SGIA

Digital Printing for Flexible Packaging Converting

An Analysis of User Adoption Practices and Opportunity

KEYPOINT INTELLIGENCE
InfoTrends

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Introduction

SGIA and its market research partner, Keypoint Intelligence, recently completed a structured survey of flexible packaging converters in North America. The goal of that research is to understand flexible packaging 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 flexible packaging converters, as well as our conclusions and recommendations for use by printing companies and others interested in the flexible packaging segment.

Executive Summary

For printers interested in printing packaging, flexible packaging is an attractive but challenging segment. It is a big market, accounting for about $31 billion in total print value in the US and Canada in 2017. Another positive is that, like all packaging, flexible packaging is a print category that is never displaced by electronic media; it is also growing in absolute terms, slowly and persistently, because it is tied to human consumption. Key features of the flexible packaging segment, though, make it a hard one for commercial printers and even other packaging converters to attempt for a few reasons:

- Most flexible packaging print media is very thin film, a challenge in terms of web handling and ink adhesion.
- Most flexible packaging is for foods and other consumables, so its inks and materials are subject to regulatory compliance.
- For finishing, nearly all flexible packaging requires specialized lamination. For some types of flexible packaging, other specialized finishing is needed as well.

A final note, though, concerns the digital print technology that is a special focus of our investigation. There is some exciting, production-level digital printing equipment available now, and more digital options will be available in 2018. Digital printing equipment is already allowing some established converters and even some new entrants to offer a new level of service to print customers and to add to their own profitability.

Today, flexible packaging printing overall is more than 99% printed by flexo and gravure print technologies. In the whole flexible packaging segment, digital printing is most often limited to a proofing role only, but there is some digital printing of production runs at dozens of companies in the US and Canada, and InfoTrends estimates that gross billing for that digital printing were about $85 million in 2017. This production-level digital printing of flexible packaging is growing rapidly thanks almost entirely to printing on electrophotographic (EP) webs from HP Indigo. HP Indigo, the leading supplier of EP webs for label printing, has spurred the use of its liquid toner EP print process first on the company's narrow (13") label web and, as of 2014, on the HP Indigo 20000, a 30" EP web that the company designed specifically for flexible packaging.

Our survey results give insights into many aspects of the flexible packaging converters' work, their equipment choices and preferences, the industries they serve, as well as other topics. The results collectively show color digital printing is starting to be recognized as a helpful tool for flexible packaging converters, one that many now want to include as a complement to their analog press technology. That, in fact, is how most current color digital printers for flexible packaging printing are installed — they work side-by-side with flexo or gravure presses and are thus ready to print jobs that analog presses cannot print efficiently or, in some cases, cannot print at all.

Print jobs with short run lengths are the biggest reason flexible packaging 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 flexible packaging converting, print jobs under 1,000 square feet are significant, at about 9% of all jobs. Meanwhile, for the limited numbers of converters that operate production-level digital printers today, jobs on those printers that are under 1,000 square feet account for a bigger share (17% of all), and 54% of all jobs printed on them are less than 10,000 square feet. Of all analog and digital output technologies, 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. About 48% of flexible packaging converters say that incidence of short run printing is growing at their companies; this is more than the 42% who say that incidence of short runs is stable and nearly five-times the 10% of converters who say that it is declining. We note with care that, through improved automation, flexo and gravure presses have greatly enhanced their ability to print short runs. That said, short runs are still a challenge for most converters that have only analog technology. Color digital printers are, in turn, becoming a way to print short runs quickly and economically.

The pressure on flexible packaging converters to print short runs comes from brand owners in various vertical industries, because those companies want to target markets precisely and improve operational efficiency for competitive reasons. Therefore, 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 flexible packaging printing jobs, but the survey data shows that companies from several other verticals also drive the printing of short runs of flexible packaging, such as medical products and pet foods.

Within the total range of vertical industries in North America, there are thus hundreds or even thousands of brands that buy flexible packaging printing services, and these many brands are the customers and prospects of flexible packaging converters. As a result, flexible packaging converters are knowledgeable 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. Flexible packaging converters in our survey say that, on average, at least 15% of their customers are willing to pay a premium for each of four types of print services:

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

These results about the willingness of customers to pay a premium for these value-added services are an important indicator about the prospect for color digital printing at flexible packaging converters in North America. That is because each of the four cited services is one where digital printing is either essential (true for variable data printing) or extremely useful (true for prototypes, jobs with 50 or more versions, or jobs with 48 hour turnaround). Color digital printing is thus a key option for converters to provide services for which brands are often willing to pay extra.

Color digital printing for flexible packaging has its challenges. Our research shows that converters have concerns about color digital printing's ability to print short runs; while that concern is registered by a small sample (10 converters), it is true that even digital printing can have workflow difficulties as it often must produce high numbers of individual jobs. Meanwhile, there are other legitimate concerns, such as running costs, media range, and printing white. That said, the research also shows that many flexible 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, "production-level color digital printer" is one of the top choices.

Methodology

To understand printing preferences, challenges, and plans in the packaging industry, SGIA and InfoTrends worked together to create a detailed questionnaire for use in telephone interviews with flexible packaging, 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?

We then conducted interviews with managers at 147 total converters in the US and Canada, of which 48 were flexible packaging converters. These flexible packaging converters are the focus of this report (SGIA and InfoTrends will provide separate reports about results for folding carton and corrugated segments). All 48 flexible packaging converters have flexo or gravure color printing of flexible packaging media, and seven also have color digital production printing of some type. Like the other converter categories in our survey, all the flexible packaging 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, we tabulated and charted the aggregated results for flexible packaging converters and for the other two converter categories. We then focused on the flexible packaging converter results to create this report — aiming not only to isolate the key findings, but also to explain their meaning and significance, and to make conclusions and recommendations.

Background Information

For printers interested in printing packaging, flexible packaging is an attractive segment to consider. It is a big market valued in 2017 at about $31 billion in total print value in North America, and it serves many vertical industries. Key features of the flexible packaging segment make it a hard one for commercial printers and even other packaging converters to attempt for a few reasons:

- Most flexible packaging print media is very thin film, a challenge in terms of web handling and ink adhesion.
- Most flexible packaging is for foods and other consumables, so its inks and materials are subject to regulatory compliance.
- For finishing, nearly all flexible packaging requires specialized lamination. For some types of flexible packaging, other specialized finishing can be needed as well.

A final consideration, though, is a positive one, that the flexible packaging segment has the advantage all packaging has: it is never displaced by electronic media and is, instead, growing slowly because it is tied to human consumption.

Flexible Packaging Described

Flexible packaging is packaging made of flexible or easily yielding materials that, when filled or closed, can be readily changed in shape. The core of flexible packaging is bags and pouches of various types, but other formats are possible, such as wrappers for candy and other foods. In terms of media, flexible packaging is mostly made from film or film laminates, but the media can instead be paper, foil, paper and film laminate, or paper and foil laminate. To print flexible packaging successfully, any printing process *must* be able to print thin, unsupported film — such as polyethylene or polypropylene — because thin films are the most common flexible packaging

media. Note also that print on flexible packaging media can be subject to wildly varying environmental conditions, depending on the product, from indoor retail shelves to microwave ovens to freezers.

Figure 1: Flexible Packaging Examples

Source: NCL Graphic Specialties

As mentioned earlier, over 99% of flexible packaging is printed on flexo or gravure web presses, often on specialized versions such as central impression flexo presses. Finishing is also specialized and normally include lamination processes that are not found in other packaging converting. For digital printing, most flexible packaging converters know of digital print systems only as a pre-press technology, most often a wide format inkjet proofer of some type. That said, dozens of converters in North America now operate digital printers to print flexible packaging, and the numbers of these companies and the volumes that they print digitally are growing.

Production Digital Printing for Flexible Packaging

A simple way to describe the status of production digital print for flexible packaging is to say that for now it is nearly all attributable to HP Indigo — the division of HP that develops and markets EP printers for commercial printing and industrial uses. HP Indigo's many installations targeting flexible packaging account for at least $300 million in gross billings worldwide from converters to their brand owner customers. In fairness, there is at least occasional printing of flexible packaging by inkjet and by other EP technology but, overall, these other technologies are very rarely used. Xeikon, for instance, is HP Indigo's nearest EP rival in label and package converting and uses a print process that includes hot fusing, which can cause unsupported film media to shrink or stretch. That said, flexible packaging is printed by at least one Xeikon user CS Labels (UK); Xeikon is aware of such use of its printers, and it is investigating its options to develop the flexible packaging application.

A few factors account for inkjet's minimal role so far in flexible packaging. Most inkjet webs for packaging are narrow format (13"/300mm) label webs using UV curing inks. The majority are

designed to print self-adhesive labels on siliconized liner media, not unsupported film. In addition, UV curing inks are a concern to many food brands because of the risk of migration of toxic "photoinitiator" molecules that can remain in the printed image after UV curing. Another concern is the narrow format of existing inkjet label webs, which is acceptable only for the smallest flexible packaging images.

Aqueous inkjet is the main alternate to UV inkjet, and it serves in label converting via Epson printers as well as some based on Memjet technology. Aqueous inkjet inks generally cause no toxicity concern, but aqueous inkjet so far has never had a role in flexible packaging printing . The most important reason is that pre-treated media is needed to ensure good aqueous ink adhesion on slick polyethylene or polypropylene film, and that media is not readily available. Aqueous inkjet also shares other limitation of UV inkjet, namely existing printers are mostly narrow webs and they cannot print unsupported film.

HP Indigo 20000 Described

HP Indigo 20000, an EP printer, is so far the only fully commercialized color digital printer specifically designed to print flexible packaging. At least 20 are installed now in the US and Canada, a big accomplishment given that the first placements occurred only in 2014. The 20000 has a 30" web width, similar to the web dimensions of many flexo presses for flexible packaging, and it prints films as thin as 10 microns in up to seven colors. Most of the printer's installations print flexible packaging intensively, but some print labels or a mix of labels and flexible packaging. It is a costly digital printer (over $1M), but a productive one that can operate multiple shifts and print over 100,000 square meters per month.

Figure 2: HP Indigo 20000, with In-Line Priming and Post Print Inspection Stations

Source: HP Indigo

HP Indigo prepared the way for HP Indigo 20000 in 2014 by working first for at least five years to make flexible packaging viable as an extra use for its narrow web EP label printers. Thus, as early as 2009, label converters and others were being shown how to operate WS6000 (a roughly 13" label web) to print flexible packaging. The HP Indigo "one shot" approach to EP printing (i.e., using an intermediate "blanket" to hold and then offset all colors at once onto the film media) worked well, especially to achieve precise image registration. The safety of "HP ElectroInks" for

indirect food contact was well documented. Karlville was enlisted as a finishing partner to provide lamination with a dedicated device. Avery Dennison was enlisted to provide dedicated media.

Figure 3: HP Indigo WS6800 (2012)

Source:

That first effort by HP Indigo had its limitations, such as narrow web width, but it was a good start. Some of HP Indigo's leading label converter customers began to print small sachets and other types of small flexible packaging with their narrow EP webs. In addition, around 2012, occasional specialists cropped up — flexible packaging converters who used WS6000 or WS6800 to print flexible packaging intensively. These companies were rare, but they helped get the concept of HP Indigo for flexible packaging rolling. When HP Indigo 20000 arrived in 2014, multiple companies were experienced users of EP printers for flexible packaging, and some were eager to operate the new printer with its much wider web.

Figure 4: Coffee Packaging Printed on HP Indigo EP Printers

Source: Roastar

While inkjet is currently far behind EP in addressing the flexible packaging opportunity, there are now a few aspiring entrants with digital printers based on inkjet, and there could be others that will become evident in the next year or two. It is worth noting that, so far, the companies that are evident as suppliers can be located only in Europe or Japan.

- **Uteco Converting** (Italy) is a major maker of flexography and other analog technology for flexible packaging converting. Uteco is developing two digital webs for use with either flexible packaging or labels. One narrow format unit is based on piezoelectric inkjet from INX and electron beam curing. The other is a 25" wide web based on a Kodak "continuous inkjet" and aqueous inks; maximum print speed is over 900 feet per minute.

Figure 5: Uteco Sapphire, Based on Kodak Stream

Source: Uteco Converting

- **Fujifilm** (Japan), a supplier of high-speed inkjet for commercial printing, also now offers Eucon — a 20" UV web printer for flexible packaging. The system has a priming function to make the film media more ink receptive before jetting CMYKW colors. While the printer uses UV inks, it also has a "nitrogen purge" feature to enhance UV curing and ensure safe use with food packaging.

- **ThinkLab,** a maker of gravure print technology, offers FXIJ-1Aqua — a 20" aqueous inkjet web printer. FXIJ-1Aqua appears to be the company's first inkjet printer, but ThinkLab has an important partner for inks (Kao Chemicals) as well as another possible partner for its inkjet print engine.

Figure 6: ThinkLab FXIJ-1 Aqua (2016)

Source: ThinkLab

Color digital printing, EP and inkjet, will gradually become a common complement to analog presses that print flexible packaging. As in the label industry, digital printing will handle the short print runs and gangs of short runs that brands increasingly ask for and, in doing so, will free the analog presses to print just the long runs where analog technology excels. HP Indigo will be the dominant supplier of digital for at least a few years because that company is now an experienced digital supplier for the flexible packaging market, and it continues to develop new solutions for flexible packaging. That said, one or more of the inkjet suppliers cited above will likely become compelling suppliers, and there could be others — digital print technology vendors that are aware of flexible packaging as a major, growing packaging category, and one that so far is little penetrated by digital printing.

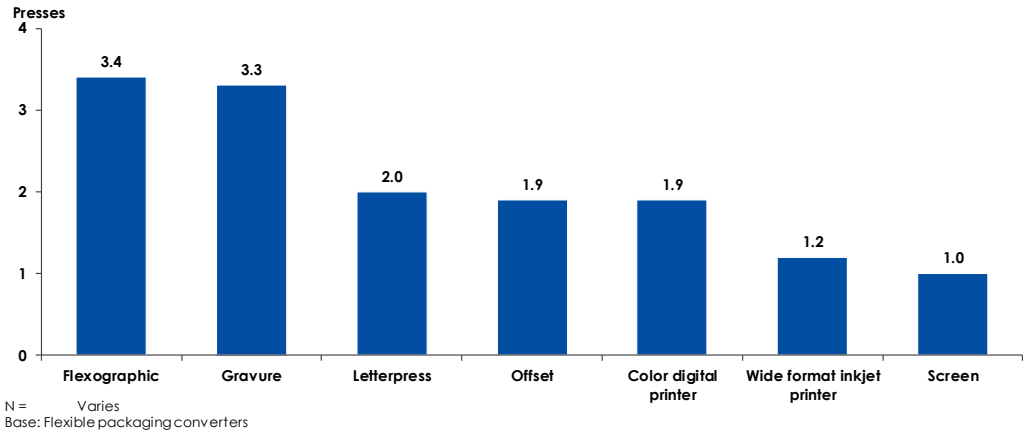
Survey Results and Analysis

In the following pages, our report will focus on the most important survey results that are based on the flexible packaging converters' tabulated answers to the survey's questions. These results collectively give a good picture of flexible packaging converters, their printing, their challenges, as well as their needs and plans — with many clues about the role and prospect of color digital printing at their companies.

Technology Owned, Technology Wanted

Figure 7 shows the average numbers of presses or printers at flexible packaging converters in the survey. Note that the sample size varies: the average cited for each device type is the average for the companies that have that particular type. That said, each of the 48 flexible packaging converters in the survey operates at least one conventional press — most often a flexo or gravure web press. Because the survey includes a good share of larger companies, the average (mean) number of analog presses is high, at 3.4 units for flexo and 3.3 for gravure. For color digital printers, the survey specifies that by "production level equipment," we mean printer by companies as HP Indigo, Xeikon, and Durst; just seven companies claim to have color digital printers that meet that standard. While wide format inkjet is used by nearly all 48 as a proofing technology, the other press and printer types cited are used by only a (often small) minority. In many cases, these other technologies may be printing other, non-flexible packaging applications, such as labels.

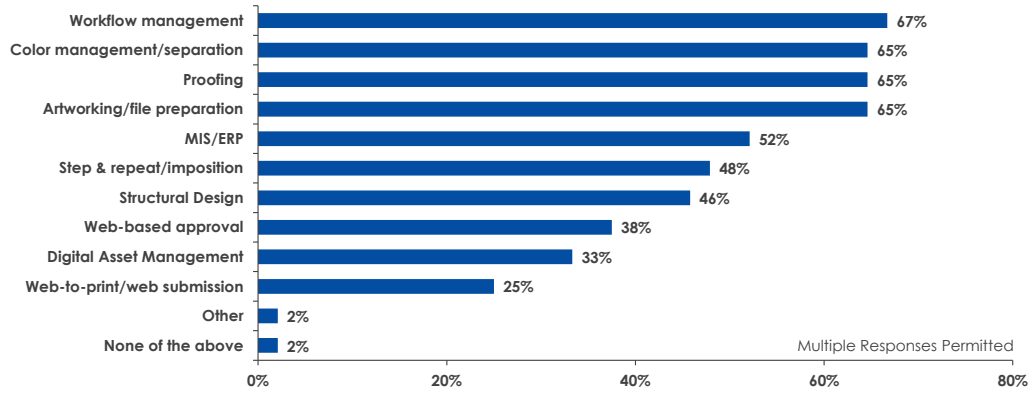
Figure 7: Average Number of Presses Operated, by Type



N = Varies
Base: Flexible packaging converters

Flexible packaging converting most often relies on software as well as hardware. As seen in the Figure 8, most flexible packaging converters own more than one type of software. Four types of tools are the most owned: workflow management (67%), color management/separation (65%), proofing (65%), and artworking/file preparation (65%). Note that the next tier of software tools, in terms of popularity, is also a mix of business management and pre-press tools: managed information system/enterprise resource planning (MIS/ERP) (52%), step & repeat/imposition (48%), and structural design (46%).

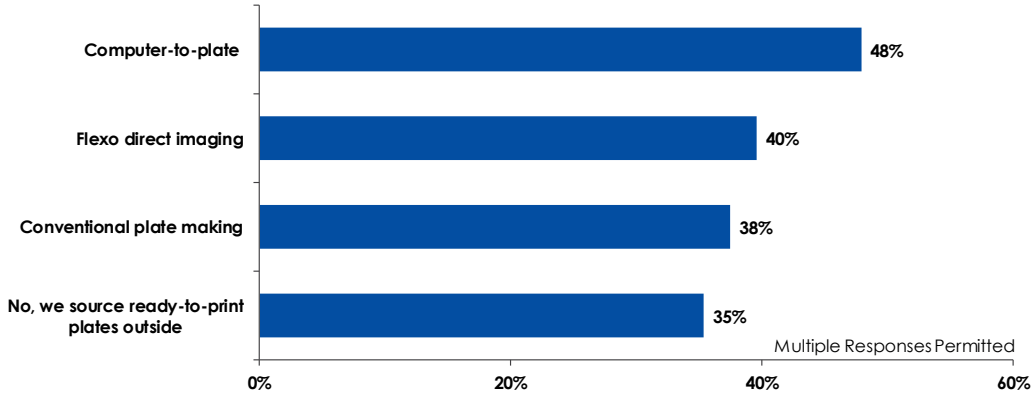
Figure 8: Types of Software Owned



N = 48 Flexible packaging converters

Given that all the flexible packaging converters in the survey operate conventional presses, it follows that most of them also operate some type of technology to create plates or masters. At 48%, flexible packaging converters' ownership of computer-to-plate (CTP) technology is lower than the rate of CTP ownership by folding carton converters (78%), but higher than that of corrugated converters (20%). Flexible packaging converters' reliance on three other plate making options is similar to the reliance on them by folding carton and corrugated converters: flexo direct (40%), conventional platemaking (38%), and outsourced platemaking (36%).

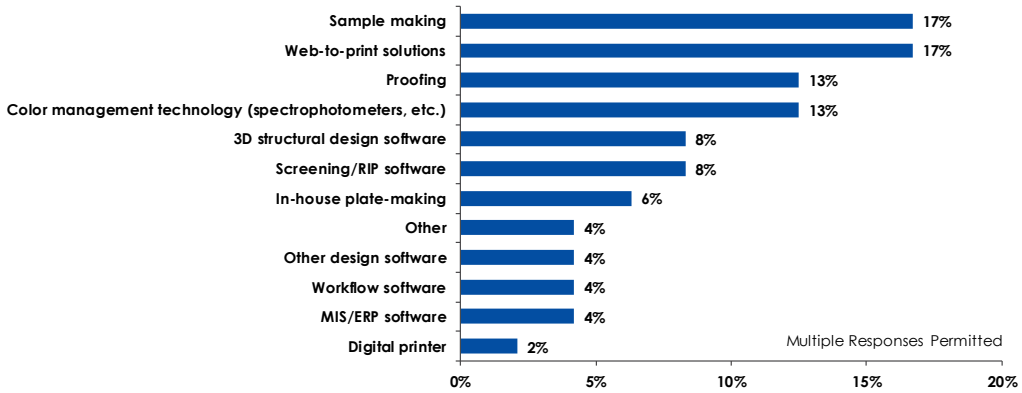
Figure 9: Pre-press Technologies Owned



N = 48 Flexible packaging converters

When asked what workflow technology they would buy if budget were no consideration, flexible packaging converters chose sample making and web-to-print solutions, each cited as a first choice by 17% of the survey respondents. The pairing shows the mix of priorities for these converters — their need to print prototypes is high, but so is their need to manage web-based ordering of their services.

Figure 10: Most Wanted Workflow Technology – 1st Choice

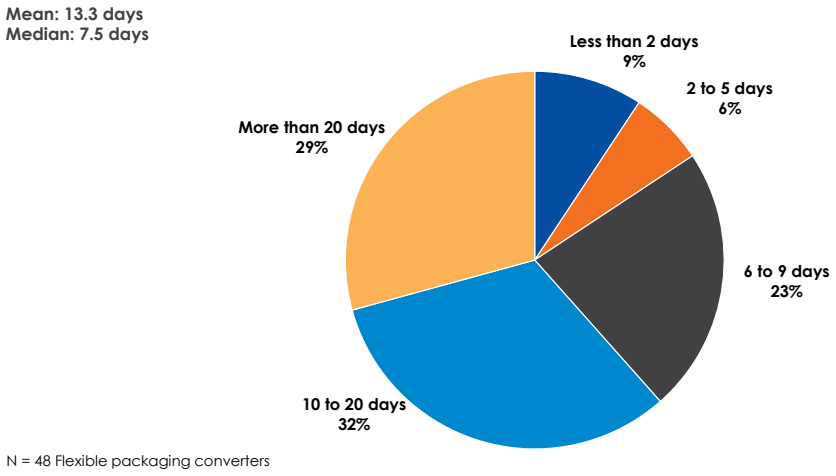


N = 48 Flexible packaging converters

Other "first choices" for workflow technology show a mix of priorities: proofing and color management (13% each), 3D structural design software and screening/raster image processing (RIP) software (8% each), and in-house plate-making (6%). The general lesson from the results to this question is that flexible packaging converters have many workflow priorities to address, and there are only a few that are prominent. Note the small response for digital printer, which just 1 of the 48 respondents (2%) cites as his or her first choice for a workflow related purchase. Having a production-level digital printer can, in fact, improve workflow for a converter that must print many short runs; at this point, though, most flexible packaging printers are 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 flexible packaging 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. As seen in the Figure 11, high shares of flexible packaging print jobs have turnaround times that are long, namely "more than 20 days" (29%) and "10 to 20 days" (32%). Flexible packaging converters, therefore, have higher shares of jobs with long turnaround times than folding carton and corrugated converters, a difference that is probably related to the long runs that many flexible packaging converters print, as well as to the curing time need for lamination, which in some cases can require seven days. Note, though, that even flexible packaging converters have some incidence of jobs that must be turned around in less than 2 days (9%); digital printing, with its electronic pre-press, can often help print such jobs.

Figure 11: Required Job Turnaround Time

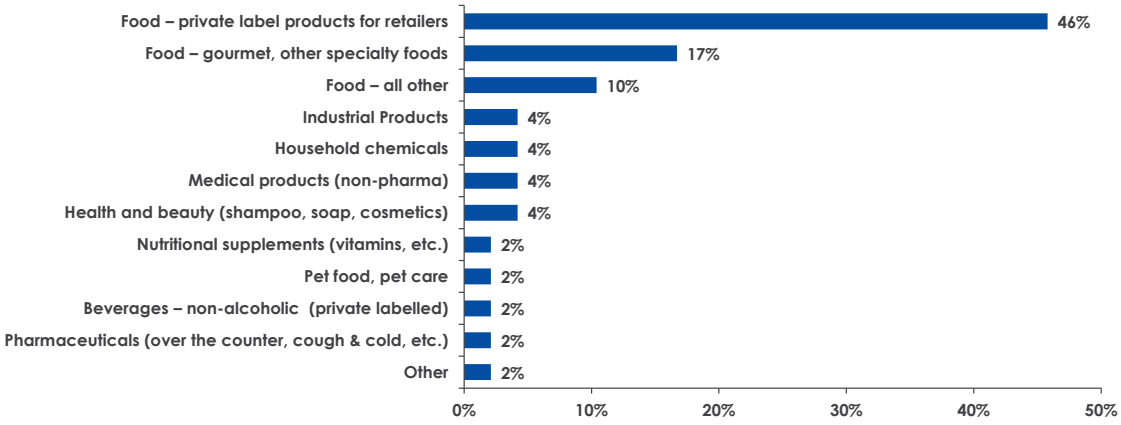


N = 48 Flexible packaging converters

Markets Served

Given that all the flexible packaging 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 flexible packaging print jobs. The survey asks flexible packaging converters which vertical industries account for most of their print volumes: to choose and rank up to three options. Food that is private labeled for retailers (46%) and gourmet, or other specialty foods (17%) lead the results for the "first choice" (Figure 12).

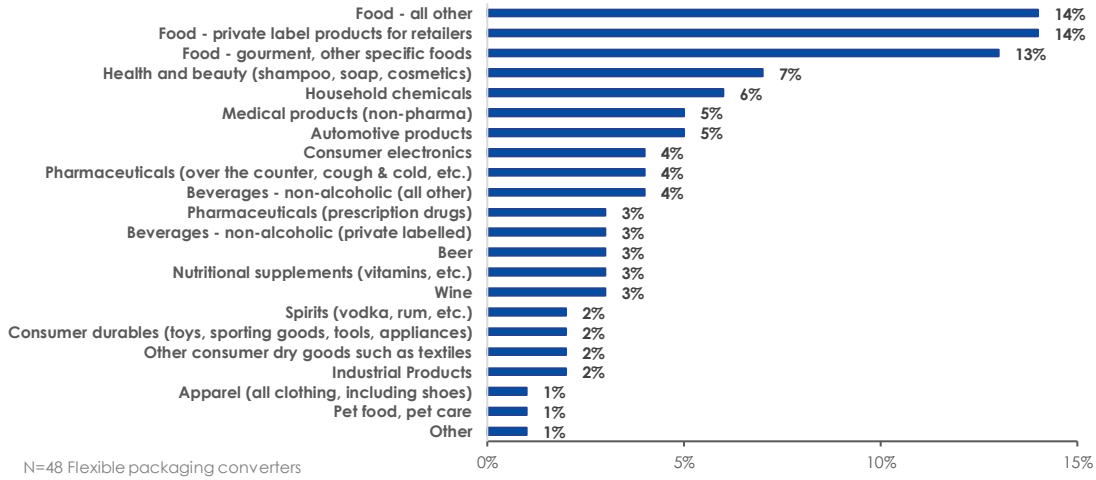
Figure 12: Analog Print Volume, by Industry — 1st Choice



N = 48 Flexible packaging converters

The results in the following chart, however, are based on total votes for each option as first, second, or third choices (Figure 13).

Figure 13: Analog Print Volume, by Industry — Most Chosen



N=48 Flexible packaging converters

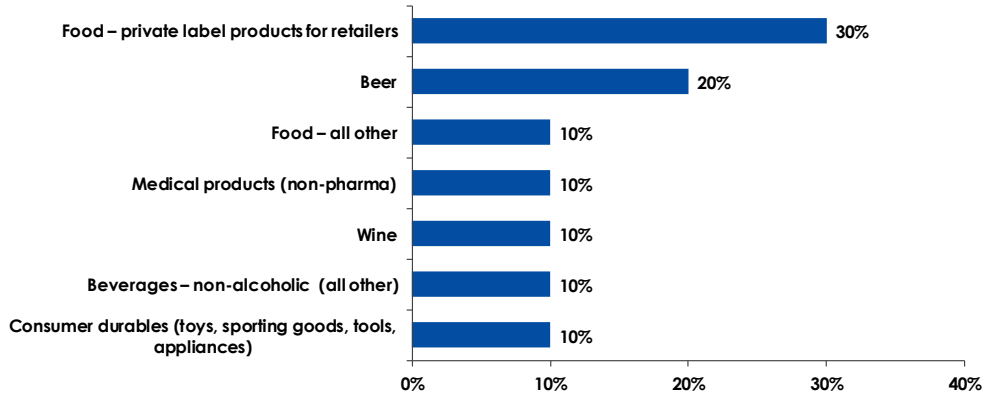
In this second view, the results change only slightly. Food products in general lead all: "Food – all other" and "Food - private label products for retailers" rank first at 14%, "Food – gourmet" is 13%, followed by "Health and beauty" (7%) and "Household chemicals" (6%).

The main takeaway from the results to this question is that for the analog technology that prints almost all of flexible packaging, food verticals and sub-vertical industries are the top purchasers of print services. Meanwhile, flexible packaging is used widely by a big range of other vertical industries, from household chemicals to industrial products to consumer electronics.

Only ten of the flexible packaging converters in the survey use digital printing for production jobs (that number includes a few who do not own production digital printers, but may buy such printing outside). While that sample size is far too low to be statistically valid (30 is the minimum for statistical validity), the results are enough to be indicative, and they indicate that the industry verticals for digital printers are similar for the verticals for analog presses.

About 30% of flexible packaging converters using color digital printing cited "Food – private label products for retailers" as the vertical industry that accounts for the most digital print volume, followed by "Beer" (20%). The reference to beer is hard to understand, since flexible packaging to hold beer is unknown; the two votes for this application, though, may come from flexible packaging converters who also use digital *label* printers, which regularly print labels for that vertical industry; the same may be true for wine. In any event, from this small sample, the message is clear that foods and beverages are the top vertical industries for digital printing of flexible packaging, which is about the same as for analog printing.

Figure 14: Digital Print Volume, by Industry — 1st Choice



N = 10 Flexible packaging converters

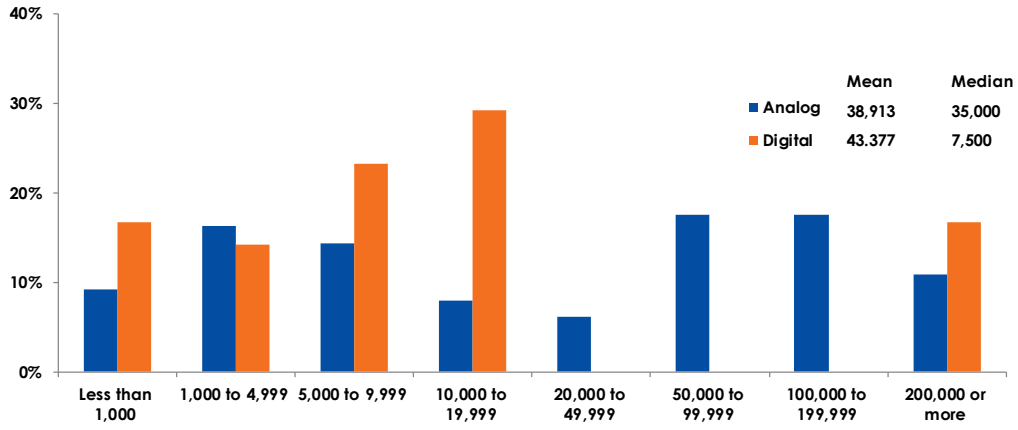
Looking at the incidence of total votes for each option as first, second, or third choices (not charted here), the results adjust that view only slightly, adding pharmaceuticals as well as health and beauty products to the list of most important vertical industries.

Print Volume: Analog vs. Digital

The figure below is especially important because it compares the run lengths of flexible packaging jobs printed on conventional presses to those printed on color digital printers. One question on the use of conventional presses and then another one on the use of digital printers ask the flexible packaging converters that use each type of print technology to estimate the shares of their companies' print jobs that fall into several volume ranges, from under 1,000 square feet to 200,000 square feet or more. The digital print sample here is just the seven companies that claim production level digital printers, a sample size that makes their responses indicative but not statistically valid. In contrast, the responses about analog presses come from 48 companies. 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 short *and* long runs. A few related points:

- 17% of color digital print jobs are less than 1,000 square feet, compared to 9% for analog presses
- More broadly, 54% of digital jobs are less than 10,000 square feet, compared to 39% for analog presses
- As seen in the chart, color digital printing *does* print some longer print runs, including a 17% share at over 200,000 square feet (quite possible with HP Indigo 20000).

Figure 15: Flexible Packaging Run Lengths, in Square Feet: Analog & Digital



N = 48 Flexible packaging converters with analog presses, and 7 with production digital printers

Note the reference in the chart to mean (average) results and median results, as cited in the legend (Figure 15). 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 35,000 square feet for conventional presses and 7,500 for digital. These median results are a fairer representation in this case than the mean results, especially regarding digital printing.

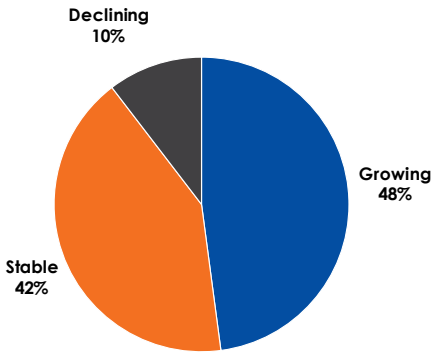
We note also some relevant history. Five years ago, when color digital printing of flexible packaging was still only a few years old, there were no digital print runs of more than 20,000

square feet and likely none more than 10,000 square feet. Digital has progressed, though, in the past few years. There is one large capacity digital printer in the market now, HP Indigo 20000, and there are more flexible packaging converters who are experienced users and marketers of digital printing than there were five years ago.

In addition, for the overall flexible packaging 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 gravure presses 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 flexible packaging market tends to welcome new and capable digital entries.

The survey asked flexible packaging 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 below, the share of flexible packaging converters that believe short run jobs are growing is 48%. That figure is nearly five-times larger than the 10% that say such printing is declining; meanwhile, 42% say the incidence of short runs is stable. A follow-up question asks the 23 flexible packaging converters who say that short runs are growing to estimate the *rate of growth* in such jobs. Their average (mean) response is 14% annual growth, and the median is 7%.

Figure 16: General Outlook for Incidence of Short Runs

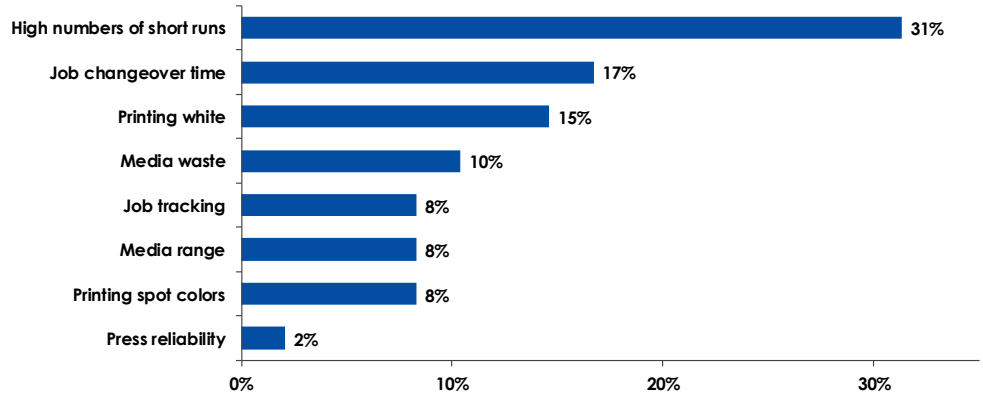


N = 48 Flexible packaging converters

Technology Concerns

The survey asks flexible packaging converters to cite and rank the top three concerns regarding their conventional print technology. As seen in the Figure 17, when looking at just the concerns that are ranked first, the top concern is high numbers of short runs (31%), followed by job changeover time (17%), printing white (15%), and media waste (10%). Meanwhile, just 2% cite press reliability, a tribute to the consistent performance of flexo and gravure presses. These results reflect the nature of conventional print technology and the challenges of flexible packaging converting in 2018. Short run printing is a significant share of business for users of flexo and gravure technology, and job changeovers occur more often as a result. These two challenges are all ones that production digital printing can help address directly or indirectly.

Figure 17: Analog Print Technology Concerns — 1st Choice



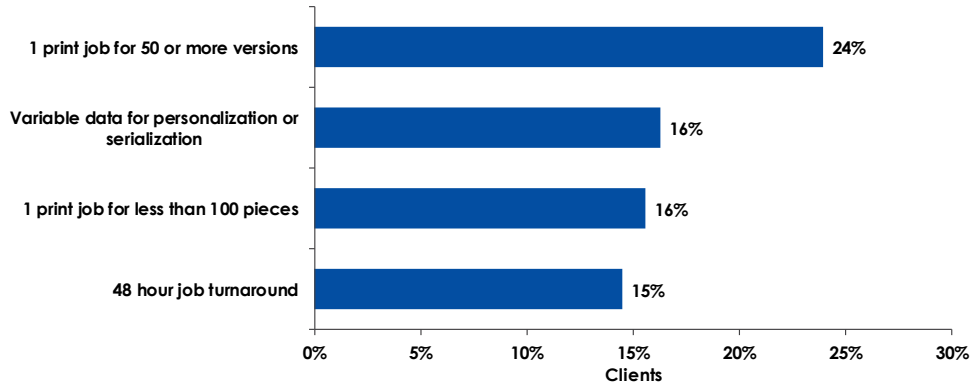
N = 48 Flexible packaging converters

Print Service Value: Customer Perspective and Printers' Opportunities

Our survey of flexible packaging 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 18: Shares of Clients Willing to Pay Extra for Certain Services (Means)



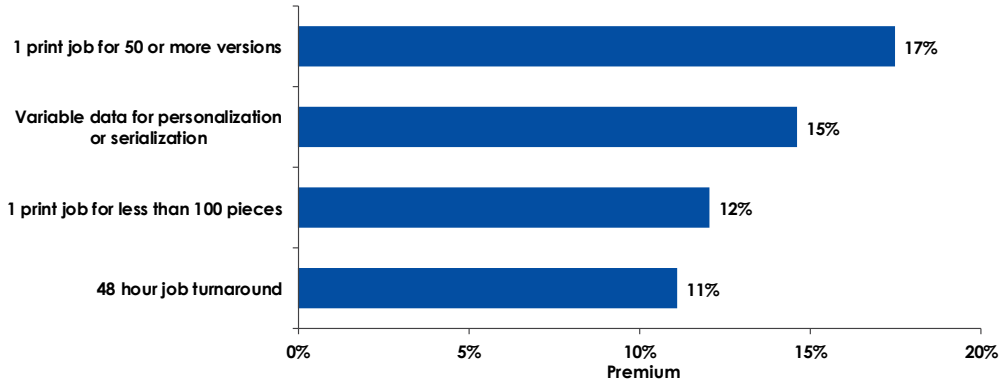
N = 48 Flexible packaging converters

As seen in the chart above, converters of flexible packaging 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. Note the especially strong showing for "1 print job for 50 or more versions," where the survey's 48 converters together say that 24% of customers are willing to pay a premium; such print jobs are ones that color digital can print readily and that, in contrast, are usually very difficult to print with conventional technology. Meanwhile, the converters say that the shares of their customers who are willing to pay more for the other services are smaller but still significant: variable data printing (a little more than 16%), one print job for less than 100 pieces (16%), and 48 hour job turnaround (15%).

We posed this question about paying a premium for certain services because 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 and is often inconvenient or even impossible to do with flexo, gravure, 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 following chart (Figure 19), the mean response is from 11% to 17%, with an average premium of about 14%.

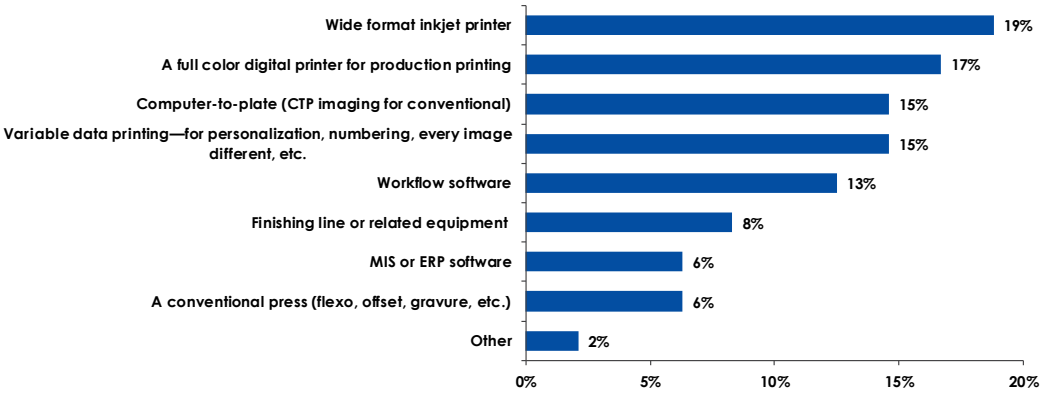
Figure 19: Print Service Premiums — Mean Percentages



N varies, Base: Flexible packaging 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 the chart of "first choice" results, wide format inkjet printer (19%) and full color digital printer (17%) for production printing lead the list; CTP imaging for conventional presses and variable data printing are next (both at 15%).

Figure 20: Most Wanted Upgrades — 1st Choice



N = 48 Flexible packaging converters

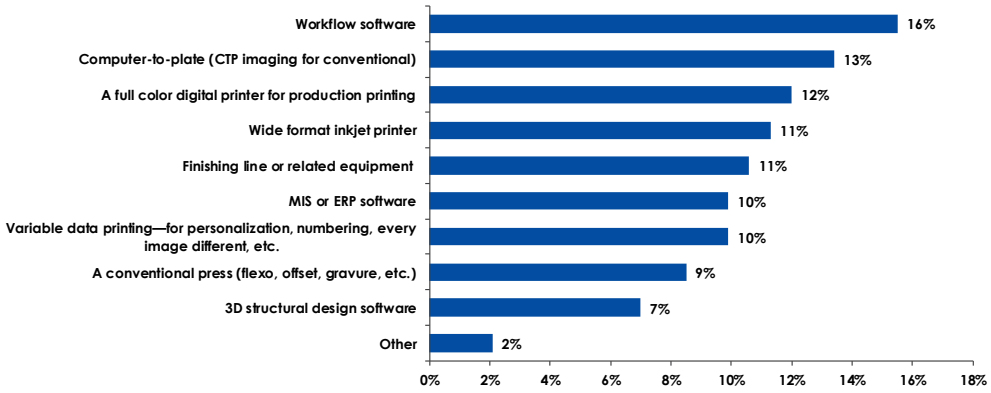
The results reflect the mix of technologies that flexible packaging converters depend on now, and ones that they aspire to own. Wide format inkjet is a helpful proofing technology for companies that deal with a constant stream of new jobs and changing packaging designs; many flexible packaging converters own such printers now, and others that do not often want to own it.

As to color digital printers for production printing, only a small minority of flexible packaging converters own such printers now, but most flexible packaging converters face challenges that production digital printing can help to address, such as the printing of prototypes and short runs.

With regard to CTP imaging and variable data printing, these choices again reflect the mix of challenges that flexible packaging converters face. All the converters in the survey use analog presses, and so all use plates, for which in-house CTP capacity is very desirable. Variable data printing is the ultimate means to achieve mass customization, whether to serialize packages or to personalize them; this is a service that only digital printers can offer and, as noted earlier, it is one for which many converters believe their clients are willing to pay extra.

Looking at the broader results — based on most responses chosen as one, two, or three — workflow software (16%) and CTP (13%) lead the list, followed by full color digital printer for production printing (12%) and wide format inkjet (11%). The main addition to the earlier view on "first choice" responses is the strong interest in workflow software; workflow tools ensure efficient job management, so the converters' desire for them is understandable. That said, the overarching takeaway from the results for this question, based on "first choice" and "most chosen," is that color digital printing for flexible packaging is now an attractive option for flexible packaging converters despite being nearly unknown as recently as 2010.

Figure 21: Most Wanted Upgrades — Most Chosen

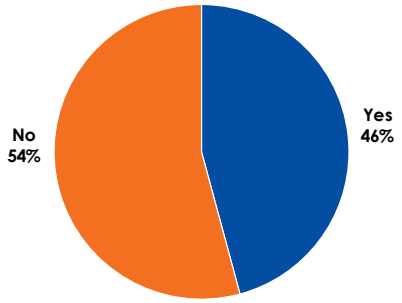


N = 48 Flexible packaging converters

Industry Awareness about Digital Printing Equipment

We noted early in this report that, so far, just one type of digital printer is now used to print flexible packaging, i.e., the EP web printers of HP Indigo. One of the survey's last questions asks flexible packaging converters if they are aware of the HP Indigo 20000 as a printer for flexible packaging, and the results are charted below. Nearly half (46%) say they are aware of HP Indigo 20000, which is HP Indigo's top offering for flexible packaging. That level of awareness is believable because the marketers of HP Indigo 20000 have marketed the printer intensively to most of the flexible companies in North America. It is also true that HP Indigo has had genuine success with this printer, with rising average monthly print volumes, print jobs for high profile brands, and companies that have installed multiple systems; part of the high awareness of HP Indigo 20000 is also due to the lack of commercially available digital competitors. A final note: other EP printers from HP Indigo also print flexible packaging; mainly these are WS6000 Series, and all are narrow webs. Thus, overall awareness of EP printing of flexible packaging may be higher than the 46% cited for HP Indigo 20000 alone.

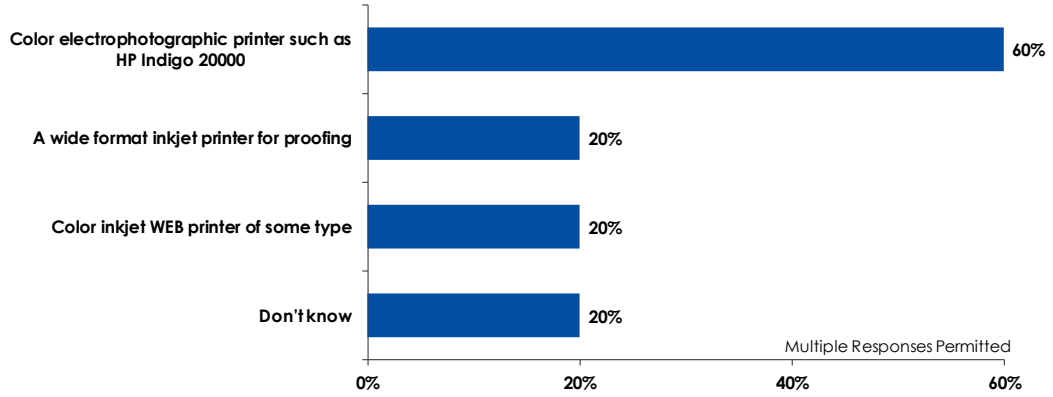
Figure 22: Awareness of HP Indigo 20000



N = 48 Converters of flexible packaging

In a following question, our survey asked all 48 flexible packaging converters if they plan to buy any color digital printing equipment; just 10% say they do plan to buy, versus 88% who say they do not have plans and 2% who say they do not know. Another question then asks the five respondents who say their companies do plan to buy digital equipment what types of printer their companies are considering. The top choice, cited by three of the five respondents (60%) is a color EP printer. Other responses, which really are too small to have meaning, were for wide format inkjet printer, inkjet web printer, and "don't know."

Figure 23: Digital Printing Equipment Being Considered

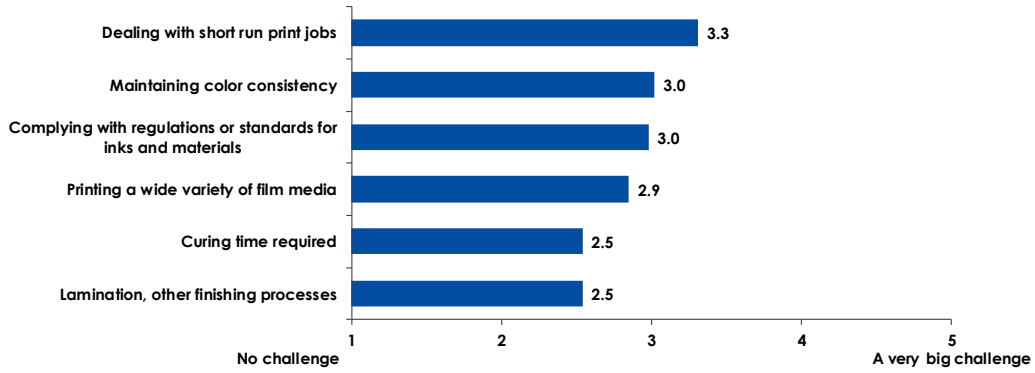


N = 5 Flexible packaging converters who are considering purchasing digital printing equipment

Industry Challenges

The survey asks flexible packaging converters to rate a series of options as challenges for flexible packaging converting on a five-point scale, where 1 meant "no challenge" and 5 meant "a very big challenge." As seen in the chart, dealing with high numbers of short runs (3.3), maintaining color consistency as well as complying with regulations or standards for inks and materials (both 3.0) are the top challenges. Of those two options, the response for dealing with high numbers of short runs has underlying results that make it even more compelling: 37% of respondents rate dealing with short runs either a 4 or a 5, versus 4% who rate it a 1 (no challenge).

Figure 24: Flexible Packaging Converting Challenges (Means)



N = 48 Converters of flexible packaging

From that result, we understand that dealing with a high number of short runs and maintaining color consistency are challenging for many flexible packaging converters, as are regulatory issues around inks and media. Color digital print can help address the issue of short runs by taking short runs away from conventional presses, allowing the analog equipment to print the long runs where that technology excels. As for maintaining color consistency, color digital printing has greatly improved its ability to meet that challenge, but it is still often not quite the equal of analog printing, especially for spot colors. Color digital printing continues to improve, though, and will rival the color consistency that analog printing can offer at some point. When considering compliance with regulations and standards for inks and materials, the compliance of HP Indigo liquid toners is well known and documented; coming inkjet competitors are all intent on the topic of compliance and, in most cases, have already taken steps to address it.

Conclusions and Recommendations

- Converters depend on a range of equipment and other technology to print flexible packaging for a range of clients, mainly brands making consumer products.
- In that range, analog print technology dominates total print volume; print jobs vary greatly in length, from sample making to jobs using over 200,000 square feet of media.
- "Short runs" range from prototypes to up to a few thousand square feet. They are a growing share of the converters' work and can be a challenge to print in analog.
- Flexible packaging converters value the ability of digital printing to print short runs efficiently as well as offer special services, such as variable data printing.
- Most flexible packaging converters are at least aware of color digital printing as an option, and a minority already use it for production printing.
- Flexible packaging converters with no digital print production today often want it to print short runs, personalization, and offer other new services that brands require.

Keypoint Intelligence also 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 flexible packaging converting, and to understand why digital printing has a good prospect there.
- 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 Pack Expo, or events hosted by HP Indigo that display the latest digital print systems.

For various reasons, few manufacturers of products engage in the printing of their own flexible packaging and other packaging, but there are rare exceptions — such as the occasional pharmaceuticals companies that install color digital printing to increase product security. That said, manufacturers in many vertical industries benefit from working with converters that have digital printing as part of their technology. For product manufacturers in general, we recommend the following:

- Use this report to understand that production digital printing is an option to analog printing of flexible packaging — one that prints short runs and variable data efficiently.
- If your company relies on a print service provider to print flexible packaging, 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 consider your own options for print.

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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.

WHO WE ARE

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."

For more information on SGIA, visit SGIA.org.