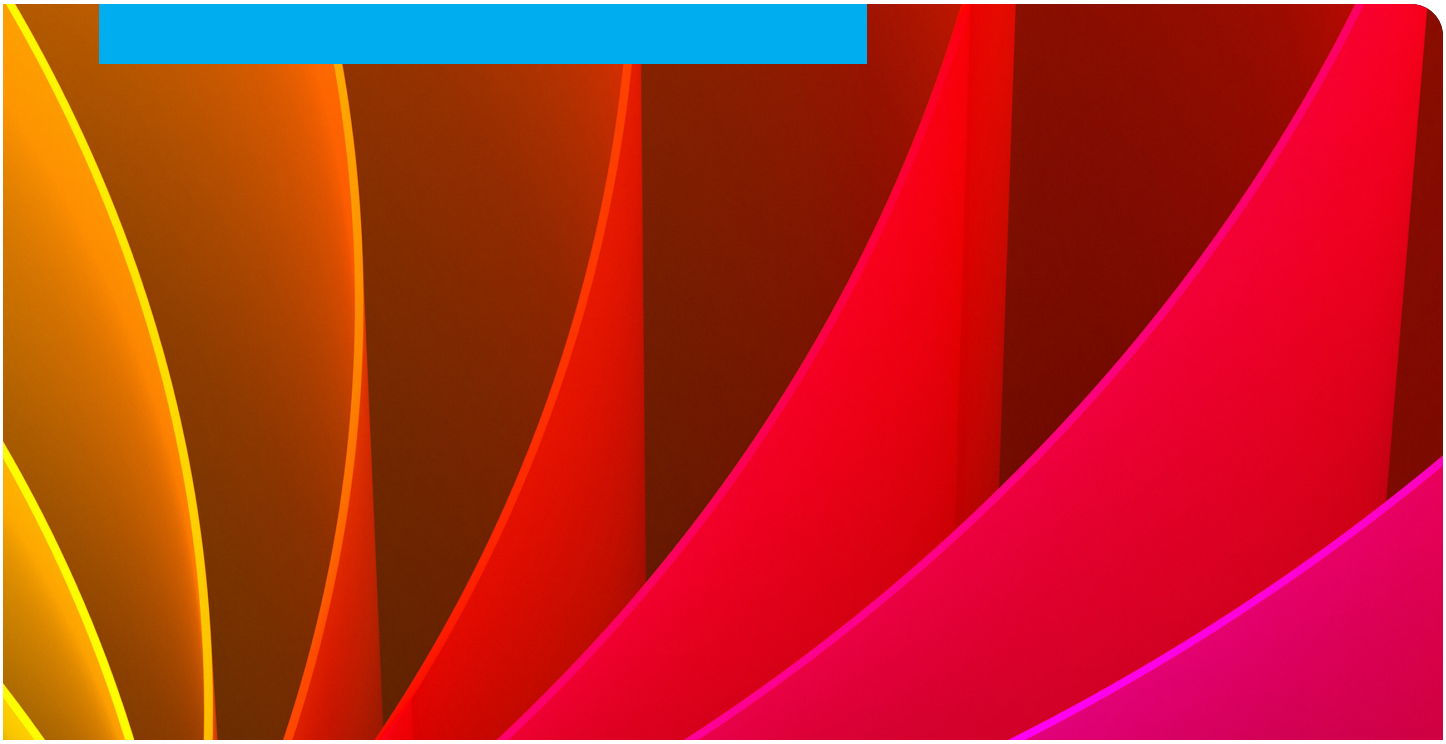

Enhancing the Digital Label Opportunity

How Digital Inkjet Printing Is Creating New Possibilities

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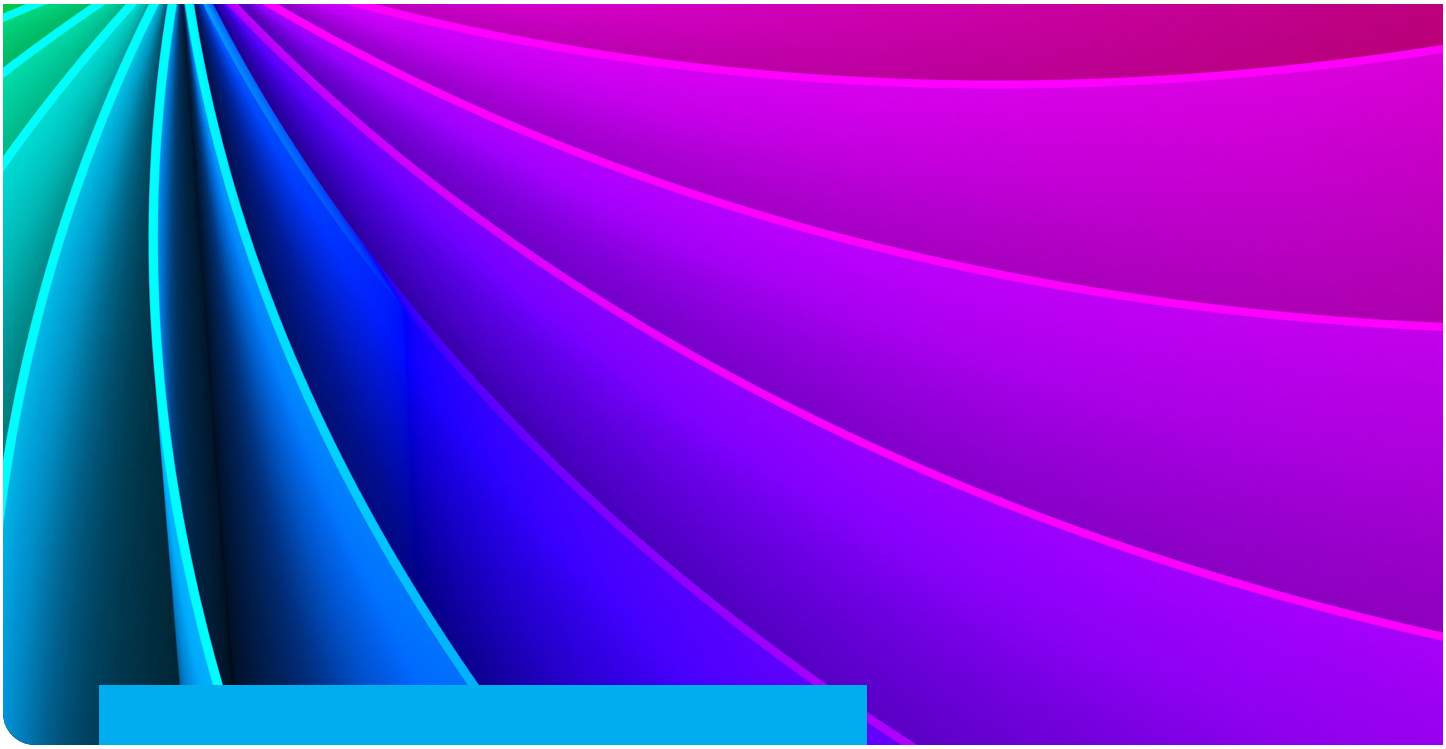

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Enhancing the Digital Label Opportunity

How Digital Inkjet Printing is Creating New Possibilities

INTRODUCTION

Evolving brand owner demands combined with innovations in inkjet technology are expanding digital label printing opportunities.

Packaging is a print sector that is not easily disrupted by market forces, as its products play an essential and non-replaceable role in many industries. It was one of the few print sectors not adversely affected by the COVID-19 pandemic. Stay-at-home orders increased demand for consumer product goods (CPG), such as paper goods and beverages. The pandemic itself introduced new products for fighting the virus, including sanitizers, vaccines, and test kits — and all of these products require labels.

A Mordor Intelligence forecast expects the global print label market to grow at a compound annual growth rate (CAGR) of 4.2% from 2021 to 2026.

Labels were one of the first packaging applications to transition to digital printing, and inkjet promises to further that transition. Many print providers first enter packaging by offering labels before adding other applications. Today, there are many inkjet options for printing labels, from tabletop devices to narrow webs to hybrid systems that add inkjet heads to analog printing presses.

Printing labels on inkjet devices offers print providers, converters, and product owners competitive cost structures, faster printing speeds, enhanced image quality, and the ability to print on a wide variety of substrates. In addition, inkjet mitigates a key barrier to digital printing: it can produce higher volumes than toner, bridging the gap between standard offset and electrophotographic run lengths.

Labels play many roles, including conveying critical product information, providing essential marketing support, and enabling security measures to combat product counterfeiting and supply-chain diversion. Inkjet supports brand owner and regulatory label requirements on these fronts and many others because it can:

- Print eye-catching designs with innovative technology and inks, enabling offset-quality output on a wide range of coated and uncoated substrates — while also resisting damage from light, moisture, and abrasion.
- Accommodate a wide variety of substrates. Because inkjet is a non-impact printing technique, it can print on film and paper labels, pre-diecut and matrix-free rolls with high reliability.
- Provide better quality control. Labels are typically printed on narrow-web presses with widths from 5″ to 15″. Some of the latest printing devices in this size range require fewer inkjet printheads to be “stitched” together to create a nozzle array that spans the width of the web. Fewer printheads mean better quality control.
- Deliver excellent print quality through substrate control and transport. As labels are typically printed roll to roll, web tension, weave, and flutter are well understood by manufacturers of continuous-feed printing devices. Experience in web transport mechanics and properties is enabling single-pass inkjet printing to deliver high-quality output on narrow-web equipment.

- Offer production flexibility. Hybrid printing systems that combine different types of technology are offering advantages and benefits to label printers. Adding inkjet heads to flexographic presses increases production flexibility. Label converters can use their flexographic presses to produce longer-run jobs, while the hybrid option extends their capabilities to include customized labels, smaller lot sizes, and faster cycle times with minimal changeover costs.
- Economically meet demand for lower quantities.
- Add variable data elements such as expiration dates, tracking barcodes, local regulatory information, and serial numbers.

This special report, sponsored by Memjet, combines NAPCO Research survey data, industry reporting by Packaging Impressions, and secondary research to showcase how inkjet printing, brand owner demands, and market trends are converging in ways that elevate the quality of digital label printing, broaden its applications, and enrich the opportunities it holds.

THE DIGITAL LABEL PRINTING OPPORTUNITY

Labels support brand owners in marketing, identifying, promoting, and transporting products. Labels also communicate information about a product's origin, manufacturer, use, shelf life, hazard warnings, nutritional content, and disposal requirements.

By definition, a label is a piece of paper, plastic film, cloth, metal, or other material affixed to a container or product, on which is written or printed information or symbols about the product or item.

The two most basic types of labels are pressure sensitive and glue applied.

1. Pressure-sensitive labels are the most common type of label and are applied using only pressure, where no other process is required. The label is composed of face stock, adhesive, and a liner.
2. Glue-applied labels do not have an adhesive layer. Instead, cold or hot glue is used to apply the label to its container.

Many Varieties of Labels

Nearly every product includes a label, and there are many varieties, as described in Table 1. There are many opportunities for inkjet printing to support an organization's label requirements.

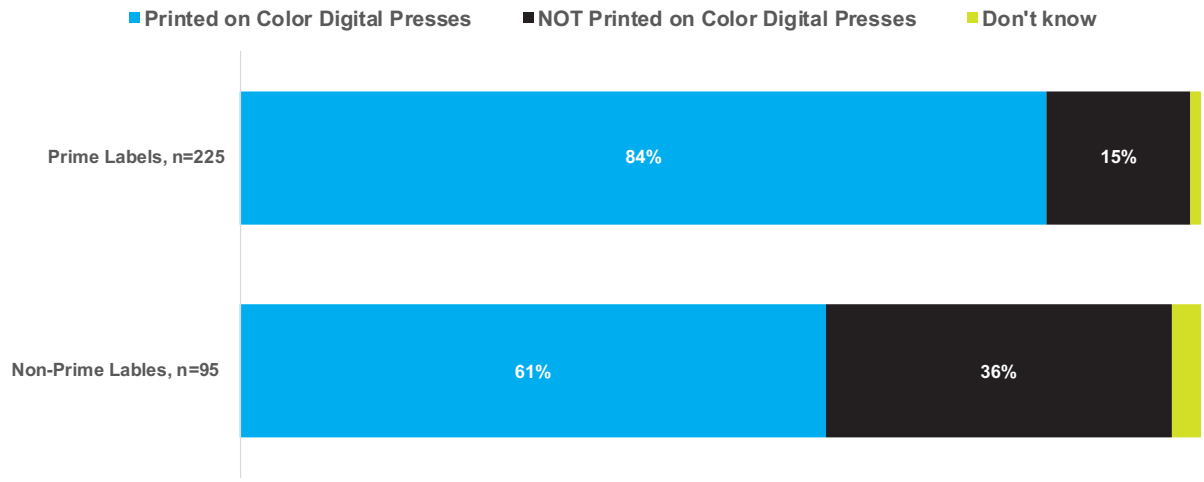
Table 1: Many Varieties of Labels

LABEL TYPE	DESCRIPTION
Prime	The main labels for products and can include a brand's images, color graphics, and marketing messages.
Safety	Attached to equipment or products to warn a user about the risks associated with using the device or item.
Product identification	List the manufacturer, part number, or a serial number of various products and components.
Pull-out	Can be peeled open to reveal additional content, such as drug usage information, coupons, or promotional contest game pieces.
In-mold	Use blow molding, injection molding, or thermoforming to apply labels to containers during the manufacturing process.
Wrap-around	Typically surround bottles or jars and include brand graphics and information such as bar codes and nutritional details.
Heat transfer	"Tagless labels" on apparel products. Instead of sewing or weaving a label into the garment, a label printed into a heat-transfer film is pressed into the garment.
Resealable	Can be pulled off a product to open it and reapplied to reseal it. Cosmetics and baby wipes are examples of products that include resealable labels.
Peel-back	Feature a thin layer of non-tacky, temporary adhesive that keeps the labels in place but lets a consumer remove them with ease. They're usually flexible for easy removal and often used as coupon labels affixed to products.
Die-cut	Have unique shapes for branding or to conform to different shapes of containers.
Domed	Printed pressure-sensitive labels that have a thick, dome-shaped, clear polyurethane coating.
Wet-glue	Labels that are not coated until the time of application. Printed paper or film substrates are coated with wet glue on the labeling line immediately prior to application.
Transparent	Printed on material that is completely see-through, giving a product the appearance that its messaging is printed directly on its packaging.

Label Production Continues to Transition to Digital Printing

Labels have long been printed on digital printing devices. According to the NAPCO Research report *Digital Packaging Printing: The Time is Now!*, a large majority of brand-owner survey respondents report their labels are produced on color digital presses (Figure 1). More than 80% produce prime labels and over 60% print non-prime labels on digital color presses.

Figure 1: Labels Printed on Digital Color Presses



Q. Of the applications you produce, which are printed on color digital presses?
Brand Owners that purchase/influence prime or non-prime labels
Source: Digital Package Printing: The Time is Now!, 2019

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Because of ongoing innovations in printing hardware, software, inks, toners, and substrates, producing labels on digital presses has become a more automated and less complicated process. These innovations have lowered and continue to lower investment risk because they reduce technology complexity, workflow steps, and process variables.

Here is a brief summary of key technology advances offering opportunity for digital inkjet label printing:

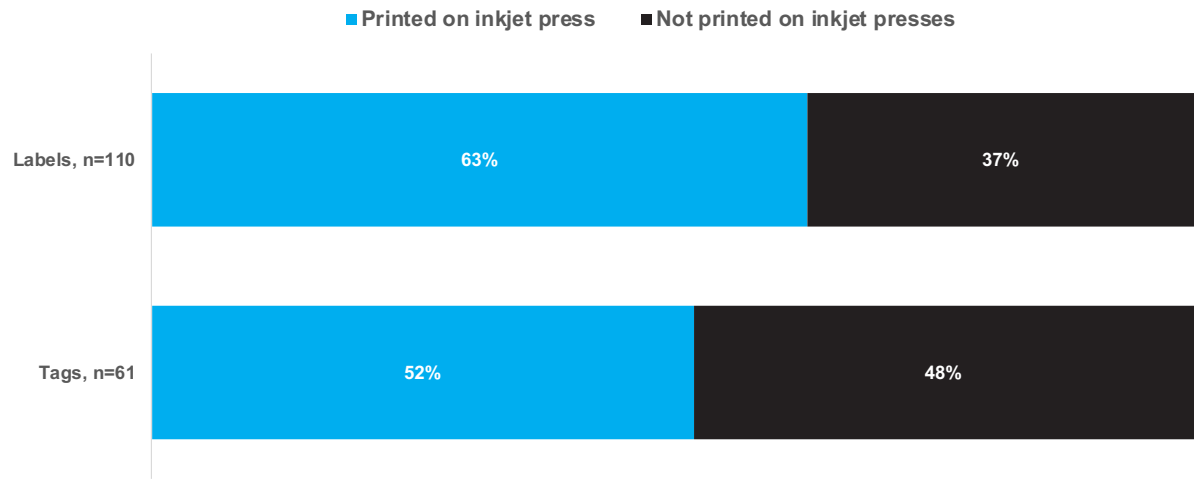
- Modular printheads versus fixed print bars enable flexibility in developing solutions for a wide range of applications and investment budgets. The ability to stitch together multiple printhead modules enables equipment manufacturers to build simple but powerful entry-level inkjet presses as well as high-end production equipment with speed and quality that can be adapted for a broad range of substrates. This means companies can enter packaging without having to make large investments in complex equipment.

- Water-based inks, printed with the highest-resolution printheads, offer high-quality precision output on a wide range of coated and uncoated substrates while also being resistant to damage from light, moisture, and abrasion. These inks also offer safety and sustainability advantages to providers serving the food and beverage markets — among the biggest users of labels and packaging — as product manufacturers must follow strict guidelines to ensure that product packaging protects human health.

- Inkjet is a less complicated printing process than other digital methods. While ink jetting is itself full of complexities in terms of ink formulation, jetting/spraying, droplet size, and adhesion, these complexities reside almost entirely in the inkjet heads and the ink and are typically resolved by the manufacturers of these components. Toner devices, on the other hand, require multiple consumable parts and mechanisms to apply and fuse the toner to the substrate, leading to more expensive maintenance and higher intervention and down time. Inkjet typically reduces device maintenance and delivers faster print speeds with better uptime.

NAPCO Research's study *Lowering Entry Barriers in Digital Printing for Packaging*, sponsored by Memjet, found that over half of printers/converters print labels or tags on inkjet devices (Figure 2).

Figure 2: Printing Labels on Inkjet Devices



Q. Of the packaging applications you print, which are printed on inkjet devices?
Providers that print labels
Source: Inkjet Lowering Entry Barriers in Digital Packaging Printing, *NAPCO Research/Memjet 2020*

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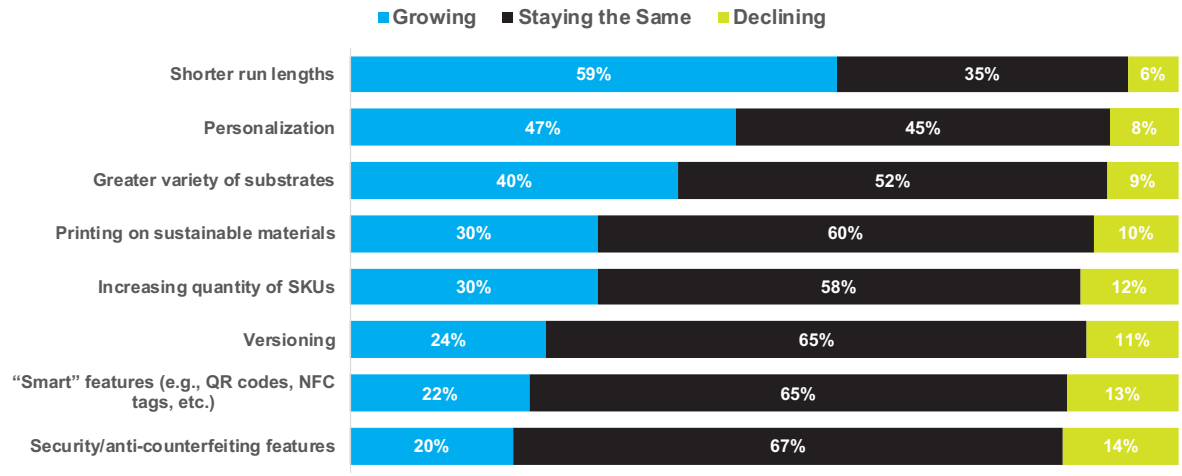
The survey also asked label printers to rank growth in demand for various customer requirements. The responses to this survey question highlight the reasons label production continues to migrate to digital printing. Respondents report high growth in demand for shorter runs, ways to improve packaging results, and substrate availability (Figure 3). Digital printing accommodates many customer requirements that respondents reported are in high demand.

Figure 3: Label Printers' Customer Demands



Please indicate if demand from your label and packaging customers for the following requirements is growing, staying the same, or declining.
n=245 Providers that print labels
Source: Lowering Entry Barriers in Digital Printing for Packaging, *NAPCO Research/Memjet April/May 2020*

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INKJET MEETING DEMANDING CUSTOMER REQUIREMENTS

Brand owner demands for shorter run lengths reflect trends toward more product varieties (increasing stockkeeping units) and on-demand ordering of labels versus ordering and storing larger volumes. Inkjet print technology ensures that label producers are able to meet customer requirements for shorter runs, personalization, quicker time to market, and more sophisticated graphics.

Improving Customer Engagement

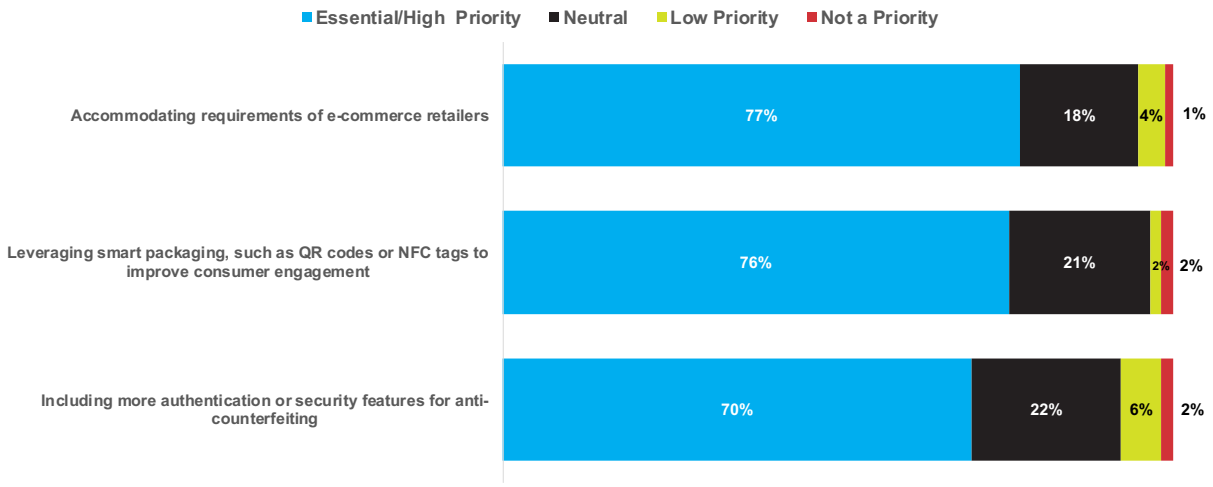
Digital printing is supporting the efforts of retailers, brand owners, marketers, and agencies to expand product versions and improve customer engagement.

Major brands such as Coca-Cola and Nutella are employing personalized labeling as part of larger marketing campaigns. On Coca-Cola's website, consumers can order personalized labels for weddings and other events. The rise in e-commerce has opened up new opportunities for suppliers of decorative labels and packaging to offer high-value, high-margin personalized labels and products to create a connection with the consumer.

Digital printing also supports increasing demand for smart packaging applications. QR codes, for instance, grew in popularity during the pandemic as a solution for touchless interactions. QR codes continue to do what they do best — deliver an interactive experience and drive consumers to websites to obtain additional information, enter competitions, play games, or become part of social networks. As part of marketing campaigns, QR codes can be customized or uniquely variable, delivering a personalized experience to the consumer.

According to a NAPCO Research survey, brand owners that influence labels report enhancing customer experiences to meet the expanding requirements of e-commerce retailers (Figure 4). Leveraging smart packaging technologies and expanding brand security features in their labels are also high priorities for their organizations.

Figure 4: E-Commerce, Smart Packaging, and Security Top Priorities



Q. What is the level of priority for the following packaging-related objectives?
n=233 Brand Owners that purchase/influence labels
Source: Digital Printing the Time is Now!, *NAPCO Research 2019*

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Meeting Food Safety Requirements

Users of labels are diverse, but a big share comes from the food and beverage industry. In this market, quality — the packaging can be as important as the product itself — and food safety are critical factors.

Labels used by food and beverage manufacturers must be safe for food contact and adhere to U.S. Food and Drug Administration (FDA) regulations. According to a NAPCO Research/ Memjet survey, 43% of package printer/converter respondents that serve the food and beverage market report that complying with packaging safety requirements is a critical/moderate challenge.

Printing labels with water-based, low-migration inkjet solutions minimizes the impact on food and human health. Several inkjet label presses, in various formats, offer 1600 dpi print quality with specially formulated aqueous inks suited to food packaging applications. Here is a sampling:

- Arrow Systems' ArrowJet Aqua 330R is a high-speed, aqueous pigment inkjet roll-to-roll print solution using Memjet DuraFlex® technology to deliver some of the highest production rates (up to 150 ft/min (45.7 m/min) and lowest print costs in digital narrow web label printing.

- The Coaso iCueLabel 420 is a Memjet DuraFlex-powered roll-to-roll label printer producing high-quality labels — including food packaging safe and high-security labels — in a fast, affordable way.
- AstroNova's QuickLabel QL-850 is a high-performance, wide-format label printer featuring Natura™ inks for food packaging and Memjet VersaPass® technology.
- AstroNova's T2-C is a high-capacity, high-volume tabletop label press capable of delivering precision over long runs on pre-diecut labels, eliminating the need for a secondary finishing process.
- The VIPColor VP650 is a desktop color label printer that features Memjet's enhanced water-resistant ink technology suitable for chilled foods/beverages and most moisture-exposed products.
- The Afinia Label DLP-2100 Mini Digital Label Press can print and finish in-line at up to 60 feet per minute. The press is capable of laminating, diecutting, waste removal, slitting, and rewinding to finished rolls that are ready for application.

Delivering Sustainability Advantages

Brand owner demands for sustainable packaging influence designs, substrates, printing processes, and provider selections. According to NAPCO Research's study *Adding Value to Digital Printing*, sustainable packaging is a top priority for brand owners and a key factor for 58% when selecting printers and convertors. Product packaging is a highly visible way to demonstrate commitment to sustainability.

Digital printing is often considered more sustainable than other printing processes since it eliminates the use of printing plates and press chemistry. It also reduces make-ready waste, as presses can print salable products almost immediately.

Printing labels on inkjet presses can eliminate waste created from product obsolescence, as brand owners can print only what is needed versus storing extensive inventories of labels that can become out of date. In addition, continually changing labeling guidelines and regulations often result in frequent design and text changes, which make labels better suited to short-run production.

Water-based inks inherently contain less harmful chemicals, making them safer for the environment and the people handling them—and adding to better work environments and cleaner waste streams. This could potentially cut a print providers' environmental costs (permits and disposal fees) when compared to other print technologies.

Thwarting Product Counterfeiting and Diversion

Brand theft is a chronic challenge for many organizations. Technology has made it possible to more easily duplicate product packaging. In addition, product knock-offs have expanded from luxury goods to almost all products. Another important area of brand protection is gray-market goods, where legal products are sold outside the normal distribution channel. This is also referred to as product diversion, as products are sold in unauthorized places.

Digital printing devices offer brand owners a strong solution to authenticate products. The ability to print variable images and text is a key weapon in brand protection. Digital presses allow brand

owners to print a unique number, image, or code for tracking or authentication purposes on individual packages and labels. In addition, some digital printing devices can print special visible or invisible inks.

BENEFITS OF PRINTING LABELS ON INKJET DEVICES

According to the Smithers' report *The Future of Inkjet Printing to 2025*, labels is a top market driving growth in inkjet printing. The report outlines these drivers and trends as the reasons for inkjet's growth:

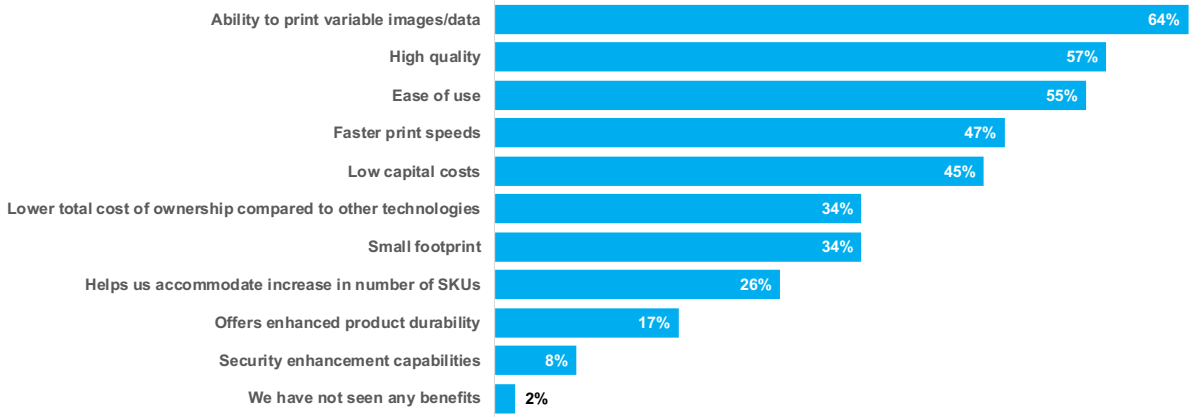
- The need for flexibility and agility to respond to customer requirements
- The benefit of digital capability to only print what is needed
- As a form of non-impact printing, the ability to print on a wider variety of substrates
- The growth of e-commerce
- The ability to provide a sustainable alternative to analog printing, because of less waste, chemicals, and materials during the printing process — especially for water-based ink technologies

Inkjet printing extends the positive features and benefits delivered by digital printing. Citing benefits of the use of inkjet devices in printing labels, the majority of respondents to the NAPCO Research survey *Lowering Entry Barriers in Digital Packaging Printing* point to the ability to print variable images and data, high quality, and ease of use. Additional top benefits are low capital costs, having a small footprint, having lower costs of ownership compared to other technologies, and the ability to accommodate an increase in the number of SKUs (Figure 5).

Digital inkjet offers converters and print service providers the opportunity to meet brands' expectations for high-quality graphics with variable imaging and data, while offering a lower cost of ownership than competing digital print technologies.

Another important benefit for survey respondents is the faster print speed of inkjet (47%) compared to other digital print technologies. In addition, 45% of respondents appreciate inkjet's low capital cost, reflecting innovations in printheads that are allowing more entry-level and lower-cost devices to enter the market.

Figure 5: Top Benefits of Printing Labels on Inkjet



Q. What are the top benefits of printing labels on inkjet printing devices?
n=53 respondents that print labels on inkjet printing devices
Source: Lowering Entry Barriers in Digital Packaging Printing, *NAPCO Research/Memjet 2020*

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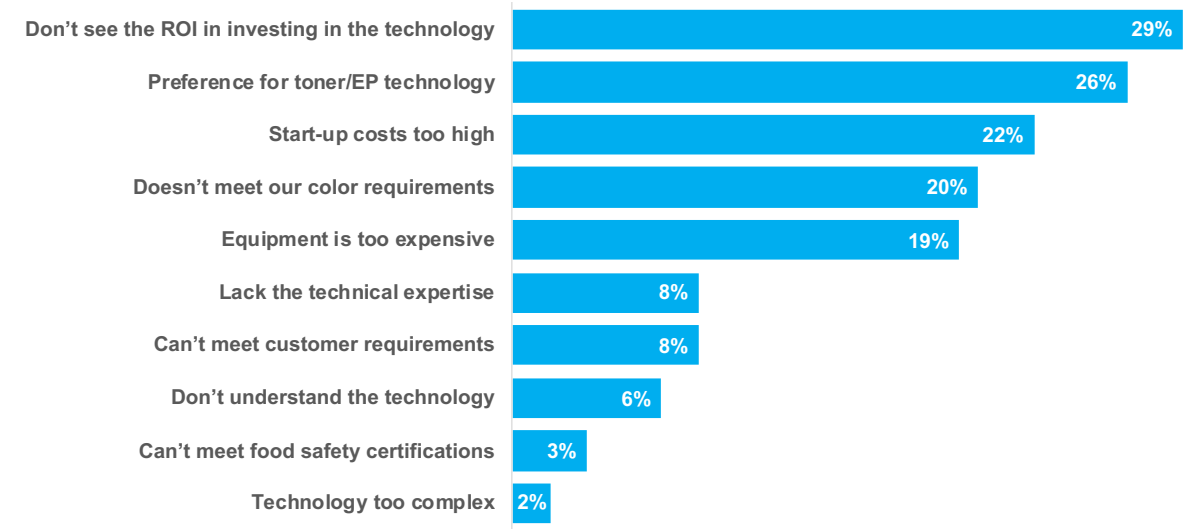
Respondents that print labels on inkjet printing devices report their top two challenges are matching output with conventional and toner devices (51%) and substrate limitations (40%). Optimizing color across printing devices and processes is a challenge in nearly all industry segments, because as print providers embrace new technologies, color management practices often lag. As more labels are produced with mixed printing technologies, providers will focus resources on improving internal color management practices.

Reasons for Not Printing Labels on Inkjet Devices

The top reasons respondents don't print labels via inkjet are that they don't see the return on investment on the technology, prefer printing labels on toner devices, believe the start-up costs are too high, and don't believe the color produced by inkjet devices meets their requirements. Interestingly, there wasn't a standout reason for not using inkjet for printing labels, and the top response (don't see the ROI) represented only 29% of respondents that don't print labels on inkjet devices.

Figure 6: Reasons for Not Printing Labels via Inkjet



Q. Why don't you print labels via inkjet printing devices?
n=126 respondents that don't print labels on inkjet devices
Source: Inkjet Lowering Entry Barriers in Digital Packaging Printing, *NAPCO Research/Memjet*

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CONCLUSION

Labels play an essential role in how products are sold, from delivering necessary information in the supply chain to making products stand out in the retail environment.

Digital printing, and in particular digital inkjet, is presenting print providers and converters with many opportunities to serve the label market.

Customer demands for short-run jobs — often outfitted with personalization or customization features — will likely increase as online retailers from Amazon and Etsy continue to offer a platform where niche products can be discovered by consumers across the globe and large brands look to offer unique and/or seasonal products to keep consumers excited by their products, and as regional regulatory requirements change.

The more versatility and flexibility label printers and converters have at their disposal, the better able they will be able to meet brands' demands.

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NAPCO Research crafts custom data-centric solutions that leverage our highly engaged audiences across the markets in which we operate, our industry subject matter experts and in-house research expertise. We partner with our clients to identify their unique business problem and create solutions that enable deeply informed decision-making.

NAPCO Research can help with:

- Business goal prioritization
- Opportunity discovery
- Market segmentation
- Landscape insight
- User needs and wants
- Product features and functionality
- Content marketing strategy
- Sales strategy and tactics
- Market conditions
- Benchmarking
- Industry trends
- Brand awareness

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WHO WE ARE

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Memjet is a global leader in the design and development of innovative thermal inkjet printhead technology, supporting modules, and aqueous inks. The modularity and technical components, combined with Memjet's commitment to customer success, empower OEM partners all over the world to develop fast, cost-effective printing solutions to grow and succeed in new markets. Together, we are building the future of print.

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1. VersaPass® technology
2. DuraLink® technology
3. DuraFlex® technology

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