

APR Narrow Web Flexo Production and Digital Printing White Paper

I. Introduction

In the first two quarters of 2016 All Printing Resources (APR) commissioned an extensive market research project, the *APR Narrow Web Flexo Production and Digital Printing Study*. The research was carried out by a leading industry firm and involved surveying narrow web flexo printers in every U.S. region. The research included both an in-depth survey in addition to qualitative interviews with converters that serve every major end-use category including:

- Food
- Beverage
- Personal care/cosmetics
- Household and industrial chemicals
- Automotive
- Consumer durables
- Office products
- Retail
- Industrial products

APR's main objectives in underwriting this effort included the following: 1) To identify the technologies flexo converters consider the most influential to the future of their businesses, 2) Primary market and customer challenges, 3) The most persistent operations issues related to narrow web printing and converting, and 4) The criteria converters are bringing to the process of acquiring digital press technology. More than 100 narrow web converters participated in the research.

The APR survey and interviewing process sought to identify the most urgent issues narrow web companies are facing in today's marketplace. Specific research areas included:

- Run lengths/average job sizes
- Lead times
- Production bottlenecks
- Productivity challenges
- Print quality demands
- Platemaking protocols
- Job-to-job consistency issues and challenges
- Downtime/press utilization rates
- Technologies most influential to businesses in the future

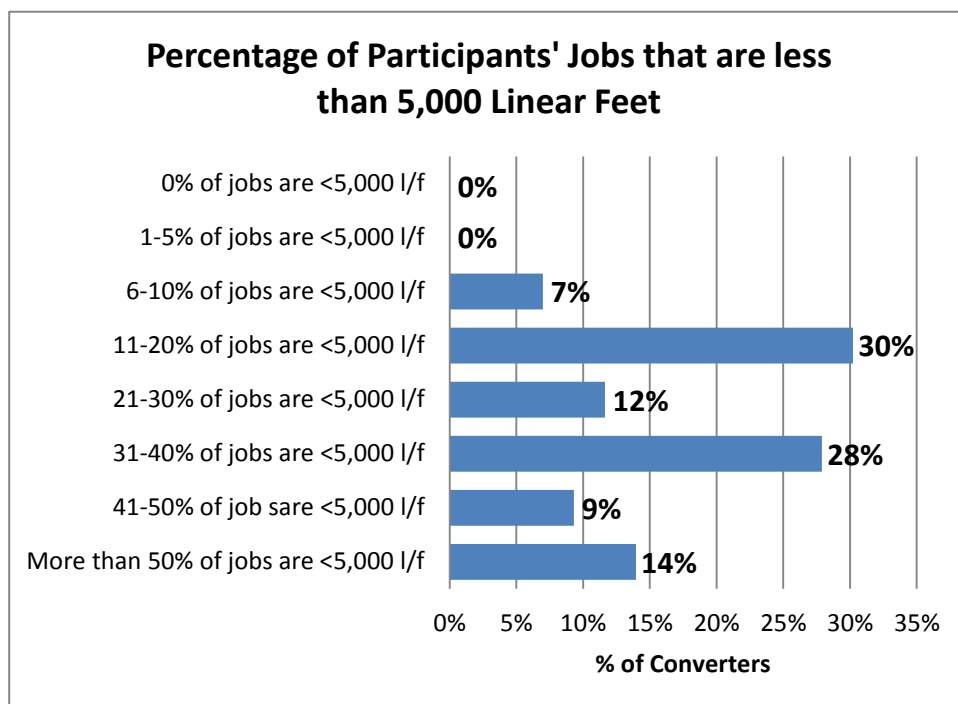
Digital printing was also a focus of the research and explored the forces that are driving converters to acquire digital presses. The hierarchy of digital press acquisition drivers was topped by the need for converters to be more efficient. Second was the need to have a better short-run solution, followed by expedited delivery times, the need to obtain new customers and lastly, the need to have the same offering as competitors.

In a market where there are now more digital printing options available than ever before and as a supplier of digital print technology, APR prioritized exploring the key market influences and production requirements that are driving the decisions of U.S. narrow web converters throughout the research process.

II. Flexo Production Key Findings

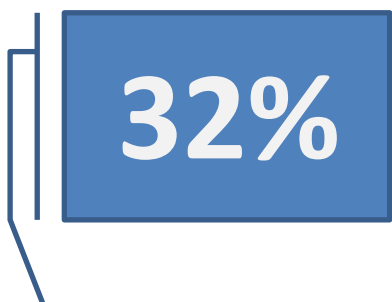
SKU proliferation and just-in-time inventory demands continue to drive average conventional job/run sizes downward. Job lengths are declining in every end-use category (food, beverage, industrial, chemicals, etc.) and for every narrow web conventional print process including flexo, litho/offset and rotogravure. The decline in average job sizes is one of the most significant production trends impacting narrow web converters, as every year higher volumes of conventional jobs are migrating to digital presses.

The APR Converter Survey asked participants to indicate the percentage of their company's job sizes that are currently less than 5,000 linear feet. Companies were given a range of percentage values to choose from and the graph on the following page breaks down companies' responses.



For the total respondent group, **28% of all converters' jobs average less than 5,000 linear feet**. All companies reported having some jobs that are less than 5,000 linear feet *and 23% of companies report that more than 40% of all jobs are run lengths of less than 5,000 linear feet.*

In addition to indicating average run lengths, converters were asked to indicate the average amount of time their presses are down due to set-up and changeovers in addition to the average number of changeovers they have per shift, per flexo press. The graphics below show the averages for both metrics:



Average time presses are down due to set-up and changeovers.



Average # changeovers per shift, per flexo press.

On average, flexo presses are down due to set-up and changeovers more than 30% of the time. This high percentage is in direct correlation with the total average percentage of converters' jobs that are less than 5,000 linear feet (28% as indicated on the previous page). To explore set-up and make-ready downtime further, converters were also asked to rank a series of criteria that were responsible for idle flexo presses on their production floors. The table below lists these downtime drivers from most to least significant.

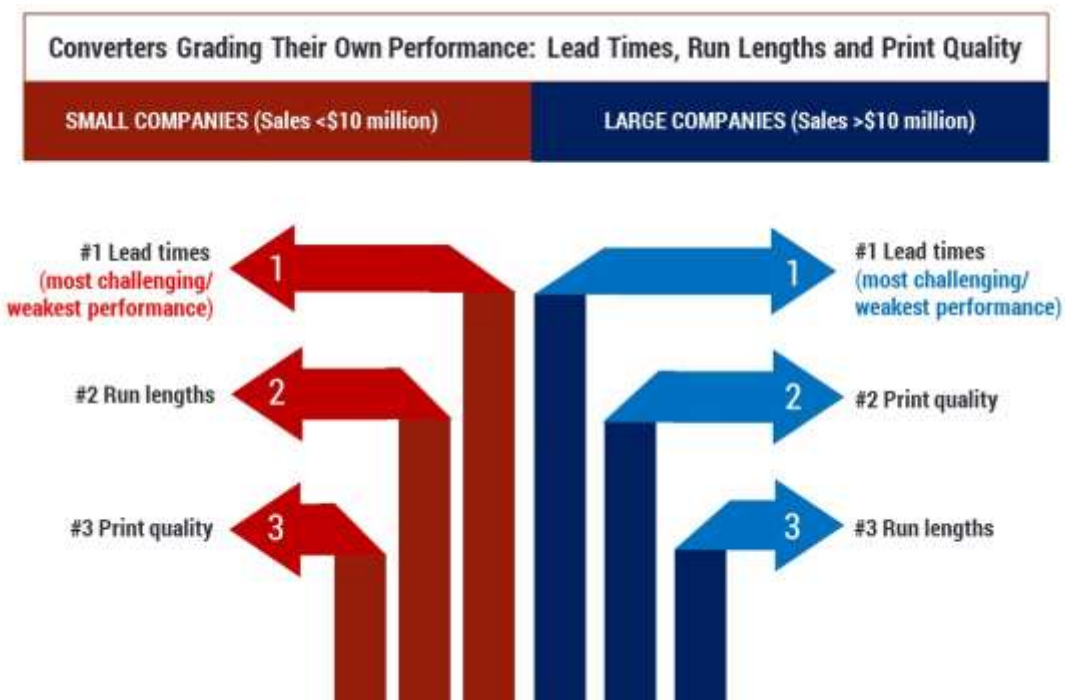
Converter Ranking: Causes of Press Downtime from Most to Least Significant	
Excessive short run work	#1
Last minute schedule changes	#2
Visual and/or density measurement color matching problems	#3
Waiting on materials (inks, plates, dies, etc.)	#4
Trouble matching proof or outside sample	#5
Impression and dirty print issues	#6
Customer or internal sign-off	#7
Art/prepress work that has not been optimized for flexo reproduction	#8

Narrow web converters report that the number one reason their flexo presses are down is the persistent reality of short run work. The *APR Narrow Web Flexo Production and Digital Printing Study* is the first commissioned market research effort that delves into the specific reasons flexo presses are idle, and to ask converters to rank the leading causes of press downtime.

As run size lengths continue to decline, label converters are becoming more proficient at tracking the point at which (in linear feet) a job is no longer profitable. In today's marketplace, that 'breakeven' tipping point averages around 2,400 linear feet. Five years ago, previous research indicated that the breakeven run size for the industry was right around 5,000 linear

feet, more than twice of what it is today. The difference in these two values is a result of two primary forces: 1) Converters are getting better at producing short run work due to leaner manufacturing practices and 2) Narrow web conventional press manufacturers are manufacturing more efficient presses capable of faster changeovers and make-ready times.

In an effort to also understand the primary influences that impact market demand, APR carried out additional research in specific areas. Expedited lead times, run length declines and rising print quality standards are forces that impact the narrow web converter every day. In further research, APR sought to understand how converters rated their own performance. For example, are brand owners and packaging buyers demanding lead times, run lengths and print quality levels that companies cannot easily provide, or, are converters able to exceed their customers' expectations? The graphic below ranks the criteria from most to least challenging, in terms of how converters rate their own company's performance.



Both large and small converters indicated that lead times were the most significant area where their companies were not always performing up to their customers' standards or expectations. Smaller companies are less confident that they are effectively meeting the print quality requirements of their customers, so much so that run lengths – an area we know is a major production pain point – received a higher self-graded ranking from small converters than their ability to meet the print quality expectations of their customers. It's also important to

note that lead times represented the widest discrepancy margin among surveyed companies. Some companies were confident their delivery times were meeting or exceeding their customers' expectations while other companies indicated that meeting lead time requirements was a real challenge.

Another area where APR deepened the research was in defining how much downtime reduction was actually a priority for converters. Companies were asked to rate how much downtime reduction is a priority to the success and/or profitability of their businesses. All large converters indicated that downtime reduction is a very high priority they link directly to the success of their businesses. The majority of small converters indicated the same; however a few small-company participants indicated that they are currently placing a higher priority on adding capacity and improving the integration of their MIS systems. One in three surveyed converters also indicated that their companies currently have no way of tracking and/or measuring downtime.

The APR Converter Survey also asked converters to predict which technologies will be the most influential to the future of their businesses and were asked to rank a set of 12 criteria from most to least important. The table below lists the top five ranked responses for both small and large companies.

Converter Ranking: Technologies that will be the Most Influential in the Future from Most to Least Significant	
Small Companies (sales <\$10 million)	Large Companies (sales >\$10 million)
#1 Inline print defect detection	#1 Digital flexo plates (no film negatives)
#2 Automated platemaking	#2 Automated platemaking
#3 Digital flexo plates	#3 Digital printing
#4 Digital printing	#4 Inline print defect detection
#5 UV-LED	#5 Hi-resolution output / Advanced screening

This table is an interesting study in comparing the different priorities of small and large-sized narrow web converters. The research indicates that inline print defect detection is a critical issue for small converters and one they believe will have a significant impact on their businesses while large companies ranked this criterion in fourth place.

While digital printing made the 'Top 5' lists for both small and large companies, large converters place its impact on their future business as slightly more significant. This isn't surprising as the majority of digital production presses (toner-based and inkjet machines capable of printing four or more colors and excluding desktop and/or tabletop systems) sold in the U.S. and Canada are sold into label converting operations with more than \$10 million in annual sales. While smaller label converters are also purchasing digital production presses, they still represent a slight minority of the total presses sold into the marketplace.

III. Digital Press Acquisition Criteria

The *APR Narrow Web Flexo Production and Digital Printing Study* identified that an estimated 28% of all jobs in the U.S. label market are less than 5,000 linear feet in length. For the first time, in 2014 the number of new digital press installations outpaced new conventional (analog) press installations in the North American marketplace.¹ Label printers have more digital technology options available than ever before. To effectively develop, market and sell their products manufacturers of digital press technology need direct access to the requirements, thought processes and technology assumptions of their label printing customers and prospects.

At this point in the North American marketplace there are an estimated 1,035 digital production label presses installed and in 2015 the region's digitally printed label revenue total reached nearly \$1.26 billion². In the current market there is a tremendous amount of uncertainty among converters as to the specific digital label press format and technology that will be the 'best fit' for their businesses. There are more digital press supplier players in the market than ever before and as we move into 2017 a significant number of label printers are vetting and researching their potential digital press options.

Beyond the benefits of per-unit customization, advancements in digital press technology continue to position digital printing as a viable contender for wider and wider application areas of end-use verticals that were once a conventional stronghold. While digital presses have long had particular relevance in the pharmaceutical and personal care sector, the technology's

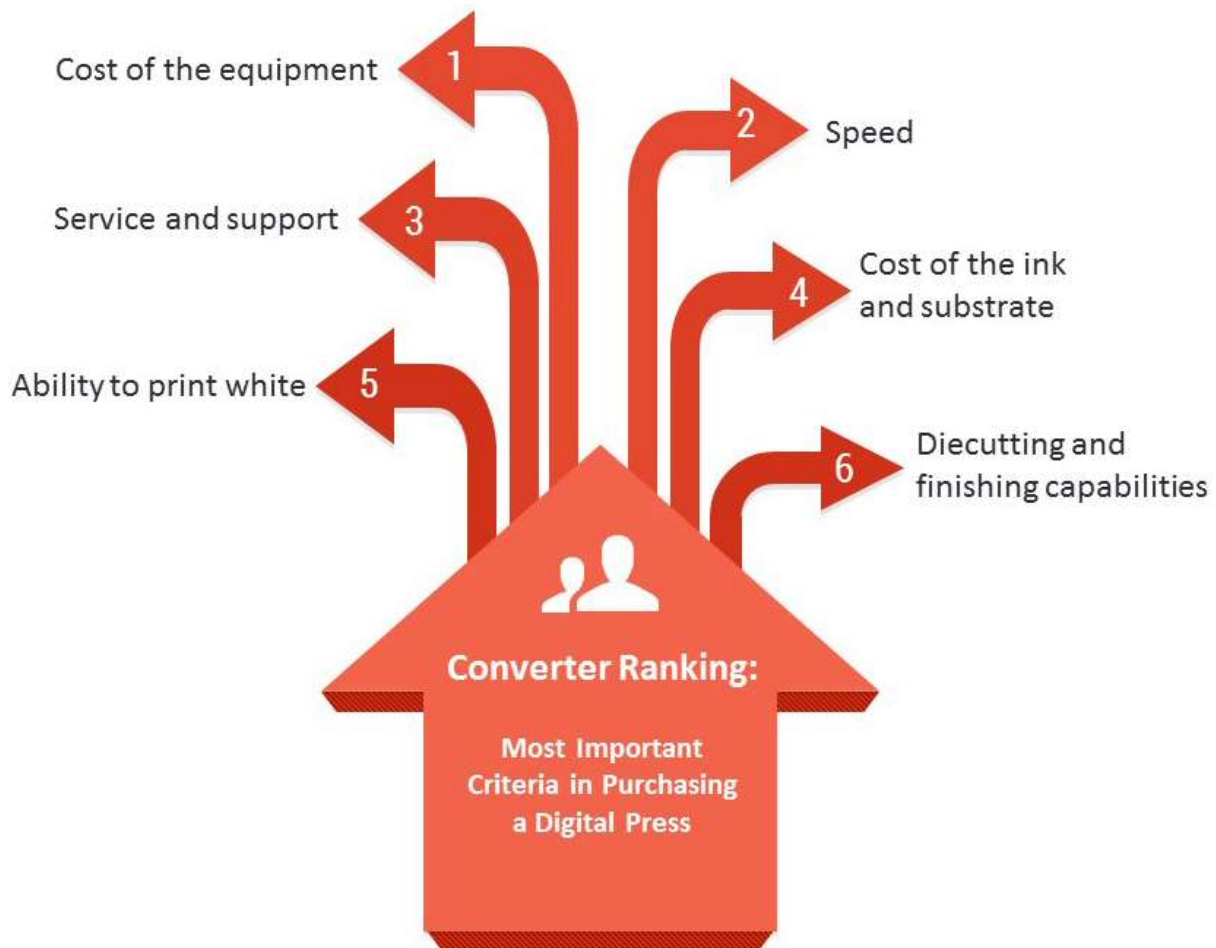
¹ *TLMI Index & Trend Report*, 2015.

² *The Multi-Client Study for Digital Press Suppliers*, LPC, Inc. April 2016.

potential continues to expand in end-use verticals that include food, beverage, household chemicals, nutraceuticals, consumer durables, automotive and pet food.

APR's digital product portfolio in the narrow web market includes the Colordyne Technologies' 3600 Series Retrofit System. The system allows converters to economically transform their existing flexo press into a state-of-the-art hybrid digital flexo press. In an effort to better understand the changing requirements of converters' short-run production protocols and digital technology purchasing drivers, the APR Converter Survey asked participants to specify the most important criteria in the purchasing of a digital press, or bringing digital print technology in-house.

Once again, converters were asked to rank the set of criteria from most to least important. The graphic below shows converters' responses.



While cost of the equipment is still at the forefront of the forces that drive digital press acquisitions, it is important to note that the criteria of ‘*speed*’ and ‘*service and support*’ were ranked very closely with ‘*speed*’ just a fraction higher. As converters have more digital print technology suppliers to choose from, support and service is becoming a critical concern both for converters that already have a digital press on their production floors as well as for companies acquiring digital print technology for the first time.

IV. Conclusions & APR’s Commitment to the Narrow Web Market

In surveys and during phone interviews, converters who participated in the *APR Narrow Web Flexo Production and Digital Printing Study* were also asked to identify the primary areas in which their companies need assistance from an outside source. For the majority of converters the two areas that topped the list were 1) Expediting set-up and changeover times and 2) Assistance with color matching and density requirements.

The APR research results reinforce the challenges narrow web converters are having with optimizing the production of short-runs on their flexo presses. As run size lengths continue to decline, this is going to become an even more critical area for converters. Color matching and density requirement assistance is another area where converters are increasingly seeking outside expertise. This aligns with research indicating that consistent job-to-job repeatability standards remain a high priority for brand owners and that issues with job-to-job repeatability is the single most cited reason that brand owners and packaging buyers seek new label vendors (due to their existing label suppliers not achieving consistent enough print quality).³

For companies that do not already have a digital press, the primary ‘buy’ criteria are press cost and print speed. It’s important to note that having to diecut/finish offline or near-line is not considered a significant barrier to surveyed converters in the purchase of a digital press. This indicates that offline finishing is still considered a necessary practice and that either auxiliary finishing/diecutting manufacturers are sufficiently meeting the requirements of the current marketplace, or, a viable and economical inline alternative has yet to be successfully implemented.

APR provides a wide range of products and services to the narrow web marketplace. Converter survey results uncovered the technologies that companies consider the most influential to the future of their businesses and the Top 5 technologies converters list are all products APR sells and supports in the marketplace. Converters can contact APR directly to

³ Brand Owner Survey, *TLMI Index & Trend Report*, 2015.

receive recommendations for best practices when it comes to optimizing the production of short runs and process controls on flexo presses. From print defect detection, to digital prepress and plate production, to carrying out an ROI assessment and analysis on the integration of a digital flexo hybrid system; APR can help your company exceed your customers' expectations and optimize performance across the production floor.

About All Printing Resources, Inc. (APR)

All Printing Resources, Inc. (APR) is a proven resource for solutions, trusted service, and support to the flexographic printing industry. APR delivers measurable performance enhancements and total cost reductions, including the after sale attention needed to see optimal results. APR represents some of the most innovative product lines worldwide and takes a "team" approach to deliver process improvement and innovative solutions.