, sheet-fed devices do not compete with web-fed devices. However, there are production and workflow reasons why a plant would want one of each. As with roll-fed printing presses, roll-fed digital color printers will always operate at faster speeds than sheet-fed printers. Sheet-fed printers are better suited to very short runs and one-at-a-time books. Roll-fed printers can handle both areas but they are better suited to more complex printed products, such as fold-out advertising brochures and personalized printing runs where each piece is different but thousands are going to be mailed.

Inkjet provides the only foreseeable threat to toner-based printing. Over the next two decades, of all digital color pages, inkjet and other technologies may take 20 percent of the potential volume—however, the growth in pages being printed via digital, as digital takes volume from offset, will still provide a substantial market. Copiers with RIPs attached do pose a potential threat, as multiple low-end printers compete with one large high-end printer. Usually low-end printers are acquired by small firms, by corporate departments, or as entry-level machines by medium and large firms who then upgrade to the high end. The major trends are:

- Sheet-fed printers that print faster, working toward 100- to 200ppm
- Web-fed printers that print faster, working toward 150- to 300ppm

The goal is to achieve speeds that compete with printing press productivity in some markets. Although some experts were overly optimistic regarding the rate at which digital color printing would be accepted, we are now seeing the technology bear fruit. Sales are robust, especially at the intermediate and high end of the market. Many of the enabling technologies such as personalization software, workflow solutions, automatic job tickets, digital bindery, and color management were not ready. The market is accelerating. Companies that acquire sheet-fed printers are now ordering web-fed versions and vice versa.

Industry infrastructure

The printing industry is made up of many segments. Below are two of the major segments with some projections on their performance in the future:

	1960	1970	1980	1990	2000	2010	2020
U.S. printing firms							
Large	800	850	800	720	700	700	600
Medium	8000	9000	10,000	11,000	8500	5000	5500
Small	23,000	29,000	30,000	32,000	30,000	20,000	11,000
Total printing firms	31,800	38,850	40,800	43,720	39,200	25,700	17,100
Employment	900,000	1,100,000	1,200,000	1,450,000	1,300,000	850,000	600,000
Industry revenue ($B)	$65	$90	$110	$144	$152	$135	$120
Revenue per employee	$72,222	$81,818	$91,667	$99,310	$116,923	$158,824	$200,000
U.S. premedia firms							
Typographers	9200	10,800	11,800	3800	100	50	0
Desktop publishers	0	0	0	4100	3900	1000	800
Color separators	2700	4000	5000	4900	2100	700	200
Other prepress	2300	3500	3600	2900	1200	1000	200
Total premedia firms	14,200	18,300	20,400	15,700	7300	3350	1200
Employment	340,000	260,000	200,000	120,000	65,000	35,000	16,500
Industry revenue ($B)	$12.5	$13.0	$16.0	$10.0	$5.5	$3.0	$1.5
Revenue per employee	$36,765	$50,000	$80,000	$83,333	$84,615	$85,714	$90,909

There is no doubt we will see increasing consolidation of the industry. This is already evident on an informal basis with "peer

groups" of printers who combine for purchasing and distributed printing. Consolidation will occur because there is a tad less printing than there used to be and such a reduction will mandate fewer printing companies.

CTP moves premedia to print provider

Through the 1980s and 1990s film was a primary manufacturing medium for printers. All pages eventually wound up as film negatives, which were required to make plates. Premedia services converted art and type to film and then "stripped" it (assembled it) into composite form. For printers, film could come from outside sources and this was especially true for publication advertisements. When all film units had been assembled, they were used to expose printing plates. Computer-to-plate requires all page content in electronic form, and there is no need for film since the laser "exposes" the plate. Because CTP systems were installed at the printing company, many content originators dealt directly with the printer instead of the premedia intermediary. CTP grew slowly from 1993 to 1998 but has exploded in the last few years, thus removing page volume from premedia services. Note that a very small number of premedia services make offset plates for the designated printing company. Another small group make gravure cylinders for gravure printers.

Elimination of film cuts a source of revenue

As CTP required a filmless workflow, ads continued to be supplied in film form, which required that they be scanned to insert them into the digital workflow required for CTP. In 2000, the PDF/X-1A standard defined an electronic approach to ad delivery to magazines for inclusion in page layouts. Actually, PDF/X-1A had been defined before 2000, but when Time Warner magazines, which account for 25 percent of all U.S. publication advertising, mandated this format, many other publications followed suit and the last vestiges of film began to disappear. Premedia services assembled ads for ad agencies and then produced four films (for four-color process printing) and a proof for all publications that would run those ads. The film cost, proof cost, and other costs were marked up by the premedia service. With a filmless workflow, the revenue from the film markup disappeared, while the markup of the electronic ad file was reduced. This caused a reduction in revenue for most premedia services.

Shift of work to desktop—in-house or end user

The 1980s CEPS systems and scanners cost $1 million or more. Today, that functionality is available on desktop computers and scanners priced under $10,000. Some volume, mostly simple work, migrated to desktop production. This has allowed premedia buyers and originators to move some level of production in-house. Creative services (designers, ad agencies, etc.) have applied scanning and digital photography, and the net effect is that volume has eroded as premedia production moves closer to the point of origination. Not all originators will choose to perform their own premedia services, but enough will move at least some percentage in-house to affect the overall market volume.

Migration of content to nonprint alternatives

Printing and premedia services are attempting to reinvent themselves with digital asset management and cross-media services—in order to develop new revenue sources as some volume of print has migrated to Internet, PDF, and other electronic publishing methods. The printing industry has seen a loss of about $16 billion in revenue since 1999 as content that would have been in print form moved to Internet or recorded disk distribution. Although premedia services now also perform new media production, the volume and profit have not restored most companies to their prenew media volumes and profits. Print-based services demand a premium and this generates higher profits.

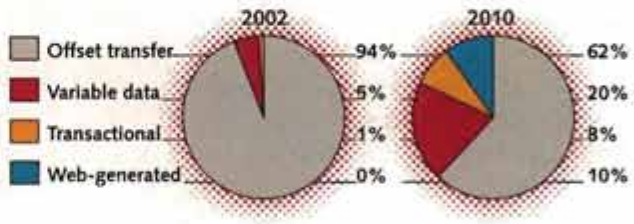
The vagaries of the economy

Printing and premedia services live and die by the volume of advertising—ads running in magazines and newspapers, direct marketing materials, catalogs, and newspaper ad inserts—which vary with the economy. The current slump has been in effect for two or more years and industry services believe that the volumes of preslump periods will return. Commentators abound, but it is valid to say that there are more alternatives for the advertising dollar, most of which are nonprint-oriented. Thus, it is doubtful that ad budgets will expand to include new media and also restore previous ad expenditure volumes. We may have lost some volume of print-based advertising forever.

Changing structure of demand

"On demand" is a euphemism for digital printing. Digital printing eliminated two of the impediments to more timely printing production: makeready and drying. Thus, printing jobs can be produced in shorter runs and with shorter schedules—something quick printers and many commercial printers have been doing for years.

Where will the volume of digital printing come from? To some extent, it will continue to come from work moved from offset litho to digital:



Some growth will occur in web-generated volumes as more firms apply customer relationship management approaches. Although transactional documents are being usurped by electronic bill delivery and payment options, some volume will gravitate to full-color printing. Market niches will evolve. These include security printing, signage, art reproductions, and others. The commercial market is driven by market demand.

There is the misapprehension that the printer must control every variable-data printing job. More complex jobs will call for intermediation by the printer—who will generate new profits through database and related services. But many jobs will be either too small or too simple to require such activity. These could be assembled by the creative originator if the capability was made available—and if a standardized method was available to allow any printer to output the file from any digital printer. We need a blind, reliable approach to transferring such files. This is what PPML/VDX was designed to do. PPML alone is not the answer.

Digital printing costs more than offset litho to produce, especially as run length increases. To compensate for this, suppliers used the benefits of just-in-time delivery to eliminate warehousing and transportation costs. This made digital printing more economical. Then came the concept of "distribute and print" which cut postal and other distribution costs by moving the point of production closer to the point of delivery. But these concepts are also applied with conventional printing, especially DI printing. Run lengths must be between 500 and 2000 to justify digital printing—in many cases. The secret to success of digital printing involves runs that approach one.

The revenue generated by digital printing (in this case black-and-white and color) has been a paltry $14.2 billion out of a total printing industry revenue of $145.8 billion. That is 9.7 percent of the total. This should grow to about 40 percent of all revenue by 2010. And this only counts revenue generated by the commercial printing industry—if you add in-plant reprographic services and data center printing, you might find a number between $10 billion and $20 billion. This would mean that the "value" of in-house digital printing is greater than commercial digital printing. Since the suppliers of this technology concentrated on the corporate market over the last decade, based on their copier placements, experts do not doubt the volume of digital printing that is done, but the way that it is valued.

Workflow and beyond

If you were to look at the printing industry product mix by 13 categories of printed product, based on revenue, you would discover the following:

Printers of every type now produce print in less time than ever before, and at lower cost. They are applying new and more automated presses, more sophisticated systems—all of which are linked by new workflows. But one workflow does not fit all. JDF and CIP4 will play a key role in traditional and digital processes.

The future of print

Print will prosper, but not as it once did. This will require a realignment of the industry. As printing firms consolidate, so will vendors, associations, and others. Ben Franklin's epitaph puts it all into perspective: "For it Will...Appear once More In a New and More Elegant Edition Revised and Corrected..." Progress starts with baby steps and ends with quantum leaps, and we may have no choice but to take quantum leaps.

Frank Romano *is founding editor of* Electronic Publishing.