

Digital Printing for Corrugated Converting

An Analysis of User
Adoption Practices
and Opportunity



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Introduction

SGIA and its market research partner, Keypoint Intelligence, recently completed a structured survey of corrugated converters in North America. The goal of that research is to understand corrugated converters' printing habits, preferences, and plans, as well as to describe the role and prospect of production-level color digital printing at such companies. This report describes the main findings of our research with corrugated converters, as well as our conclusions and recommendations for use by printing companies and others interested in the corrugated segment.

Executive Summary

For printers interested in printing packaging, corrugated printing is an attractive segment but a specialized one. It is a big market, accounting for about \$25 billion in total print value in the US and Canada in 2017. Another plus is that, like all packaging, corrugated is a print category that is never displaced by electronic media and that is also growing in absolute terms, slowly and persistently, because it is tied to human consumption. At the same time, key features of the corrugated segment make it a difficult one for commercial printers and even other packaging converters to attempt, because printing and finishing equipment are mostly quite specialized. On a positive note, there is news related to the digital print technology that is a special focus of our investigation, namely that there is some exciting, production-level digital printing equipment available now, and more digital options will be available in 2018. Rare digital installations are just now beginning to print corrugated in full color in annual volumes equal to many millions of square meters per system. Digital printing equipment is thus already allowing some users to offer a new level of service to print customers, and in turn to add to their own profitability.

Today, corrugated printing overall is more than 99% done by flexo or offset presses, but that is augmented by inkjet printing from various types of equipment. The most numerous digital printers in this sector are wide format inkjet printers that print mainly prototypes but some small production runs also, always in multiple passes. Meanwhile, high production inkjet printing of corrugated is just starting, thanks to the first installations of high speed, *single pass* inkjet printers from companies such as Barberán, EFI, and HP.

Our survey results give insights into many aspects of the corrugated converters' work, their equipment choices and preferences, the industries they serve, and other topics. Corrugated converters are under pressure from customers to print short runs efficiently and economically on whatever presses or printers they have. Print jobs with short run lengths are the biggest reason corrugated converters are interested in digital printing. As the survey results show, these converters' individual print jobs vary greatly in length from under 1,000 to over 200,000 square feet; even for the analog printing that dominates corrugated converting, though, print jobs under 1,000 square feet are significant, at about 15% of all



jobs. Meanwhile, for the converters that operate digital printers of some type today, jobs on those printers that are under 1,000 square feet account for a bigger share (45%), and a full 60% of all digital print jobs are less than 5,000 square feet. Of the two general print technology categories, analog and digital, digital printers handle short runs much more easily than analog presses because their pre-press work is all electronic. In contrast, analog technology sometimes struggles with short runs because all analog printing requires plates and related plate preparation, as well as related costs in time and money.

Another finding of the research is that the frequency of short runs is now increasing. 58% of corrugated converters say that the frequency of short run printing is growing at their companies, *nearly 30 times* the 2% of converters who say that it is declining. Through improved automation, flexo and offset presses have greatly enhanced their ability to print short runs, but short runs are often still a challenge for most converters that have only analog technology. Color digital printers are, in turn, becoming known as a way to print short runs quickly and economically.

The pressure on corrugated converters to print short runs comes from brand owners in various vertical industries, companies that, for competitive reasons, want to target markets precisely and improve operational efficiency — thus, they tend to order package printing more often and in smaller amounts. Companies making foods, beverages, health and beauty products, as well as some industrial products, are the most important drivers of short run corrugated printing jobs, but the survey data show that companies from several other verticals also drive the printing of short runs of corrugated, such as medical products, pet foods, and consumer electronics.

Within the total range of vertical industries in North America, there are hundreds or even thousands of brands that buy corrugated printing services, and these many brands are the customers and prospects of corrugated converters. As a result, corrugated converters are good witnesses about brands' buying habits. Of the various insights about brands that come from converters in the survey, an especially important one concerns the willingness of brands to pay a premium for certain print services. Corrugated converters in our survey say that on average at least 15% of their customers are willing to pay a premium for each of the four types of print services:

- ◆ Prototypes
- ◆ Variable data
- ◆ Jobs that include 50 or more versions
- ◆ Jobs with a turnaround of 48 hours or less



Each of the four cited services is one where digital printing is essential (variable data printing) or extremely useful (prototypes, jobs with 50 or more versions, or jobs with 48 hour turnaround). Color digital printing thus is a key tool for converters to provide services for which brands are often willing to pay extra.

Color digital printing for corrugated has its challenges. The research shows that converters have concerns about maintaining color consistency and printing white, as well as the costs of digital inks and media. That said, the research also shows that many corrugated converters want to own digital print technology. When asked what they would buy to upgrade their companies' printing operations, assuming cost is not an issue, their top choice was production-level color digital print technology.

Methodology

To understand printing preferences, challenges, and plans in the packaging industry, SGIA and Keypoint Intelligence worked together to create a detailed questionnaire for use in telephone interviews with corrugated, folding carton, and corrugated packaging converters in the US and Canada. Most of the survey's questions were the same for all three converter types, but several questions were particular to each converter category. The following are the general types of questions in the survey:

- ◆ What print technology does your company use to print packaging?
- ◆ What are your company's technology needs and plans?
- ◆ What are the main challenges to your package printing?
- ◆ Does your company use any color digital printing technology?
- ◆ What are the trends in your company's package printing business?
- ◆ What is the outlook for color digital printing in your industry?

Keypoint Intelligence then conducted interviews with managers at 147 converters in the US and Canada, of which 50 were corrugated converters. These corrugated converters are the focus of this report (SGIA and Keypoint Intelligence will provide separate reports about results for folding carton and flexible packaging segments). All 50 corrugated converters have analog color printing of corrugated media, and 14 also have color digital production printers of some type. Like the other converter categories in our survey, all the corrugated converter respondents are decision makers or influencers regarding printing at their companies.

After reviewing the completed interviews, and rejecting a small number that were marginal, Keypoint Intelligence tabulated and charted the aggregated results for corrugated converters and for the other two converter categories. Keypoint Intelligence then focused



on the corrugated converter results to create this report — aiming not only to isolate the key findings, but also to explain their meaning and significance as well as make conclusions and recommendations.

Background Information

For printers interested in printing packaging, corrugated is an attractive segment to consider. It is a big market with over \$25 billion in total value in North America in 2017, and it serves many vertical industries. At the same time, key features of the corrugated segment make it a specialized one for commercial printers and even for other packaging converters to attempt, for a few reasons:

- ♦ Print media varies hugely from coated and uncoated rolls of paper to thick, multi-layer corrugated board;
- ♦ Printing equipment varies as well, from wide format inkjet flatbeds to some of the print industry's biggest sheet and roll fed flexo and offset presses;
- ♦ Cutting, creasing, and gluing processes generally are done on equipment that is specifically designed for corrugated.

Final considerations, though, are strongly positive. Unlike most print applications, corrugated is never displaced by electronic media and is instead constantly growing along with human consumption. Meanwhile the small share of all corrugated that holds fine color graphics is in the billions of square meters; that tally is also growing steadily and often includes short print runs where color digital printing can be a vital help.

Corrugated, Described

For the sake of precision, we offer a quick definition of this print application: corrugated is normally wood-fiber based material consisting of a fluted sheet (the “medium”) glued in place between two other layers of paper (paper “liners”). There are many variations on this basic construction, such as multi-layer corrugated, and (rarely) corrugated made from non-paper media. For the most part, though, fully formed corrugated is a thick, multi-layer paper-based substrate, commonly up to about 0.25” in thickness.

The core of corrugated is secondary packaging, i.e. boxes that hold and transport primary products such as bottles, produce, cans, and a wide range of household, industrial, and other goods. To a much smaller extent, the corrugated market is also displays, although displays are a tiny share of the overall corrugated print market; that said, because of their marketing role, the display category is nearly all printed with fine color graphics.

While as much as half of the total corrugated market is either unprinted brown cartons or is printed with only a single color, a small but growing share of all corrugated is printed with at least three colors and sometimes as many as seven or eight, for use in both packaging and



displays. This growth in graphics printing for corrugated is tied to changing strategies of brand owners, who increasingly use corrugated packaging for marketing products, not just transporting them. Thus the shelves of Costco, Walmart, Best Buy, and many other retailers hold products in corrugated boxes that are printed either directly or indirectly with fine color graphics.

Figure 1: Corrugated Examples



Sources: Moore Packaging, Parkway Display

Over 99% of the total corrugated market is printed by flexo or offset presses. The highest analog print quality is achieved either by pre-printing the liner media before a “corrugator” manufactures board stock, or by laminating offset printed paper to the media (“litho lam” and “litho label”).

It is in the share of the market that uses high color graphics where inkjet most often serves as a complement to flexo and offset press technology. Inkjet flatbed printers, in fact, have been used for over 20 years to print prototypes for corrugated converters. In just the past few years, though, wide format inkjet printers for corrugated have come to include ones that are especially oriented towards production print runs, rather than just prototypes; the newest wide printers thus include highly automated multi-pass flatbeds for post-printing corrugated board media. At the same time, a new category of inkjet for corrugated is now developing, specifically wide bed, high-speed, *single pass* printers. These single pass printers include both sheet-fed systems for post-printing board and roll-fed systems for pre-printing corrugated liner; all such printers use wide inkjet heads that print the entire width of the media in one pass. (While these single-pass printers are normally very big and very costly, they include a small, entry-level category, namely manually-fed inkjet printers that cost less than \$150,000 and are mainly for use by small print service providers and some manufacturers.)



Figure 2: Inca Onset X3 for Multi-Pass Printing of Corrugated Board



Source: Inca

Today both multi-pass and single-pass color inkjet printers contribute to production print runs of corrugated. Automated multi-pass printers such as HP Scitex 15500 and Inca Onset X3 can run unattended and print hundreds or even low thousands of displays or cartons automatically. Meanwhile, several wide bed single pass inkjet printers are now commercially available that can print many millions of square meters of corrugated per year; prominent examples include EFI Nozomi and HP C500, each of which has beta units now operating, and HP T400S and T1 100S, which have had a few commercial installations in North America since 2016.

Figure 3: HP T1100S for Single-Pass Pre-Printing Liner Media



Source: HP



Figure 4: Barberán Jetmaster, for Single-Pass Post-Printing of Corrugated Board



Source: Barberán

Color inkjet printing has a strong future in the corrugated industry. One reason is the usefulness of multi-pass wide format flat beds for printing prototypes and now even for production runs. The other reason is the advent of highly productive single-pass inkjet printers, which are just now beginning to serve in North America and other regions. The destiny of color digital printing in the corrugated industry is to become a common production partner to analog presses that are the main print technology for corrugated. As in other packaging converting segments, digital printing will print the short print runs and gangs of short runs that brands increasingly ask for; in doing so, it will free the analog presses to print just the long runs only where analog technology excels.

Survey Results and Analysis

In the following pages, our report will focus on the most important survey results based on corrugated converters' tabulated answers. These results collectively give a good picture of corrugated converters, their printing, their challenges, and their needs and plans, with many clues about the role and prospect of color digital printing at their companies. What are these companies like, in terms of equipment and software? What do they want? What do they think of digital printing? What are their plans? In the text that follows, our report will use the survey results to answer these questions and others.

Technology Owned, Technology Wanted

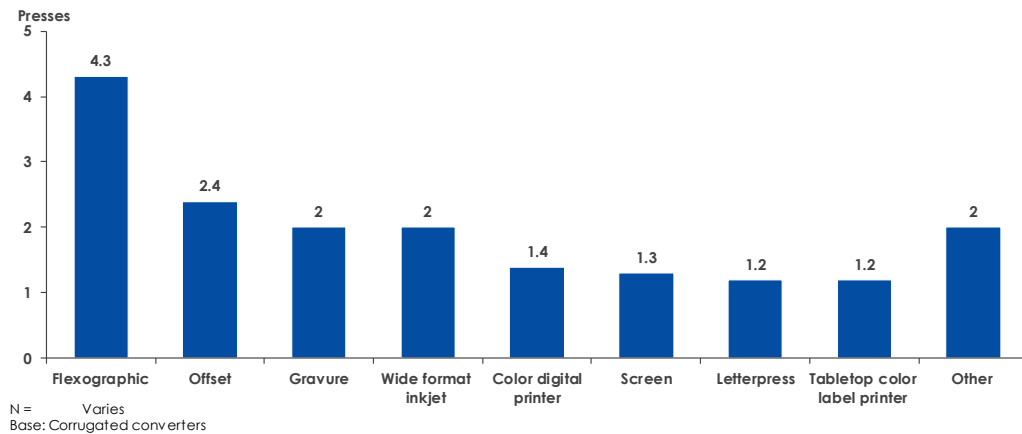
Figure 5 shows the average number of presses or printers at corrugated converters in the survey. Note that the sample size ("N") varies — the average cited for each device type is the average for the companies that have that specific type. That said, each of the 50 corrugated converters in the survey operates at least one conventional press, most often a



flexo or offset press. Because the survey includes a good share of larger companies, the average (mean) number of analog presses is high, at 4.3 units for flexo and 2.4 for offset.

For color digital printers, the survey specifies that we mean production-level equipment, such as HP Indigo, Xeikon, Durst, and similar digital webs; just 14 companies claim to have color digital printers that meet that standard. While wide format inkjet is used by most of the 50 as a proofing technology, and 9 corrugated converters claim to use it at least partly for production — the other press and printer types cited are used by only a minority, often just a small minority. In many cases, these other technologies may be printing other, non-corrugated applications, such as labels.

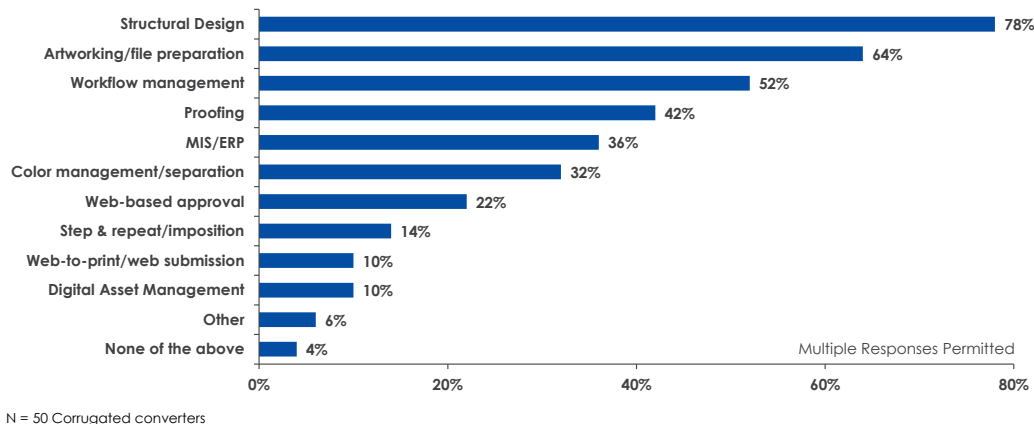
Figure 5: Average Number of Presses Operated, by Type



Corrugated converting most often relies on software as well as hardware. As seen in the Figure 6, most corrugated converters own more than one type of software. Four types of tools are the most owned: structural design (78%), artworking/file preparation (64%), workflow management (52%), and proofing (42%). Note that the next tier of software tools, in terms of popularity, is also a mix of business management and pre-press tools: MIS/ERP (36%), and color management/separation (32%).

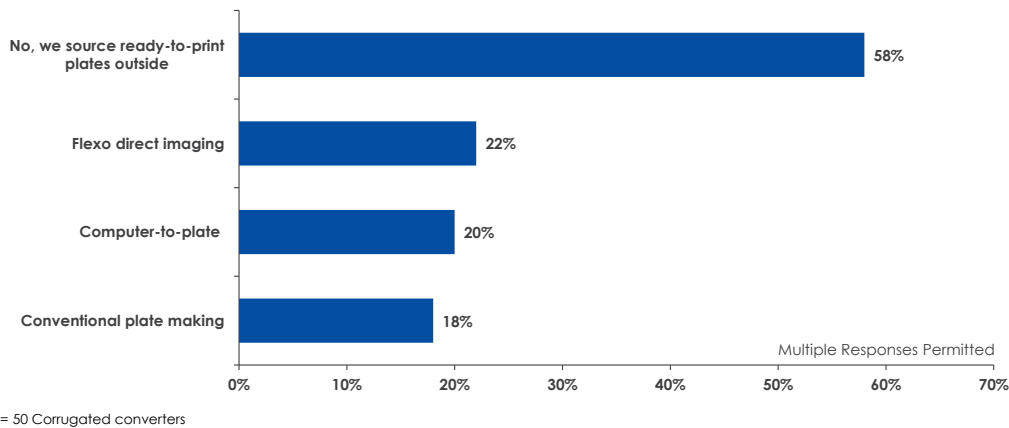


Figure 6: Types of Software Owned



Given that all the corrugated converters in the survey operate conventional presses, it follows that they also require plates or masters. A full 58% of corrugated converters in the survey buy plates outside; that result is so high that it may be more than is true for the overall industry. Meanwhile, for the converters that do not buy plates outside, computer-to-plate (CTP) technology is owned at a 20% rate. Corrugated converters' reliance on two other plate making options is only moderate, and not as high as the reliance on them by flexible packaging and folding converters: flexo direct (22%), and conventional platemaking (18%).

Figure 7: Pre-press Technologies Owned

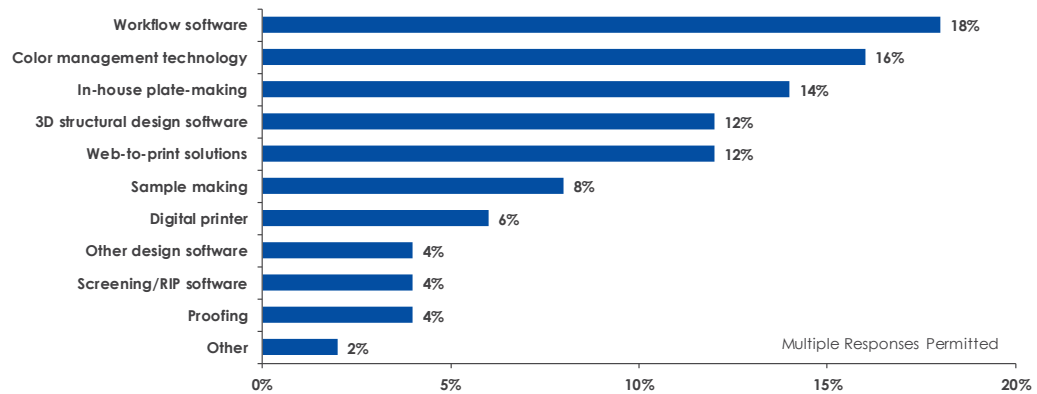




When asked what workflow technology they would buy, if budget were no consideration, corrugated converters choose first workflow software (18%) and color management software (16%). The pairing shows the mix of priorities for these converters — their shops are busy and require efficient scheduling and execution, and at the same time, standards for color printing are high and require dedicated software tools. Note that the next choice is in-house plate-making; given that most of the converters say in an earlier response that they buy plates from outside, many of them likely think the use of internal resources for plate-making will help workflow.

Figure 8: Most Wanted Workflow Technology — 1st Choice

Q9: Assuming you have the budget to buy ANY new production workflow technology, what would you buy?



N = 50 Corrugated converters

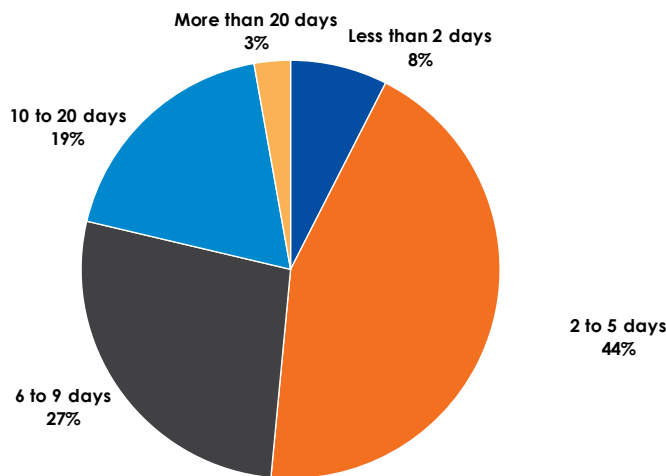
Other “first choices” for workflow technology again show a mix of priorities — 3D structural design software and web-to-print software, both 12%; and sample making, 8%. The general lesson from results to this question is that corrugated converters have many workflow priorities to address, and there are only a few that are fairly prominent. Note the small response for digital printer, (6%). Having a production-level digital printer can, in fact, improve workflow for a converter that must print many short runs; at this point, though, many corrugated converters are either not aware of it, or they do not rate it highly enough to cite it as a top choice for technology to improve workflow.



Another question asks corrugated converters how their jobs are split in terms of required turnaround time, from order receipt to actual delivery, with response options ranging from less than 2 days to more than 20 days. Many factors can affect required turnaround times, from rates of retail sales to the need to print packaging related to a current event, such as a sports championship. As seen in the chart, high shares of corrugated print jobs have turnaround times that are short, namely “less 2 days” (8%) and “2 to 5 days” (44%); in contrast, jobs where required turnaround is long account for much smaller shares, “10 to 20 days” (19%) and “more than 20 days” (3%). Regarding the high incidence of jobs with short turnaround times, depending on the needed run length, such jobs are often good candidates for digital printing.

A final note on this survey result is that, in the overall corrugated industry, the incidence of jobs needing very quick turnaround times may not be as high as is indicated by this sample. The types of companies making corrugated vary greatly, from very small sheet printers to very big, fully integrated manufacturers; our base of respondents includes only a small share from the biggest companies, which probably have more jobs with longer turnaround times.

Figure 9: Required Job Turnaround Time



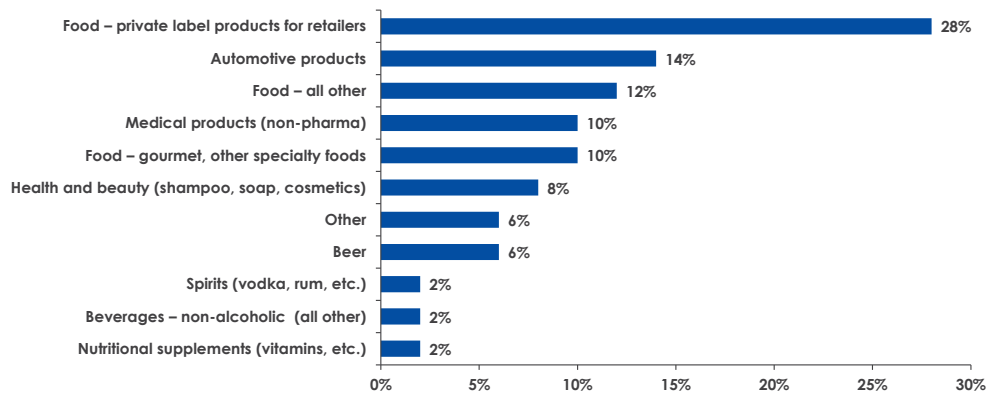
N = 50 Corrugated converters



Markets Served

Given that all the corrugated converters in the survey have analog presses of some type, the industries that these companies serve with analog technology are a good indication of the overall origins of corrugated print jobs. The survey asks corrugated converters which vertical industries account for most of their print volumes. The survey asks each respondent to choose and rank up to three options. Food that is private labeled for retailers (28%) leads the results for “first choice” (Figure 10).

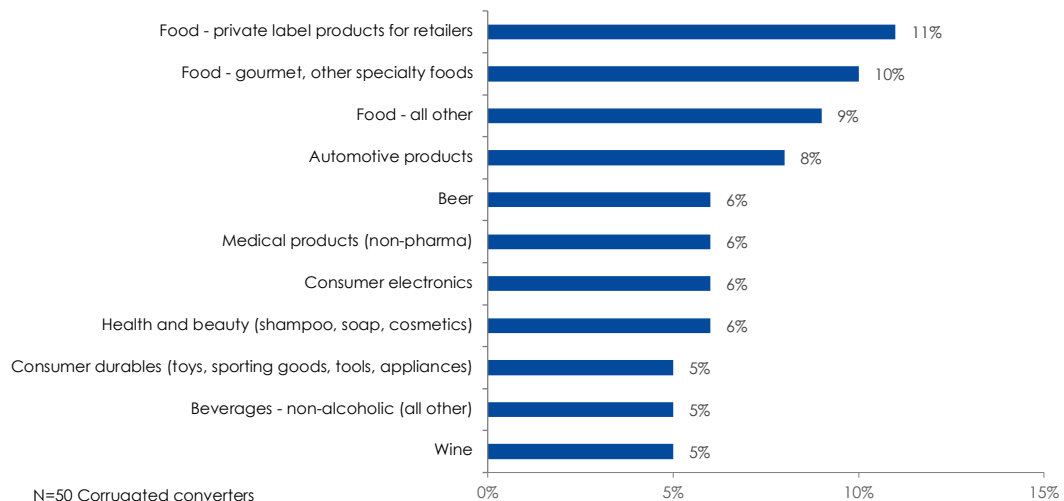
Figure 10: Analog Print Volume, by Industry — 1st Choice



N = 50 Corrugated converters

Looked at another way in the next chart, the results are based on total votes for each option as first, second, or third choices. In this second view of the response to this question, the results change only slightly. Food products in general lead all: “Food — private label products for retailers,” “Gourmet foods,” and “Food — all other” rank first, second, and third (11%, 10%, 9%), and “Automotive Products” is next (8%) (Figure 11).

Figure 11: Analog Print Volume, by Industry — Most Chosen



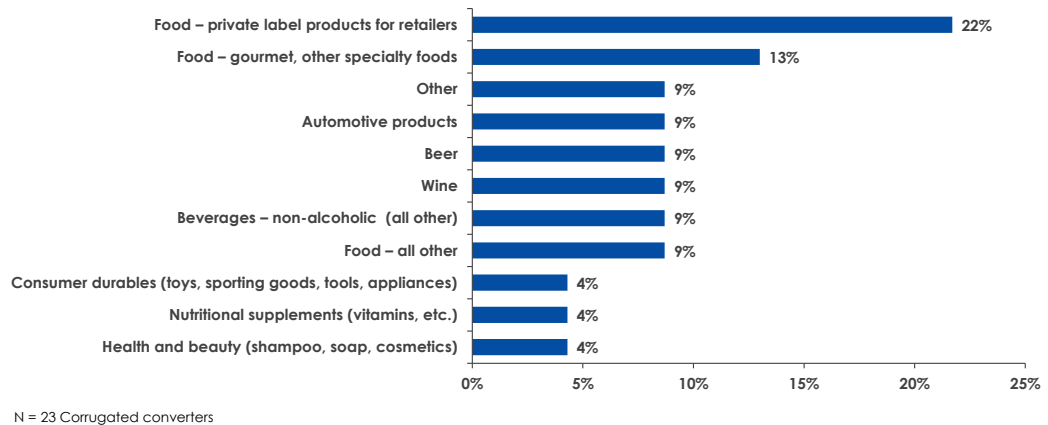
N=50 Corrugated converters



The main takeaway from the results to this question is that for the analog technology that prints most corrugated, food verticals and sub-vertical industries are the top purchasers of print services. Meanwhile, corrugated is used widely, by a big range of other vertical industries, with auto parts and related products being a good example, but many other verticals are also relevant, as seen in the chart, with even obscure ones garnering at least a small percentage in the list of “most chosen” verticals (Figure 11).

Of the 50 companies in the survey, 23 use digital printers for production of some share of jobs; that group of 23 includes 14 that claim to have a single-pass production-level digital printer of some type, and 9 that use multi-pass wide format inkjet at least partly for production. The total of 23 is too low to be statistically valid (30 is the minimum for statistical validity). That said, this small sample of color digital printer users is enough to be indicative, and the results show that the industry verticals for digital printers are similar for the verticals for analog presses. Again, foods are the top verticals (“private label for retailers” at 22% and “gourmet, other specialty foods” at 13%), and automotive products and multiple other verticals are cited next, as seen in the chart.

Figure 12: Digital Print Volume, by Industry — 1st Choice



Looking at the incidence of total votes for each option as first, second, or third choices (not charted here), the results adjust that view only slightly, adding pharmaceuticals, medical products, and non-alcoholic beverages to the list of most important vertical industries.

Print Volume: Analog vs. Digital

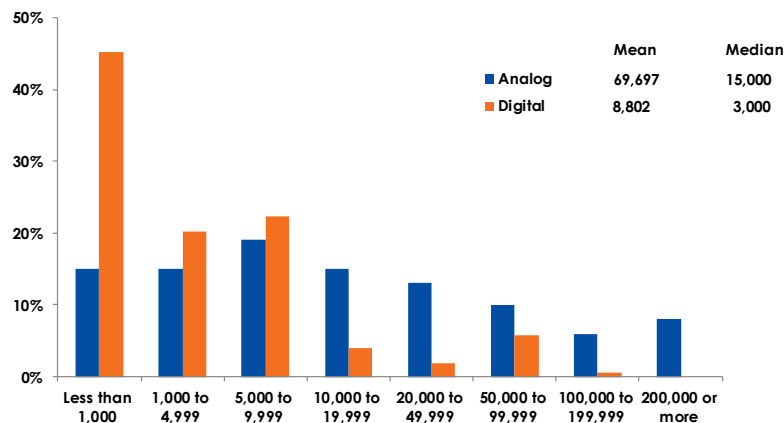
Figure 13 is especially important because it compares the run lengths of corrugated jobs printed on conventional presses to those printed on color digital printers. One question on the use of conventional presses and another one on the use of digital printers ask the corrugated converters that use each type of print technology to estimate the shares of their companies’ print jobs that fall into each of several volume ranges, from under 1,000 square



feet to 200,000 square feet or more. The digital print sample here is just 21 companies that claim to use digital for print production, thus their responses are indicative but not statistically valid; in contrast, the responses about analog presses come from all 50 companies and are thus enough to be statistically valid. With that difference in mind, it does appear that color digital printing is mainly used for short runs, and that conventional printing is used for both short and long runs. A few related points:

- ◆ Where 45% of color digital print jobs are less than 1,000 square feet, so are a full 15% of analog print jobs, a clear indication that even flexo presses must print short runs.
- ◆ More broadly, a combined 65% of digital jobs are less than 5,000 square feet, compared to 30% for analog presses.
- ◆ As seen in the chart, color digital printing does print some longer print runs, including a 7% share at over 50,000 square feet (quite possible with automated systems).

Figure 13: Corrugated Run Lengths, in Square Feet: Analog & Digital



Base: 50 Corrugated converters with analog presses and 21 with digital printers

Note the reference in the chart to mean (average) results and median results, as cited in the figure's legend. Median results show the level at which half the results are higher and half are lower; regarding run length estimates, medians are likely a better overall indicator than averages. Median estimate of job sizes is 15,000 square feet for conventional presses and 3,000 for digital; these median results are a fairer representation in this case than the mean results, especially regarding digital printing.

To give a historic perspective, five years ago, when color digital printing of corrugated was limited to multi-pass systems, there were no digital print runs of more than 50,000 square feet and likely none more than 20,000 square feet. Digital has obviously progressed, though, in the past few years. There are highly automated multi-pass printers in field now, such as HP Scitex 17000, as well as a tiny number of single pass systems such as EFI Nozomi and

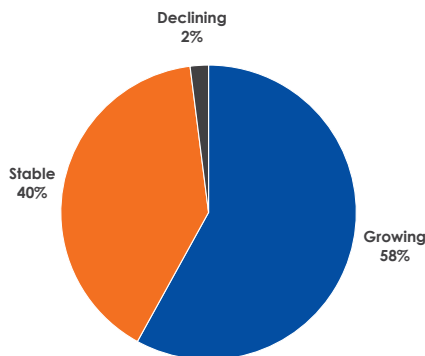


Barberán Jetmaster, which can print many millions of square meters annually. More printers in each category will be placed over the next few years.

A related consideration is that for the overall corrugated market, short print runs are now a significant part of the converting business — one that even users with just conventional presses must handle. We note with care that vendors of flexo and offset press suppliers have greatly improved the ability of their newer presses to print short runs, mainly through automation. That said, short run printing is something that color digital printers naturally excel at, and that is the most important reason the corrugated market tends to welcome new and capable digital entries.

The survey asks corrugated converters whether short run printing is growing, stable, or declining, regardless of how it may be printed and how the respondent defines the term “short run.” As seen in the chart, the share of corrugated converters that believe short run jobs are growing is 58%. That figure is nearly 30 times larger than the 2% that say such printing is declining; meanwhile, 40% say the incidence of short runs is stable. A follow-up question asks the 29 corrugated converters who say that short runs are growing to estimate the *rate of growth* in such jobs. Their average (mean) response is 19% annual growth, and the median is 15%.

Figure 14: General Outlook for Incidence of Short Runs



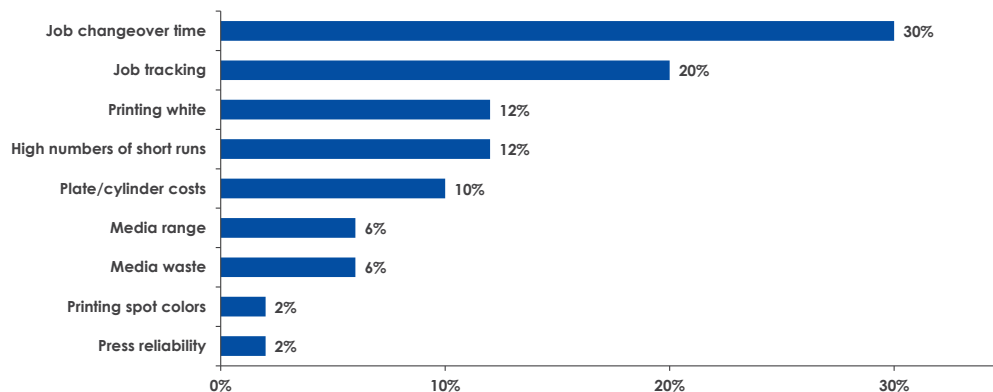
N = 50 Corrugated converters



Technology Concerns

The survey asks corrugated converters to cite and rank the top three concerns regarding their conventional print technology. As seen in the Figure 15, when looking at just the concerns that are ranked first, the top concern is job changeover time (30%), followed by job tracking (20%), printing white (12%), and high numbers of short runs (also 12%). Meanwhile just 2% cite press reliability, a tribute to the consistent performance of flexo and offset presses. These results reflect the nature of conventional print technology and the challenges of corrugated converting in 2018. Job changeover time is a significant concern for users of flexo and offset presses. As to job tracking, the response there is consistent with an earlier response, which showed that workflow software is a top wish for future purchases. Printing white is a focus for packaging converters of all types, a big contrast with commercial printing, which has essentially no need for white ink. Regarding high numbers of short runs, the response there is consistent with an earlier response, which showed that short runs are growing.

Figure 15: Analog Print Technology Concerns — 1st Choice



N = 50 Corrugated converters

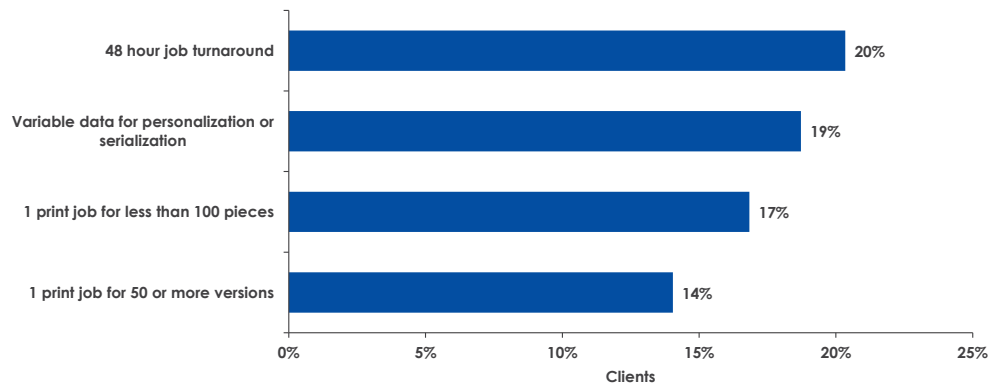
Print Service Value

Our survey of corrugated converters also asked "for the following print services or features, what share of your clients would be willing to pay a premium?" The response options that we offered for that question include:

- ◆ 1 print job for 50 or more versions
- ◆ 1 print job for less than 100 pieces
- ◆ Variable data for personalization or serialization
- ◆ 48 hour job turnaround



Figure 16: Shares of Clients Willing to Pay Extra for Certain Services (Means)



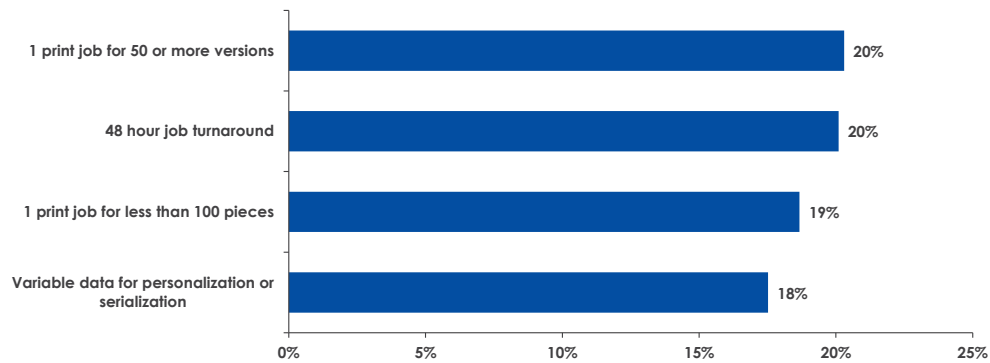
As seen in the Figure 16, converters of corrugated say on average that some share of their customers are willing to pay extra for one or more of the services that are cited in the response options. The strongest showing is for “48 hour job turnaround”, where the survey’s 50 converters together say that 20% of customers are willing to pay a premium — such print jobs are often ones that color digital printers help execute, because their pre-press activities are electronic and quick, and because color digital printers are more productive than ever. Meanwhile, the converters say that the shares of their customers who are willing to pay more for the other services are smaller but similar, namely variable data printing (19%), one print job for less than 100 pieces (17%), and one print job for 50 or more versions (15%).

Why did we pose this question about paying a premium, and why did we offer these response options? We wanted to find out if the market really values the kinds of print services that production digital printing offers. Note that each of the services cited as a response option, from printing many versions to 48 hour job turnaround, is something that color digital printing excels at. Note also that each service is often inconvenient or even impossible to do with flexo, offset, or other analog printing.

Where respondents have indicated that their clients are willing to pay a premium for one or more services, the survey further asks *how much* of a premium those clients are willing to pay, with options ranging from “1% to 4%” to “50% or more.” As seen in the Figure 17, the mean or average response is from 18% to 20%, with the mean for all of about 19%.



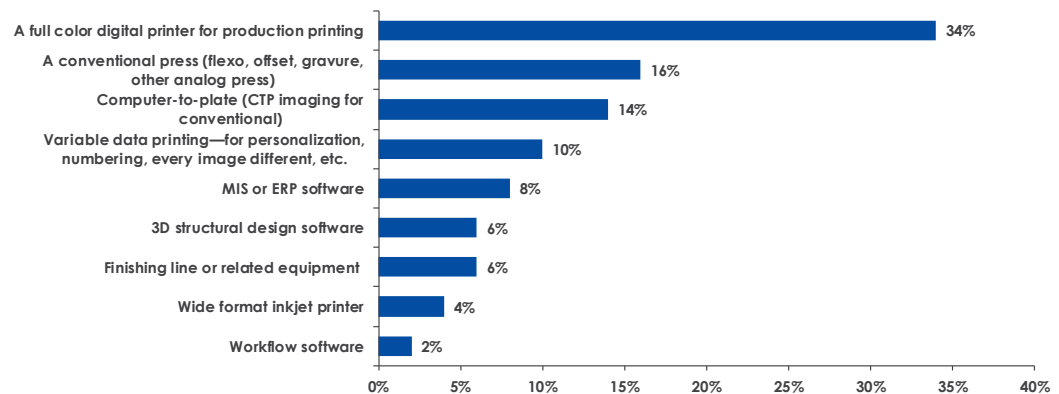
Figure 17: Print Service Premiums — Percentages (Means)



N varies. Base: Corrugated respondents who believe that clients would be willing to pay a premium for services or features

Another question in the survey asks converters what they would buy for their companies to upgrade their printing capabilities, assuming there is no budget or price consideration. Response options range from MIS/ERP software to conventional presses and digital printers as well as pre-press technology. As seen in Figure 18, a full color digital printer for production printing has the strongest response (34%), far more than the response for a conventional press (16%) and computer-to-plate imaging for conventional presses (14%). That strong indication of interest in production digital printing is consistent with responses to earlier questions about the growth in short runs, the need for quick turnaround, and the services for which customers are willing to pay extra. At the same time, all the other response options received some “first choice” responses, such as variable data printing (10%), MIS or ERP software (8%), workflow software (2%), and finishing equipment and structural design software (both 6%).

Figure 18: Most Wanted Upgrades — 1st Choice

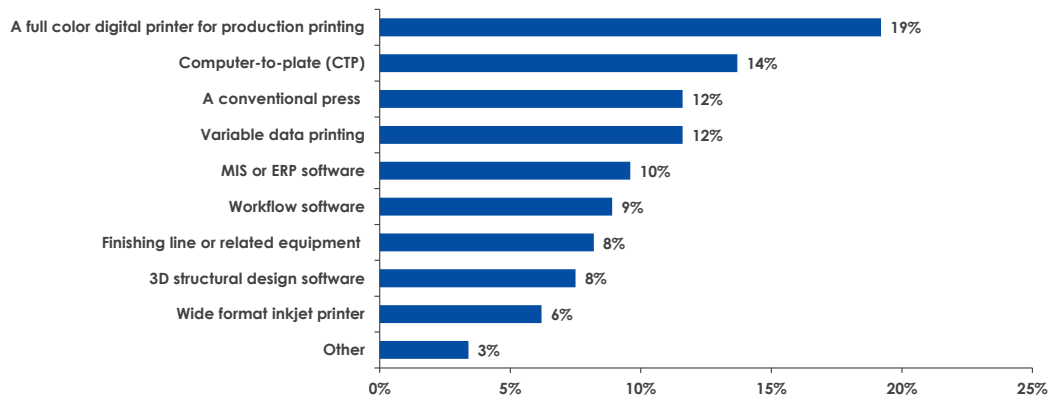


N = 50 Corrugated converters



Looking at the broader results — based on most responses chosen as one, two, or three — full color digital printer for production printing is still the top choice (19%) followed by CTP (14%) and conventional press and variable data printing (both 12%). The overarching takeaway from the results for this question, based on “first choice” and “most chosen” responses, is that color digital printing for corrugated is now an attractive option for corrugated converters.

Figure 19: Most Wanted Upgrades — Most Chosen



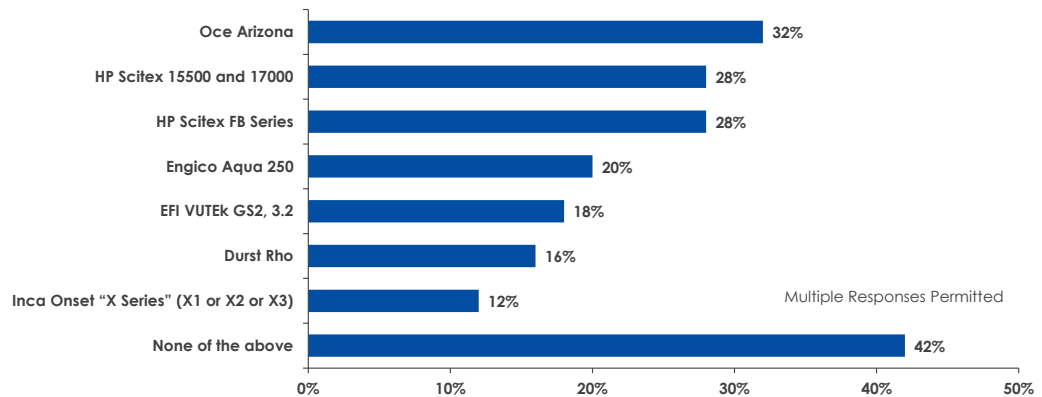
N = 50 Corrugated converters

Industry Awareness about Digital Printing Equipment

One of the survey's last questions asks corrugated converters if they are aware of various multi-pass printers and, separately, various single pass printers. As seen in the Figures 20 and 21, the strongest response is for “none of the above”, since 42% of the respondents are not aware of any of the multi-pass printers cited, and for the single pass models, 48% say the same. To that we would respond that corrugated converting is a big field, with many different types of companies participating, including many small ones that may not have attended important industry shows such as CorrExpo and SGIA. At the same time, about half the market is aware of one or more digital printers for corrugated. In multi-pass printers, Océ Arizona is the most known: while this model is not specifically built for corrugated, its reliability and relatively low price (\$200K to \$300K) have given it some success in the corrugated field. HP Scitex is the next most known brand, via HP Scitex 15500 and 17000, both highly automated and both designed specifically for corrugated, and also via the HP Scitex FB (Flatbed) series, which has current and former models that have been widely used by converters. Overall, HP Scitex really is the top brand for multi-pass inkjet corrugated printers, but the other major suppliers cited in the chart, EFI VUTEk (18%), Durst (16%) and Inca (12%) are also recognized by many companies.



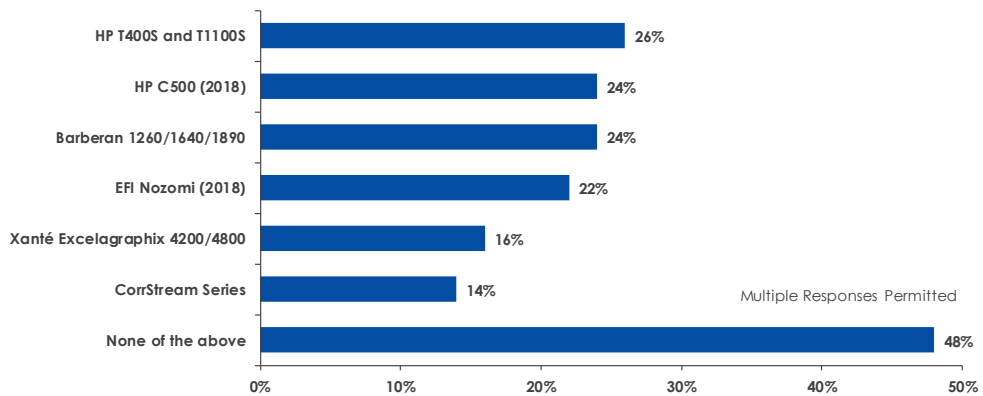
Figure 20: Multi-Pass Inkjet Printer Awareness



N = 50 Corrugated converters

Regarding single-pass printers, HP has the leading brand, based on the awareness level for the HP T-Series printers, which pre-print liner media prior to corrugation, and HP C500, a high-speed system to post-print corrugated board stock. The HP T400S and T1100S have several high-profile installations in the US; HP C500, which has a first beta site in Israel, has been much covered in the trade press since its introduction at the drupa show in 2016. Barberán, based in Spain, has at least a few US installations of Jetmaster that have all been publicized, and EFI Nozomi has one placement in North Carolina and another scheduled for installation this year in Washington. Xanté Excelagraphix is an outlier in this rarefied area. It is a manually fed single pass printer that costs only about \$130,000, compared to \$1 million to \$10+ million for the various other single pass printers cited. Xanté had its first placements in about 2014, with an installed base of over 100 units globally.

Figure 21: Single-Pass Inkjet Printer Awareness

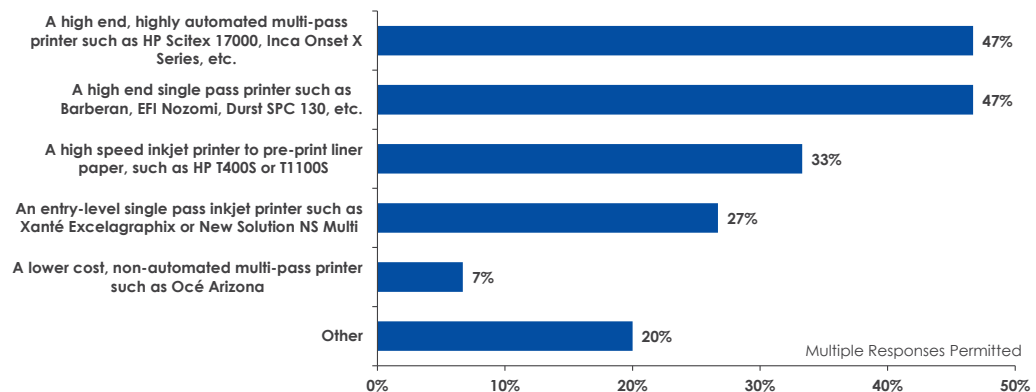


N = 50 Corrugated converters



In a following question, our survey asked if corrugated converters plan to buy any color digital printing equipment; 30% say they do plan to buy, versus 66% who say they do not have plans, and 4% who say they do not know. Another question then asks the 15 who say their companies do plan to buy digital equipment what types of printer their companies are considering. The results for this second question on planned purchases are thus based on a sample that is tiny and can only be indicative. The top choices, cited in each case by 7 of the 15 respondents (47%) is "A high end, highly automated multi-pass printer such as HP Scitex 17000, etc." and "A high end single pass printer such as Barberán, EFI Nozomi, etc.". The third strongest response, "A high speed inkjet printer to print liner paper, such as HP T400S or T1100S," cited by 5 converters (33%) is a specialized printer for liner media, normally for use only by companies big enough to have their own corrugators.

Figure 22: Digital Printing Equipment Being Considered



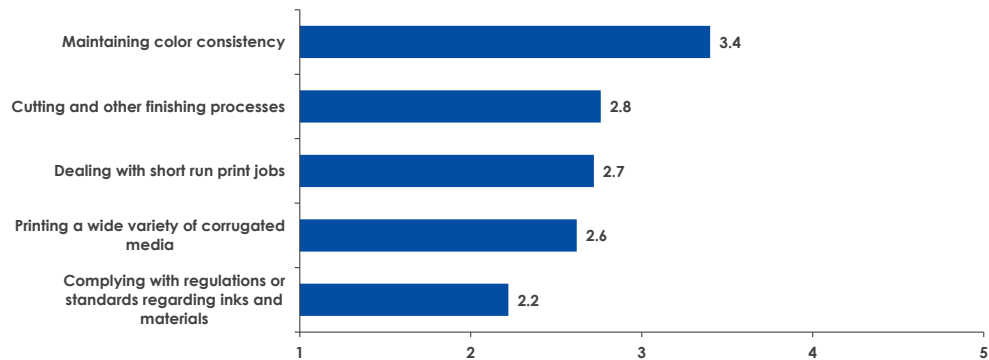
N = 15 Corrugated converters who are considering purchasing digital printing equipment



Industry Challenges

The survey asks corrugated converters to rate a series of options as challenges for corrugated converting on a five-point scale, based on 1 meaning “no challenge” and 5 meaning “a very big challenge.” As seen in the Figure 23, “maintaining color consistency” (3.4), “cutting and other finishing processes” (2.8), and “dealing with short run print jobs” (2.7) are the top challenges. Of those options, the response for maintaining color consistency has underlying results that make it more compelling: 58% of respondents rate that challenge as a 4 or a 5, versus 12% who rate it a 1 (no challenge).

Figure 23: Corrugated Converting Challenges (Means)



N = 50 Corrugated converters

From that result, we understand that maintaining color consistency is challenging for many corrugated converters, as with finishing processes and dealing with short runs. For vendors of color digital printers, these results will help them prioritize their own technology development efforts, with color management getting increased attention. While color digital printing has greatly improved in terms of color matching and consistency, it is still often not quite the equal of analog printing.



Conclusions and Recommendations

- ◆ Converters depend on a range of equipment and other technology to print corrugated for clients in many industries, mainly brands making consumer products.
- ◆ Analog print technology dominates total print volume, but print jobs there vary greatly in length, from sample making to jobs using over 200,000 square feet of media.
- ◆ “Short runs” range from prototypes to runs of up to a few thousand square feet, are a growing share of the converters’ work, and can be a challenge to print in analog.
- ◆ Corrugated converters value the ability of digital printing to print short runs efficiently and to offer special services, such as variable data printing.
- ◆ Most corrugated converters are at least aware of color digital printing as an option, and some use it now for production printing.
- ◆ Corrugated converters with no digital print production today often want to own it to offer short runs, personalization, and other new services that brands require.

Keypoint Intelligence offers several recommendations for printing companies and for product manufacturers. For printing companies:

- ◆ Use this report to understand the overall status of digital printing in corrugated converting in our region, and to understand that digital printing is young but growing.
- ◆ If you have no production digital printing capacity now, but you have a significant incidence of short run printing, consider your options to buy and install digital printing.
- ◆ If you have production digital printing now, consider using it for new services such as personalization, a service for which brands will often pay a premium.
- ◆ Consider attending key trade shows, such as SGIA and Corr Expo, or events hosted by Durst, EFI, HP, or some other digital printer vendor, to see the latest digital print systems.

For various reasons, few manufacturers of products engage in the printing of their own corrugated and other packaging, but there are rare exceptions, such as small manufacturers that can justify the installation of an entry level product like Xanté Excelagraphix 4800. That said, manufacturers in *many* vertical industries benefit from working with converters that have digital printing as part of their technology. For manufacturers in general, we recommend the following:

- ◆ Use this report to understand that production digital printing is an option to analog printing of corrugated — one that prints short runs and variable data efficiently.
- ◆ If your company relies on a print service provider to print corrugated, find out if that company has production digital printing of its own or access to it outside.



- ♦ Consider the services that digital printing can offer and, in turn, consider adjustments to your company's packaging that might be possible because of digital print.
- ♦ If your company prints its own packaging, or wants to do so, see the earlier recommendations to print companies, and study your own options to do that printing.

WHO WE ARE

Author

Robert Leahey has many years of experience in consulting to the peripherals and supplies industries. At InfoTrends, his main work has been to conduct custom research projects, most often on inkjet, thermal, and color laser technologies used for commercial and industrial applications. He is also the main analyst of InfoTrends' Color Digital Label and Package (CDLP) continuous information service.

Keypoint Intelligence/InfoTrends

Keypoint Intelligence is a major source of market research and consulting services to clients in the digital printing and imaging industries. Our 125 professionals around the world provide a range of services, from digital printer market analysis and forecasting to product testing, competitive intelligence, and sales training. Keypoint Intelligence has two divisions: Buyers Laboratory, Inc. (BLI), a provider of testing and engineering services, and InfoTrends, a provider of market research and consulting services.



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SGIA — Supporting the Leaders of the Digital & Screen Printing Community

Specialty Graphic Imaging Association (SGIA) is the trade association of choice for professionals in the industrial, graphic, garment, textile, electronics, packaging and commercial printing communities looking to grow their business into new market segments through the incorporation of the latest printing technologies. SGIA membership comprises these diverse segments, all of which are moving rapidly towards digital adoption. As long-time champions of digital technologies and techniques, SGIA is the community of peers you are looking for to help navigate the challenges of this process. Additionally, the SGIA Expo is the largest trade show for print technology in North America. “Whatever the medium, whatever the message, print is indispensable. Join the community — SGIA.”

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