

WhatTheyTh!nk

2026 | Technology Outlook



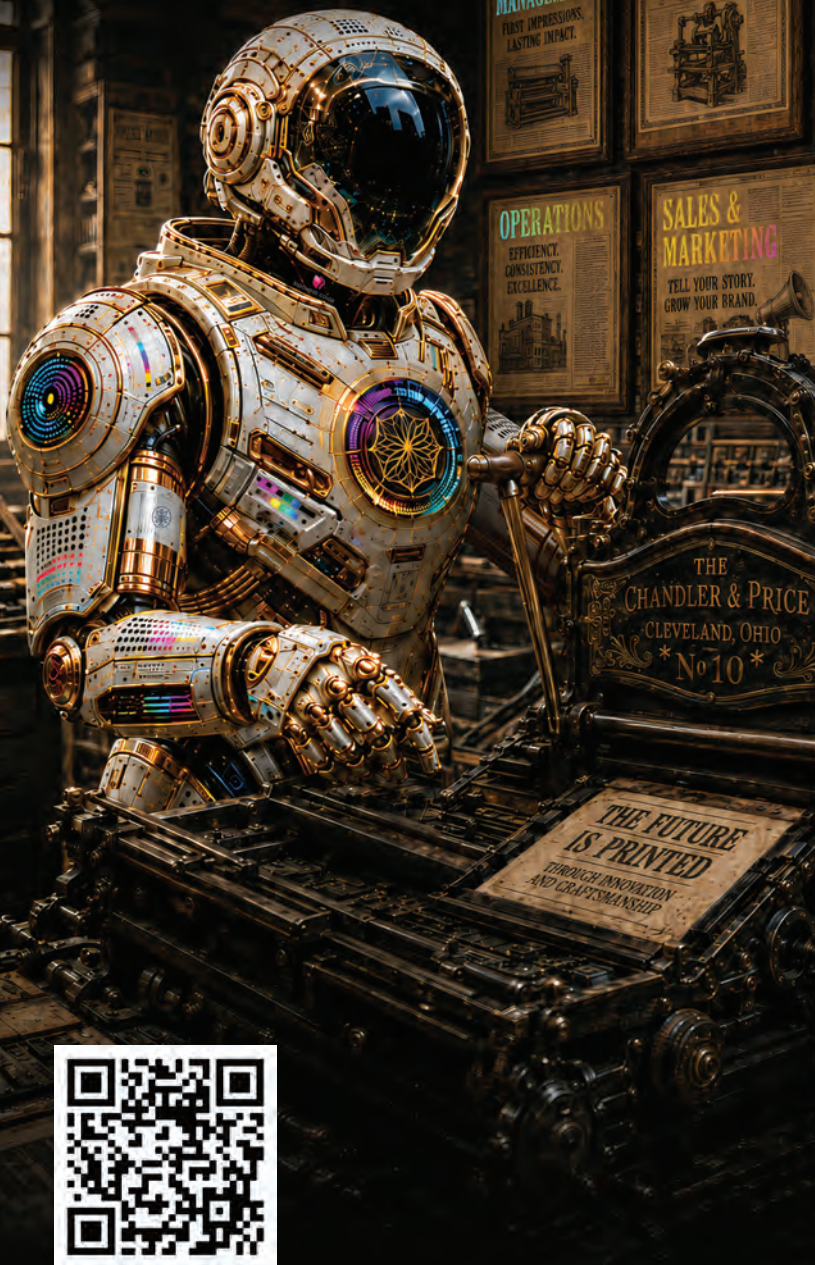
THE LATEST
DEVELOPMENTS

Plus a 2026 New
Product Roundup

2026

TECHNOLOGY OUTLOOK

WhatTheyThink



Our 2026 Technology Outlook series is designed for you to quickly learn about new innovations from industry analysts and thought leaders.

The Technology Outlook resource center is designed to help print providers understand the trends, tools, and market shifts that matter most as they prepare for fall trade events and begin 2027 planning.

Find discussions on these key topics:



Production Print

with Mary Schilling

Highlighting the latest technology and product announcements from manufacturers of production inkjet digital printing equipment.



Display Graphics and Textiles & Apparel

with Richard Romano and Cary Sherburne

Identifying the top trends in digital graphics applications and digital textile printing and how they complement each other.



Labels and Packaging

with David Zwang

Detailing new product announcements, new features, capabilities and applications in the label and packaging market, plus prevailing and emerging trends.



Software and Workflow

with Pat McGrew and Ryan McAbee

Sharing a practical guide to where print shops should focus their front office automation efforts, the technology options and how vibe coding fits into the picture.



Appearance Management

with Don Carli

Explaining why appearance management is an important issues for brands, converters and print providers, and identifying tools and standards to manage image appearance.



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WELCOME TO OUR ANNUAL TECHNOLOGY OUTLOOK!

If you are familiar with previous years' installments, you may notice that we are doing something a little differently this year. Previous Technology Outlooks have focused on product or application categories—digital printing, labels and packaging, wide format, software, finishing etc.—this time we are looking at technology areas. Such as:

In **Automation**, we are looking at production automation, both from a 10,000-foot view and a deeper dive, as well as specific software automation strategies. Naturally, there is no escaping AI, and we have a close look at today's buzzphrase "vibe coding" and what it means for print businesses, especially in the context of automation.

Our **Operations** section looks at the latest developments in Extended Producer Responsibility (EPR), as well as other imminent legislation that is likely to impact print businesses in the near future. We also take a look at robotics: robots are closer to becoming print business employees than ever, but where and how?

Another new buzzphrase that has emerged in the past year or so is **Appearance Management**, sort of "Color Management 2.0." Maintaining how products appear across packaging, print, textiles, embellishment, retail, and in-home environments is—and has been—a major challenge, and is the top reason for product returns. But the responsibility for getting appearances right remains surprisingly unclear. One new challenge with appearance management is the fast-growing area of embellishments. In the past year, software solutions have emerged to try to effectively preview how embellishments will look, so we present a round-up of the current portfolio of products. And whilst digital embellishments are all the rage, traditional embellishments are still very much with us, as the FSEAs Jeff Peterson reminds us.

Marketing has changed dramatically in the past couple of years. Once upon a time, we would have devoted a whole slate of features to "search engine optimization" (SEO)—indeed, we have spoken to a number of companies who built successful print businesses based on highly effective SEO. Today, however, SEO is largely being supplanted by "Answer Engine Optimization" (AEO)—you guessed it, based on appealing to AI platforms. How is it being used for print business marketing? What are some success stories and best practices? Another fast-growing new development is "agentic" sales, which is transforming how sales outreach is conducted. What does agentic sales involve and how are print businesses using it—or how should they be using it?

Sustainability continues to be an important aspect of

today's print business. We look at the dubious concept of "zero waste"—to what extent is it even possible, and, if it's not, what are reasonable waste-reduction targets, and how are print businesses measuring progress? We also take a look at the "Digital Product Passport," which is gaining traction in Europe and will become important in the US as well. At its simplest, a Digital Product Passport is a digital record attached to a physical product accessed through a QR code, NFC chip, or barcode that documents everything about that product across its entire lifecycle. Our textiles expert Debbie McKeegan takes a deep dive into what that means practically for print businesses today.

We also offer a section on **Consumables**, taking a look at the latest developments in inks, the advantages of automated ink management, as well as potential sustainable substitutes for vinyls.

And what Technology Outlook would be complete without a **Cool Tools** with Mary Schilling?

Our extensive **New Products** section in the back of this issue lists many of the most recent new product announcements that have been made as of presstime, and to look out for at PRINTING United.

Finally, we profile printing industry icon Frank Romano on the occasion of his 85th birthday—and publication of his 85th book.

Also be sure to check out our archived Technology Outlook series of webinars:

- **August 24—Production Print**, presented by Mary Schilling.
- **August 25—Display Graphics & Signage and Textiles & Apparel**, presented by Richard Romano & Cary Sherburne.
- **August 26—Labels & Packaging**, presented by David Zwang.
- **August 27—Software & Workflow**, presented by Pat McGrew and Ryan McAbee.
- **August 28—Appearance Management**, presented by Don Carli.

All five Technology Outlook sessions are available for playback at https://www.bigmarker.com/series/whattheythink-2026-technolog/series_summit.

A NOTE ON THE COVER

The futuristic design of this year's magazine cover—depicting the integration of modern technology and robotics with the traditional printing process—was designed by Blooming Color and was embellished by Truly Engaging.

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Lift
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PRODUCTION AUTOMATION TODAY AND TOMORROW

BY DAVID ZWANG

Automation is no longer experimental in print and packaging, but it is still unevenly adopted, for many reasons. The most mature automation is in prepress, color control, estimating, scheduling, inline inspection, web-to-print, MIS/ERP integration, and short-run digital production. The less mature part is true end-to-end, lights-out production across mixed analog, digital, converting, finishing, shipping, and customer-service workflows.

PRODUCTION AUTOMATION TODAY

Automation today is mostly being applied as an optimization layer, not as a replacement for the plant operation. Current uses include predictive maintenance, defect detection, color and ink optimization, production benchmarking, prepress layout/design optimization, job ticketing assistance, and simulation of packaging designs for lower material use.

Some print and packaging production companies have been using pipeline automation in various forms for years, routinely checking files, applying color corrections, imposing layouts, flagging missing fonts or incorrect color spaces, and reducing manual intervention before

production. Enfocus Switch, Callas pdfToolbox, HP Site Flow, Hybrid CLOUDFLOW, Esko Automation Engine, and increasingly many more are available. The addition of AI tools in those applications is in its infancy, but increasingly in development. One of the more forward-thinking AI workflow introductions is Fiery JobFlow Pro, a very innovative workflow platform that has been developed from the ground up to support new demands and significantly increase performance. It is powered by large language models (LLM), and currently supports Open AI's ChatGPT and Anthropic's Claude with support for Google Gemini and others.

The near-term value of AI in hardware systems is decision support. Monitoring quality drift, recommending settings, reducing ink or substrate waste, improving scheduling, and helping less experienced operators get to acceptable production faster. Heidelberg Boardmaster's Intellimatch offline 3D plate scanning system is designed to scan and identify a mounted plate sleeve, performs a quality check and pulls the relevant information from the stored data for the print run. This includes the precise print unit



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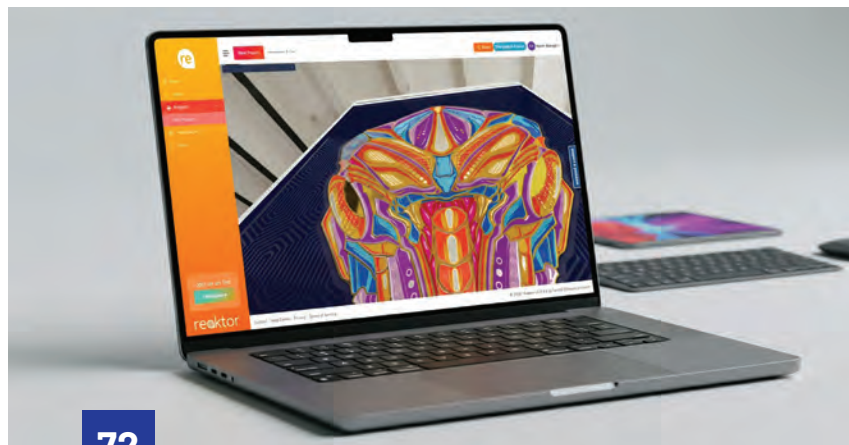
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(Image courtesy Adobe Stock)

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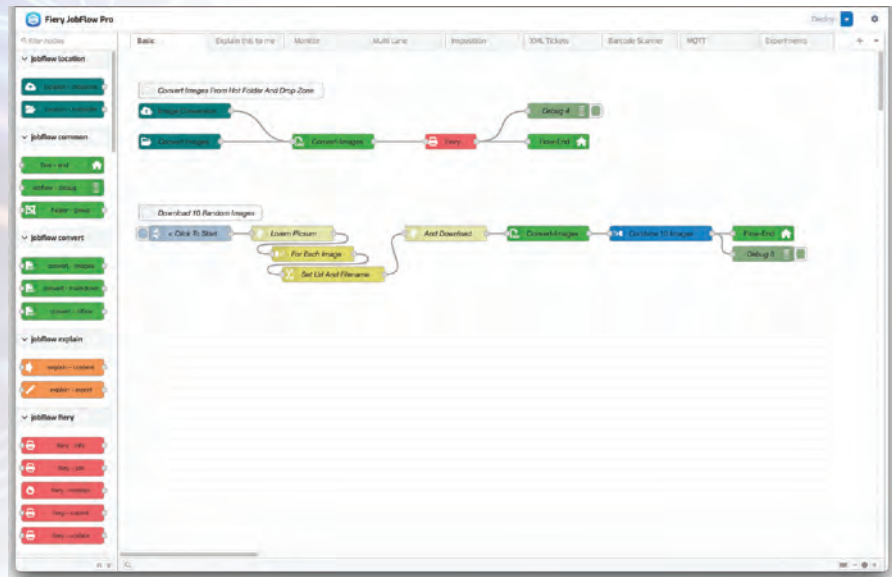
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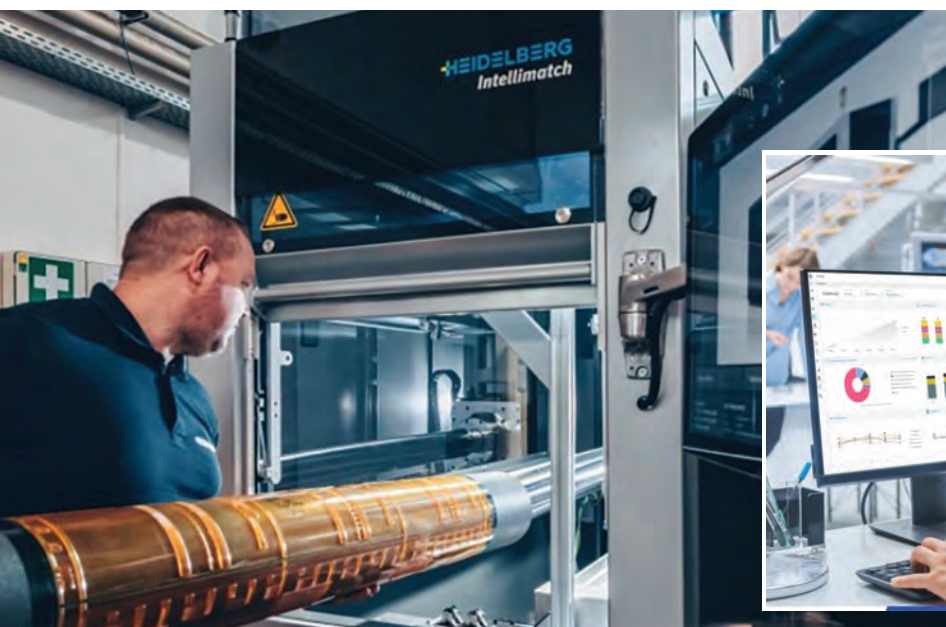
Fiery JobFlow Pro

instructions for automatic pressure and registration settings, all done while the press is running at full speed with the other paired print unit.

Providing accurate and repeatable color throughout a press run is an imperative, and automated press calibration with G7/G7+ style process control, centralized profiles, and self-correcting color tools are becoming core productivity tools rather than premium add-ons. The Canon imagePRESS V series does this through a number of automated technologies. Consistency is provided by their Multi-DAT technology with built-in densitometers, while the imagePRESS V1350 press performs this measurement between every image. Color accuracy is achieved with the help of ILS (Inline Spectrophotometer) technology, which consists of up to

four spectrophotometers, and can quickly perform an engine linearization (calibration) without the need for an external spectrophotometer. It can also perform media calibration, create custom media profiles, calibrate to the G7 standard, and even run a verification check to many color standards.

HP Indigo has moved to the next level of integrated artificial intelligence across its products and workflows, enabling autonomous decision-making capabilities within the press. These include; Auto Recovery, which resolves press issues without human intervention, PQ Maestro offering AI powered diagnostics and corrective recommendations. Additionally, they offer, Print Mode



(Left) Heidelberg Boardmaster's Intellimatch flexo plate scanner
(Below) HP Nio



Preflight, a machine learning tool that analyzes jobs and recommends optimal print modes (Standard, ECO, or EPM), and AAA 2.0, an AI system that detects defects and automates reprints, eliminating manual inspection.

FRONT OFFICE AUTOMATION

MIS/ERP and workflow orchestration is another area that is showing active development. Modern MIS and ERP platforms increasingly connect estimating, order entry, scheduling, inventory, production status, and reporting, but integration quality varies widely by plant and vendor stack.

HP has been developing intelligent workflow solutions, and collecting customer performance data, since PrintOS was released in 2016 as a workflow infrastructure platform. Currently, thousands of companies and devices are connected to its cloud-based platform. HP Nio is an AI-powered conversational assistant integrated directly into HP PrintOS, that can access that information. It acts as a digital companion that allows operators to ask questions about performance and receive instant, data-driven answers, moving beyond manual reporting and designed to optimize production, reduce downtime, and provide real-time, actionable insights.

Packaging automation is moving from machine-level efficiency to connected production ecosystems. BOBST, for example, frames its current packaging vision around connectivity, digitalization, automation, and sustainability, with cloud workflow, equipment monitoring, performance data, substrate libraries, centralized color management, inline adjustment, and quality inspection tied into packaging lines.

WHAT ABOUT AI?

As we move from Industry 4.0, where cloud communications and data sourcing are fairly commonplace, to Industry 5.0, where we use that platform to build distributed value chains, remote production, and cyber physical systems, there has naturally been a lot of discussion around artificial intelligence (AI). Surely there are areas where AI can offer some benefits to the print supply chain today and even more so tomorrow. However, there are so many different types of print applications and the supply chains for each of those applications can be very different as well. Much of that benefit will be dependent on the growth of machine learned (ML) data and any new demands of the print applications.

The AI that we see in action today is supported by machine learning (ML). With that, the machine or software has the ability to modify its behavior dynamically when exposed to more data. The “learning” part of machine learning describes the AI algorithms which attempt to

optimize behavior along a certain dimension; i.e., they usually try to minimize error or maximize the likelihood of their predictions being true. Increasingly, there are new data science-based cloud platforms and frameworks specifically designed to increase the amount of available data and algorithms “deep learning” using that collected data. By expanding the amount of collected data used to compare against and make predictions, it increases the likelihood of the decisions being true.

However, if we look at print and packaging application production, it introduces some challenges to this model. Print applications and production really fit into two overriding categories: *printing services* and *printed products*. Printing services rely on ad hoc design and variable production techniques, contrasted against online services’ constrained design and predefined printed products. In each case, there is an effect on margin, with printing services usually demanding a higher margin. However, with these differences there is also an effect on the value and amount of ML data that can be captured to provide the benefits of AI algorithms for production.

Today’s AI value is in scheduling, preflight, color correction, predictive maintenance, inline inspection, ink optimization, and production data analysis rather than fully autonomous decision-making. Plants with clean data, standardized processes, open APIs, and disciplined color/workflow practices will pull ahead, while fragmented shops will struggle to realize ROI from new software or equipment.

ULTIMATELY IT’S ABOUT THE SUPPLY CHAIN

Supply chain automation uses automation technology, like AI, machine learning, and digital process automation to perform and monitor supply chain tasks with limited human intervention. The use of this technology can streamline the management of printed goods and services and help scale the organization.

As print and packaging service providers we tend to look at what we do somewhat myopically. It is totally understandable, since delivering on shifting markets and changing expectations while still getting product out the back door on time is a huge focus, and challenge unto itself, although the reality is that print and packaging manufacturing is just a part of a much bigger and wider supply chain.

That may seem more obvious in packaging, since you can probably envision product design and manufacturing through converting, delivering and ultimately the purchase by the consumer. However, even in business communication, display, etc., there is at least a value chain and in many cases a supply chain as well.

Connecting and/or sharing this data is what will bring siloed companies and process automation to the entire supply chain. Packaging is already becoming more data-rich, with Serialized QR, GS1 Digital Link, RFID, and NFC. Authentication and supply-chain visibility will continue to increase the need for variable-data printing, code verification, and inspection at production speed.

Amazon is focusing on using serialized QR codes for logistics, brand protection, and anti-counterfeiting (Transparency program), while Google provides infrastructure for generating and scanning QR codes (via Android/Google Play) and uses them to connect physical products to online information.

DRIVING THE CHANGE

Digital print is moving from specialty, high-graphic, short-run applications into broader production environments, especially labels and corrugated, where brands want faster versioning, faster campaigns, and lower inventory risk.

Workflow integration has become *the* buying criterion. Printers and converters will increasingly judge equipment by whether it connects cleanly to prepress, MIS, color, inspection, finishing, and scheduling systems, not just by speed or print quality. OEMs are increasingly selling presses, workflow software, cloud analytics, color systems, consumables, service contracts, and optimization tools as integrated platforms, not as standalone machines.

Fully lights-out plants will most likely remain exceptional, primarily dedicated to highly constrained design production. Inspection, finishing, and fulfillment should become much more common as hardware, DFEs, MIS, and inspection systems converge. Shop floor automation like those being developed by BOBST, Durst, Heidelberg, HP, and others are already being pieced together with data sharing, AI, and robotics. Analog will remain but its role will continue to evolve. Flexo, offset, and gravure will still dominate long-run economics, but digital will increasingly absorb versioned, regionalized, seasonal, serialized, test-market, and short-life-cycle packaging work.

STANDARDIZING DATA IS CRITICAL

Standardizing classification of print and packaging applications and processes is essential for ML and process data collection and the use of AI to support future growth and intelligent supply chains. Working with various industry stakeholders, educators, including the work of PRINTING United Alliance, GWG, CIP4, UCP, and others, we have already begun to develop workflow data standardization.

Ultimately, as an industry, we need to pull all of these standards together and do a “read, compare, and consolidate” so we have data discipline that can translate into multi-function and multi-user ML history that can be assimilated and then applied against various LLMs.

CHALLENGES

Many plants still run disconnected islands that include web-to-print, MIS, prepress, RIP/DFE, press console, inspection, finishing, shipping, and accounting that often do not share clean, reliable data. Successful automation requires sales, customer service, prepress, production, and management to redesign the workflow together, not just buy another software module. Automation depends on accurate job tickets, substrate libraries, color targets, equipment capabilities, naming conventions, and standardized processes.

Labor needs to change from a craft operation to exception management—and this is not a technology problem but a management problem. Skilled operators still matter, but their work will shift toward process control, troubleshooting, data interpretation, color governance, maintenance planning, and workflow supervision.

MOVING TOWARD THE END GAME

The medium-term opportunity is enhancing productivity, using automation tools to provide fewer touches, faster makeready, better scheduling, less waste, and more reliable color. The long-term opportunity is really about a business-model change, where print and packaging plants become connected manufacturing platforms that can handle shorter runs, more SKUs, more personalization, more compliance, and more real-time brand demand.

The industry is in the “connected automation” phase, not yet the “autonomous factory” phase. Best-in-class operations are building closed-loop workflows from quote to ship, while average operations are automating high-friction islands such as preflight, proofing, color, estimating, scheduling, inspection, and reporting.

The winners will not simply be “digital printers.” For printers and converters, the winners will be the companies that treat automation as a workflow architecture problem. The press matters, but the bigger advantage comes from clean data, standardized processes, APIs, color discipline, substrate libraries, and operators trained to manage exceptions rather than touch every job. They will be integrated manufacturers with clean data, disciplined color, automated prepress, connected MIS/ERP, inspection at speed, substrate libraries, and operators trained to manage exceptions.

There is no need to wait to automate.

PRODUCTION AUTOMATION: A DEEPER DIVE

BY DAVID ZWANG

DATA, DATA, DATA

Data integration with external business, information, production, and supply systems is rapidly becoming the more crucial currency of connection for a print providers relationships. This integration is often enabled by different types of connectors (APIs) that can be used to integrate one system with another, allowing them to pass relevant data, both job and production information between each other. End-to-end data process management is the key element of a production automation. It provides visibility and control of the production process from start to finish, including expectations, status, load balancing, and response tracking. Monitoring incoming jobs and automatically matching them with available production capacity is what drives automated production and can provide greater visibility as well as transparency to customers and suppliers.

JOB ONBOARDING IS REACHING A NEW INFLECTION POINT

Getting jobs into the plant is the key area in any production facility, and sets the groundwork for production. However, the advent of online print, e-commerce, and, more recently, agentic purchasing have begun to rewrite how we get and do business—and control plant process automation. Historically, the CSR played an important role in client relations, as the point person between the customer and the plant. However, manual order entry, or onboarding, is being replaced by a number of different forms, driven by buyers who are shifting how they buy, not just what they print. More demand is coming through online portals, brand-specific ordering sites, and embedded commerce, compressing cycle times and raising expectations for real-time status and analytics.

The online print market (web-to-print, print e-commerce, POD, etc.) is one of the faster-growing segments of the generally

The advent of online print, e-commerce, and, more recently, agentic purchasing have begun to rewrite how we get and do business—and control plant process automation.



slow-growing print industry, driven by e-commerce, personalization, and automation rather than overall page growth. Online-driven models (web-to-print storefronts, POD platforms, B2B print e-commerce portals) are growing faster than the aggregate market, typically mid single- to high single-digit CAGR, and much higher (20%+) in pure consumer POD niches. While overall global printing is growing modestly with the overall print market at about US\$343–356 billion around 2025–2026, with ~3–4% CAGR to ~US\$420 billion by 2030, largely on the back of packaging, labels, and e-commerce.

That having been said, the vast majority of print and packaging providers support a blended mix of jobs and onboarding needs. Beyond e-commerce procurement, for some, B2B custom storefront creation helps facilitate plant-level production automation. The best solution for production automation is almost always onboarding with a constrained design online solution. However, you can't always use that to control the onboarding of all of your work. For the jobs that don't come in online, other production data *could* be captured through purchase orders. This EDI (Electronic Data Interchange) process is ideal for large customers, and offers benefits to both the customer and the production plant.

However, if we look at print and packaging application production, it introduces some challenges to this model. Print applications and production really fit into two overriding categories: printing services and printed products. Printing services relies on ad hoc design and variable production techniques, contrasted against constrained design and predefined printed products. In each case, there is an effect on margin, with printing services usually demanding a higher margin. Additionally, with these differences there is also an effect on the opportunities of automation.

PLANT-LEVEL AUTOMATION

Automation and workflow integration demand is rising for automated print workflow integration, template-based print, and cloud print management, particularly for short-run/on-demand work. As consumers continue the move to touchless procurement, the need for deep e-commerce integration, where it increasingly plugs into generic commerce platforms and marketplaces, extending printers' reach beyond proprietary portals is crucial, as are MIS/W2P/ERP integration that can ingest many small orders with minimal touch, and API-driven connectivity so that orders originate anywhere (marketplaces, brand portals, partner sites) and are routed to optimal production nodes.

The key to optimal automation opportunities is collecting all of the job ticket data from the MIS system and then designing your flows for onboarding normalization and production.

In my experience, regardless of the print application type, rules-based automation platforms are one of the more important tools to help support this need. The key to optimal automation opportunities is collecting all of the job ticket data from the MIS system and then designing your flows for onboarding normalization and production.

The reality is that even with automation, there will be some need for exception handling. This can be easily accomplished with checkpoints and appropriate notifications. For example, if a job is missing pieces or the job doesn't align with the job ticket, it should go back to a CSR (or the customer, if desired). If it fails in process, it should go to prepress for manual intervention, etc.

PROCESS CONTROL

When looking at production, even before you can look at plant-level automation, you need to establish and maintain standardized processes and aim points. Ultimately, everything else gets built on top of that. In many printing plants, prepress operators are the guardians of the process aim points. They open every job to look at it to check for missing links and against the JT. From there, it gets a preflight and processes through an imposition system. Additionally, proofs, soft and hard, are created for most jobs and manually sent to customers. With a plant-level process automation system, when fully operational, you would only need prepress operators to handle exceptions. From what I have seen, many of these failures can be addressed through an automated workflow that includes preflight software and profiles and actions. On an ongoing basis, the best way to identify what needs to be fixed in the profiles is to look at the checkpoints for common failures. In many cases, these can be addressed in the preflight software.

Facilitating automation using PDF/X-4 files is one of the more important factors, since it was designed to ensure reliable exchange and production. Different printed products have different requirements, and these

can be met with preflight settings developed by the Ghent Workgroup (gwg.org). This step can be migrated to an automated process using Pitstop Server or callas pdfToolbox in Switch with proper preflight profiles and actions as needed. These are more finely tailored to specific print and device requirements.

AUTOMATED IMPOSITION

Many imposition solutions currently used are based on the creation and maintenance of templates, as well as operator intervention. The smarter approach is using a rules-based imposition solution. This type of solution eliminates the need to create hundreds of templates, and easily conforms to new work types by parsing the incoming files and using predefined rules-based templates based on your devices and work types for both digital and offset jobs. Most of these integrate nicely with workflow automation platforms to create more simplified flows as well.

DIGITAL PRINT

Digital print offers the best platform for automation opportunities. However, you can expect that your digital print equipment will almost always be from disparate vendors. Multiple machines from different manufacturers will increasingly be required to satisfy different production requirements. Normalizing data and automating front-end workflows provide the “late binding” flexibility to move work around as needed as schedules or requirements change. Prepress automation can also provide inline and near line binding automation capabilities in the digital printing and finishing process.

OFFSET PRINT

Depending on your work types, your press equipment could be a blend of offset and digital printing. That being the case, any automated workflow solutions needs to support offset printing as well. You can integrate the automated production system with a CTP DFE to direct the jobs directly through imposition to the platemaker. Capturing the job ticket data while automating the upstream workflow can further provide automation opportunities in print and bindery with the compatible equipment as well.

FINISHING/FULFILLMENT

By consolidating your front-end workflows into a unified system, you will also be laying the groundwork for back-end automation in finishing. Using a software solution that can take any JDF (ICS) imposed job and automatically set up “automation compatible” finishing equipment such as saddle-stitchers, cutters, slitter-

creasers, three-knife cutters, folder-glueers, etc., will allow you to produce variable length products in different quantities, on the fly with no manual makeready.

INTEGRATION IS A CORE REQUIREMENT

As we continue the digital journey toward Industry 5.0 and more automated and integrated procurement and production processes, new skills are demanded across the value and supply chains. Onboarding the production and order data, normalizing them, and capturing and returning the resultant performance is the new prepress. Connecting and “tailoring” all of the necessary individual component solutions is a new and critical requirement for many if not most companies of any size.

While AI is constantly trending in the news, much of that is in the form of textual and image content generation. However, there are some real benefits today for print and packaging production and supply chains. Whether it is in machine or production system learning, scaling process automation, robotic processes, or even supply chain alignment, we are beginning to see more solutions introduced and they are having an impact.

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Most of the AI that we see today is supported by machine learning (ML). In ML, the machine or software has the ability to modify its behavior dynamically when exposed to more data. New data science-based cloud platforms and frameworks specifically designed to increase the amount of available historic data and use algorithms for “deep learning” using that collected data are increasing. By expanding the amount of collected data used to compare against and make predictions, it increases the likelihood of the automated decisions being true.

Today, while not impossible for complete AI production systems in print, today, the areas where we are seeing implementations and real value in AI are in Process Support, Predictive Maintenance, Quality/Color Performance, Internal Production Performance, Comparative Production Performance, and Machine Control. As we have more historic ML data, this will open new opportunities for AI automation.

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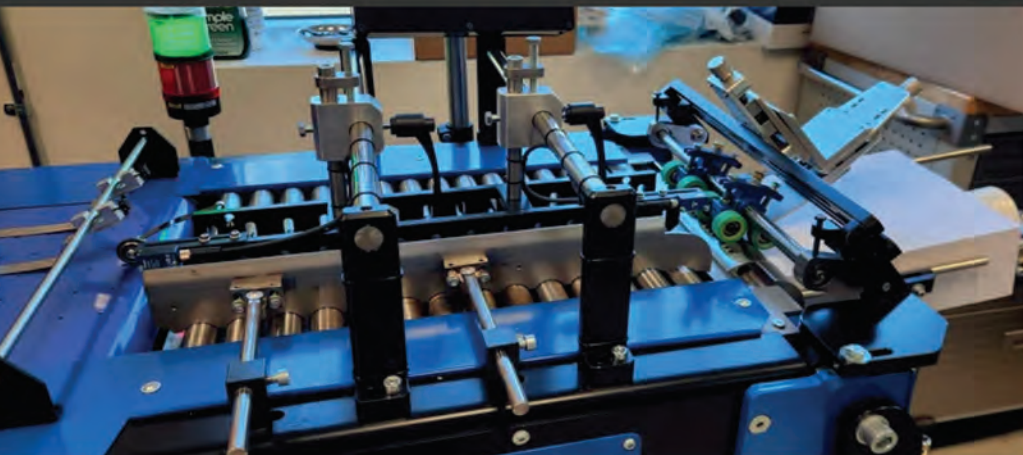


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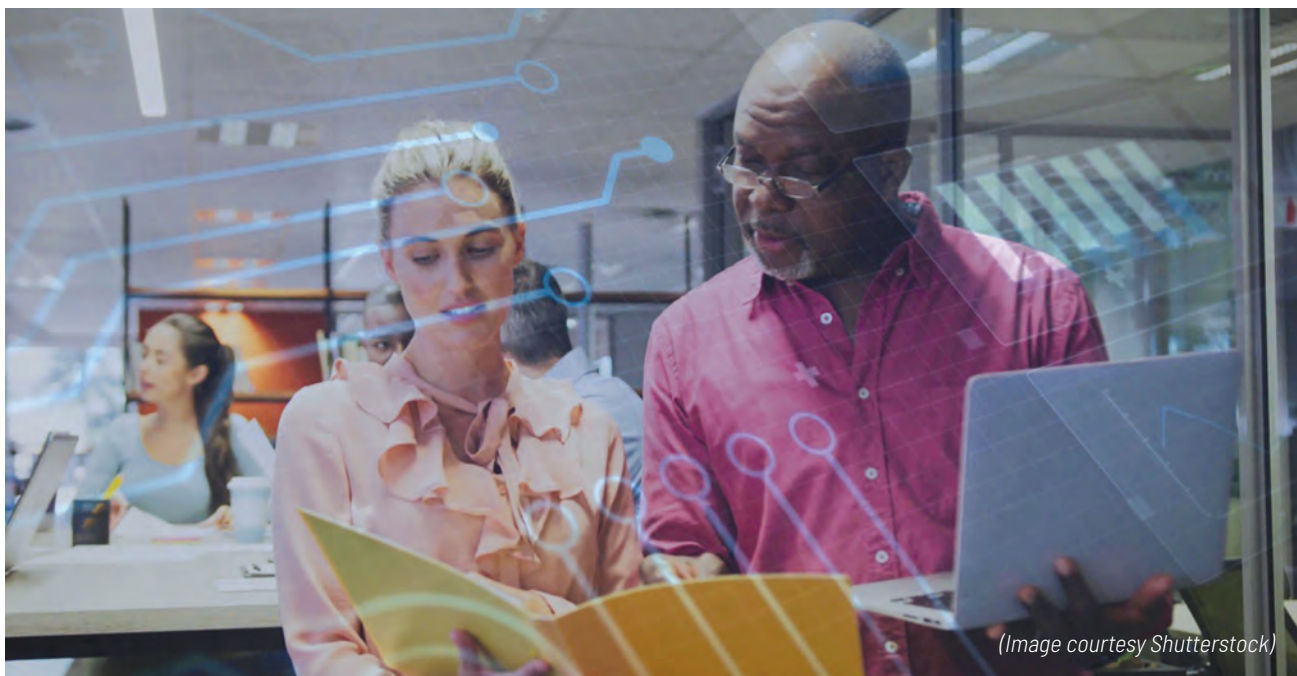
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FROM INBOX TO JOB TICKET: AI, VIBE CODING, AND THE FRONT OFFICE RESET

How Print Shops Should Be Thinking About Front Office Automation
and the Role for AI-Assisted Coding

BY RYAN MCABEE AND PAT MCGREW



Most print operations have spent the last decade automating the production floor. Presses run faster, prepress workflows are more consistent, and color management has moved from guesswork to repeatable science. Yet in the same shops where digital workflows run reliably behind the pressroom door, the front office frequently runs on email threads, manual rekeying, and tribal knowledge. A customer sends a request. Someone interprets it. Someone else builds an estimate. Someone else creates the job ticket. By the time the job reaches prepress, it has passed through three or four human touchpoints, each one a potential source of error, delay, or margin loss.

That model is no longer competitive. Buyer expectations have shifted toward the speed and self-service they experience in every other commercial transaction. Workforce pressures have made CSR-intensive intake processes expensive to sustain. And the

tools needed to automate the front office have matured to the point where they are accessible to shops of nearly any size.

This article is a practical guide to where print shops should focus their front office automation efforts, what the technology options look like, and how an emerging practice called vibe coding fits into the picture, both as a tool with genuine promise and as one that requires clear expectations before you put it to work.

In shops where production workflows run reliably behind the pressroom door, the front office still runs on email threads, manual rekeying, and tribal knowledge.

WHAT FRONT OFFICE AUTOMATION ACTUALLY MEANS

The term gets used loosely, so it is worth being specific. Front office automation covers every process and technology involved in moving a customer's intent into a structured, actionable production job. That includes:

- How a customer submits a request, whether by email, web form, storefront, or phone
- How that request gets interpreted and validated against your product catalog and pricing
- How an estimate is generated and returned to the customer
- How an approved job becomes a ticket in your print MIS
- How artwork and data files are received, preflighted, and queued for production

Each of these handoffs is a point where time is lost, errors are introduced, and labor is consumed. The goal of front office automation is not to replace customer relationships. It is to remove the mechanical, repetitive work that consumes your team's capacity so that human judgment is reserved for the decisions that require it.

Think of it as the front door of your operation. Every job walks in through that door. If the door is slow, manual, and error-prone, everything downstream pays the price.

THE FOUR AREAS THAT DESERVE ATTENTION

1. Structured Intake from Unstructured Requests

The most consequential automation opportunity in the front office is converting unstructured customer requests into structured job data. Most shops receive a meaningful share of their work via email. It may look something like: "We need 2,500 brochures, 8.5 x 11, tri-fold, full color, 100-lb. gloss text, by Thursday." A CSR reads it, interprets it, and manually enters it into the estimating system. That process is slow, scales poorly, and introduces errors at every step.

Large language models (LLMs) have changed what is possible. Several vendors have built tools that sit in front of the inbox or job submission portal, extract job specifications from natural-language text, and push structured data into the MIS or estimating system without manual transcription.

Good2Go's AI Order Pilot takes this approach at the customer-

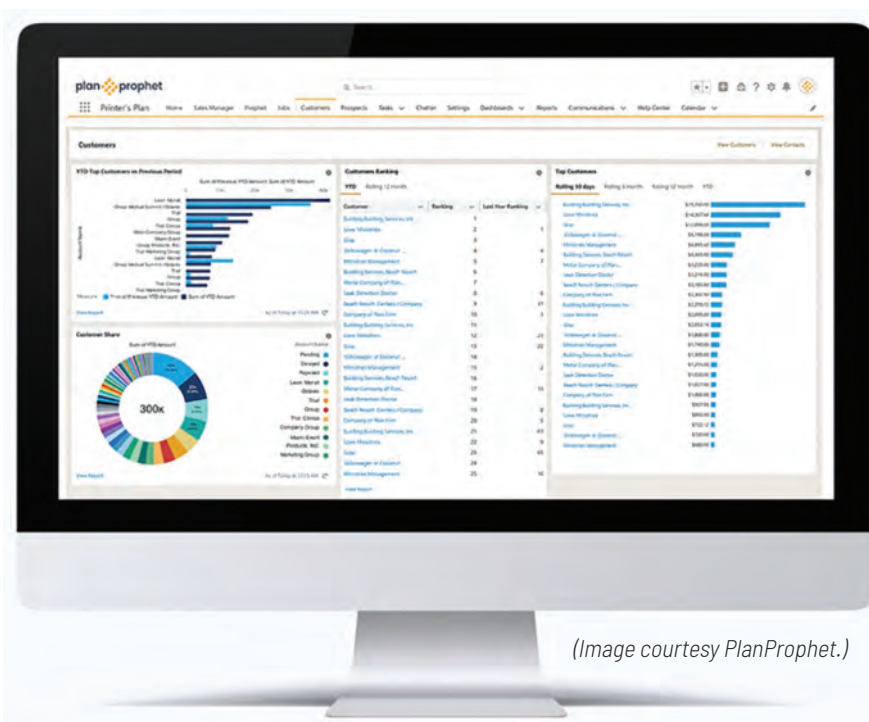
facing layer. When a buyer submits a job through the Good2Go portal, the AI parses the order details, identifies potential issues with specifications or files, and creates a structured job record that can feed downstream into the production workflow. It is designed to reduce the back-and-forth that typically happens between submission and job acceptance.

Fiery Scribe operates at the inbox level, monitoring a job-submission email account, using an LLM to extract quantity, media, and finishing details, and pushing the attached file into Fiery Command WorkStation with job properties pre-populated. It is aimed at shops where a significant share of work still arrives by email rather than through a structured portal.

PlanProphet, built on Salesforce, addresses the customer communication layer around intake. Its AI modules handle quote follow-ups, payment reminders, and customer portal inquiries using context drawn from live job and invoice data, reducing the CSR time spent on routine outbound communication.

The architecture behind these tools follows a consistent pattern: a submission triggers an AI-based extraction of job specifications. A validation layer checks those specs against the shop's catalog and pricing rules. Then the validated data is sent to the MIS via an API, and operator corrections improve accuracy over time. The loop closes without manual transcription.

Any shop still manually transcribing email requests into its MIS should be asking what tool, whether native, bolt-on, or lightly custom, eliminates that step.



(Image courtesy PlanProphet.)

2. Speed-to-Quote

Quote turn time is a competitive variable that is easy to underestimate. Buyers who receive an instant or same-hour quote from one provider rarely wait a day for another. Web-to-print platforms, including OnPrintShop, Infigo, Pressero, and GelatoConnect, offer real-time pricing engines on the customer-facing storefront, with live material rates, margin logic, and bill-of-materials generation. GelatoConnect's AI Estimator targets sub-five-minute custom quotes that can be embedded directly on a shop's website.

Inside MIS platforms, similar tools are available. Graphic Communications iQuote uses natural-language input to return the closest historical estimate with material and method recommendations. printIQ evaluates multiple production paths to return the most cost-effective option while retaining alternates.

The practical observation is that if your average quote turn time is measured in hours or days for repeat product types, the bottleneck is process, not complexity. Template-based estimating, rules-driven pricing, and buyer-facing self-service configurators can compress turnaround for most company's job mix.

3. Automated File Receipt and Preflight

Artwork and data file receipt is another manual process that automation handles well. The basic sequence, where a file arrives, an operator opens it, preflight runs, issues are flagged, and the customer is notified, is entirely automatable for standard jobs. Enfocus Switch has been the workflow orchestration tool of choice in this space for many shops, routing files from hot folders, FTP, email, and web portals through preflight. applying fixes

where rules allow, and routing genuine exceptions to a human operator. Enfocus PitStop handles the preflight logic itself, with recent updates adding an AI-assisted interface to build and troubleshoot preflight profiles.

For packaging and label converters, Esko Automation Engine handles file onboarding at scale. Esko's Comply module extends preflight into content validation, checking that allergen statements match approved library versions, barcodes meet grade standards, and regulatory claims are present and correctly formatted. This direction, where software validates the accuracy of content rather than just the integrity of the PDF file, represents where preflight automation is heading.

The minimum viable version of this for most commercial shops is straightforward: files submitted through a portal or storefront are automatically preflighted on receipt, common fixable issues are corrected without operator intervention, and customers receive automated status notifications. Shops that are still receiving files as email attachments and running preflight manually as a separate step are incurring labor costs they do not need to bear.

4. Job Ticket Creation and MIS Handoff

Once a job is quoted, approved, and preflighted, it needs to be created as a job ticket in the print MIS. This is where a surprising amount of manual work persists in otherwise automated shops. Details from the estimate get partially rekeyed into the job ticket. Specification changes discussed in the email are not reflected in either system. Production planning happens on a whiteboard rather than inside the scheduling module.

The automation target is a clean, API-driven handoff from the storefront or estimating system to the MIS job ticket, with no rekeying. Avanti Slingshot, Graphic Communications Pace, printIQ, and Graphic Communications Tharstern all support JDF/JMF-based connections to downstream production systems. The gap is often not the MIS capability but the connection between

The goal is not to replace customer relationships. It is to remove the routine, repetitive work so that human judgment is reserved for the decisions that actually require it.



(Image courtesy Esko Comply.)

ENTER VIBE CODING: PROMISE, PERIL, AND PRACTICAL LIMITS

Vibe coding is a term that emerged from the software development world to describe a practice that has quickly spread among non-technical users: using AI tools like Claude, ChatGPT, or GitHub Copilot to write functional code via conversational prompts, without requiring formal programming experience. You describe what you want in plain language. The AI generates the code. You test it, refine the prompt, and iterate.

For print shop owners who have never written a line of code, this represents a genuine shift in what is within reach. Tools that previously required a developer's budget and a months-long services engagement can, in some cases, be prototyped in an afternoon. That is not hype. It is a real change.

But the operative phrase is "in some cases." Before committing resources or operational dependencies to vibe-coded solutions, print shop owners need a clear view of both sides of the ledger.

WHAT VIBE CODING CAN REALISTICALLY DELIVER

At its best, vibe coding is a useful tool for prototyping and automation for people who understand their own workflows deeply but lack coding skills. Specific use cases where it delivers well include:

- Simple web forms that collect job specifications from customers and send structured data to an email inbox or spreadsheet.
- Scripts that reformat exported MIS data for import into another system.
- Basic notification triggers, for example, a script that sends a text or email when a job status changes in the MIS.
- Simple connectors that move data between two systems that both have documented APIs but no native integration.
- Internal dashboards that pull job or order data from an existing system and display it on a screen.

These are genuine, valuable automations. For a shop spending an hour a day manually copying data between systems, a well-prompted script can reclaim that time. The cost is low. The iteration cycle is fast, and the barrier to creating something useful is minimal.

WHERE VIBE CODING CREATES RISK

The risks are equally real and cluster in predictable places. Print shop owners considering bespoke vibe-coded solutions should weigh the following:

- **Maintenance dependency:** Code that nobody on your team fully understands becomes a liability when it breaks. If the person who built it leaves or an API

changes, you may end up with an opaque system with no clear path to repair.

- **Security and data exposure:** Customer data, pricing logic, and production specifications are sensitive. AI-generated code does not include security controls by default unless explicitly prompted. Any tool handling this data needs appropriate access controls and encrypted connections.
- **Integration fragility:** APIs change over time. A connection built against today's API version may break silently when a vendor releases an update. Commercial integrations are maintained by vendor teams. Vibe-coded integrations are typically maintained by nobody.
- **Scope creep:** It is easy to start with a simple automation and find yourself weeks later maintaining a growing custom system that competes in scope with commercial software available at a reasonable monthly cost. The time a shop owner or manager spends debugging custom code is rarely accounted for in the business case. There are decades of examples in the industry of in-house, custom solutions that were found less desirable as time marched on.
- **Compliance risk:** In any environment with regulatory requirements, custom-coded tools that touch production data carry compliance risk unless they are built, tested, and documented to appropriate standards.



(Credit: Adobe Stock)

Use this to frame any decisions; vibe coding is a legitimate tool for automating simple, low-risk, internal processes where the downside of failure is a temporary inconvenience rather than data loss, regulatory exposure, or customer impact. It is not a replacement for purpose-built commercial software where reliability, vendor support, and long-term maintainability are requirements.

The most practical use of vibe coding in a print operation is not building a parallel system. It is filling the specific integration gaps that commercial software has not addressed and that previously required expensive professional services to bridge.

the front-end intake tool and the MIS backend. Closing that gap is where the next section becomes relevant.

THE BETTER APPLICATION: USING VIBE CODING FOR INTEGRATION, NOT REPLACEMENT

Most print shops are not missing a front office automation system. They are missing the connections between the systems they already have. The web-to-print storefront does not talk to the MIS. The MIS does not push job status to the production floor display. The estimating system does not automatically create a job ticket when a customer approves a quote. These are integration gaps, and historically, they required either native vendor support or paid professional services to close.

Vibe coding used for API integration work changes that calculus. Modern print software platforms publish APIs so that connections can be built without touching the core application. Avanti Slingshot, Graphic Communications PrintSmith Vision, Pace and Tharstern, printIQ, , Enfocus Switch, Infigo, and OnPrintShop all have documented APIs. The pieces are there. The missing piece has historically been the development work to connect them.

A PRACTICAL EXAMPLE: EMAIL ORDER TO ESTIMATE IN THE MIS

Consider a scenario most shops will recognize. A customer emails in a job request. A CSR reads it, opens the MIS, types in the job specs, runs the estimate, copies the total into an email reply, and sends it. When the customer says yes, the CSR returns to the MIS and manually creates a job ticket from the estimate. This happens dozens of times a week.

A vibe-coded script could simplify part of this. Using plain-language prompts to an AI tool, a non-programmer could build a form on the shop's website where customers fill in their job details: product type, quantity, size, stock, finishing, and due date. When submitted, the form sends a structured email or spreadsheet row to the CSR instead of a free-text paragraph. The CSR still reviews it and enters it into the MIS, but the interpretation step is removed. Spec data is already clean and consistently formatted.

For shops whose MIS has a documented API, the next step is to prompt the AI to write a script that takes the structured form data and automatically creates a draft estimate in the MIS, ready for the CSR to review and send. This does not require deep technical knowledge to prompt and test. It does require that the MIS API documentation is available and that someone on the team is willing to iterate on the prompts and test the output carefully before using it on live customer data.

That is a practical scope for vibe coding. It removes manual typing. It does not rebuild the estimating system.

A PRACTICAL EXAMPLE: JOB STATUS TO THE PRODUCTION FLOOR

A second common gap is visibility between the MIS and the production team. In many shops, a job ticket is created in the MIS and then communicated to production via a printed docket or a verbal handoff. When due dates shift or specifications change, the update often gets made in one place but not the other.

A vibe-coded solution here might be a simple script that checks the MIS for new or updated job tickets every few minutes and sends a summary to a shared group text, a Slack channel, or a basic screen on the shop floor. The message might say: "New job added: 5,000 postcards, 6 x 4, 4/4, 100-lb. gloss, due Friday, assigned to press 2."

This is the kind of automation achievable without deep technical skills with today's AI tools. The script does not need to be elegant. It needs to be reliable enough that the team trusts it, and simple enough that someone can figure out what went wrong if it stops working.

Both examples share a key characteristic. They connect existing commercial systems via their published APIs, rather than replacing those systems with custom-built alternatives. The vibe-coded script is a bridge. When something breaks, the problem is isolated to the bridge. Troubleshooting a small connector script is manageable. Troubleshooting a custom-built order management system is not.

HOW TO APPROACH THIS PRACTICALLY

For print shop owners who want to explore this path, a few guidelines can reduce the risk considerably:

- **Start with documented APIs:** Before prompting anything, verify that both systems you want to connect have published, versioned API documentation. Unofficial or undocumented APIs are fragile and not worth building on.
- **Scope tightly:** Define exactly what data needs to move, in what direction, under what conditions, and what should happen when it fails. A well-scoped prompt produces dramatically better code than a vague one.
- **Ask for logging:** When prompting the AI, ask it to include logging in what it generates, so that when the integration fails, you have a record of what happened. This single step makes future troubleshooting manageable.
- **Test before going live:** Most MIS vendors offer test or sandbox environments. Build and test the integration there before connecting it to live customer data and active jobs.
- **Document what you built:** Use the same AI tool to write a plain-language explanation of how the integration works, what it connects, and how to

restart it if it stops. Future you, or whoever inherits the system, will need this.

- **Know when to hire:** If the integration involves regulated data, customer payment information, or any process where failure has a significant business consequence, a professional services engagement is likely the right call. Vibe coding works best where the downside of failure is a temporary disruption, not a compliance issue or a data problem.

NATIVE VS. BOLT-ON: FRAMING THE BUILD-OR-BUY DECISION

The vibe coding conversation sits inside a larger build-or-buy decision that every print shop owner navigates. The market offers a wide range of purpose-built front-office automation options, and the gap between what commercial software offers and what a shop actually needs has narrowed considerably.

Platform vendors are investing in native AI capabilities. Fiery Scribe handles email-to-job-ticket parsing within the Fiery ecosystem. PlanProphet wraps Salesforce with print-specific AI for CRM, quoting, and customer communication. Heidelberg's Prinect is building toward cloud-native autonomous scheduling and production routing. HP's PrintOS applies AI to production monitoring and quality alerting. Esko Comply uses AI to validate packaging artwork for regulatory compliance.

Independent tools are often faster to deploy and more aggressively featured than native platform AI, partly because they are not constrained by installed-base compatibility. GelatoConnect's AI Estimator, OnPrintShop's storefront AI, and Good2Go's AI Order Pilot all represent this category, shipping capabilities that native MIS vendors have not yet matched in their core products.

A practical framework for the decision is: if a commercial tool exists that reliably solves the problem, has vendor support behind it, and integrates with your

stack, buy it. If the gap is a specific connection between two commercial tools that both have APIs but no native integration, that is a reasonable candidate for a carefully scoped vibe-coded bridge. If the need is so custom or complex that it exceeds what either option provides, consider whether the automation is truly necessary at that level of complexity, or whether a professional services engagement with appropriate scope and guardrails is the right investment.

WHERE TO START

For operations that have not yet meaningfully automated the front office, the sequence matters as much as the tools.

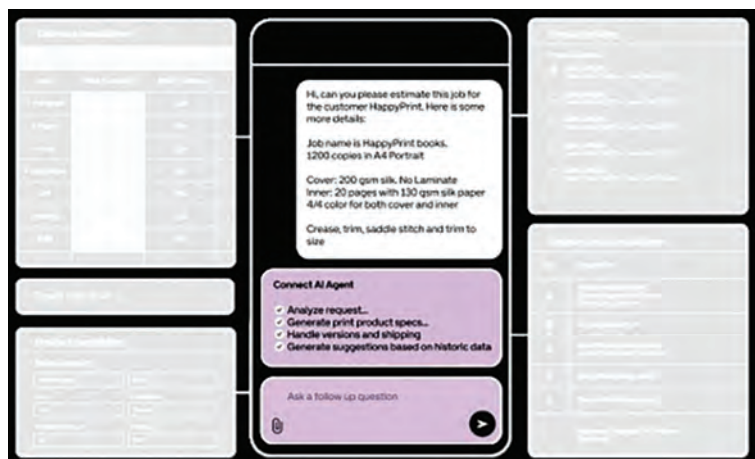
Audit the handoffs first. Map every point where information moves from one person, system, or medium to another between customer inquiry and the job reaching prepress. Each manual transfer is a candidate for automation. Prioritize by frequency and error rate, not by technical complexity.

Fix the intake before estimating. The biggest labor sink in most front offices is not building estimates. It is the back-and-forth of clarifying incomplete or ambiguous customer requests. A structured intake process, whether through a web-to-print solution, a standardized order form, or an AI-assisted email parser, compresses the most expensive part of the workflow first.

Connect the systems you already have before buying new ones. Most shops are under-leveraging the APIs and integration capabilities of the software they already license. Before evaluating a new tool, ask your current vendors what integrations they support and whether the connection you need is already documented and available.

Measure what you automate. Front office automation only compounds value if you track what it is saving. Measure quote turn time, intake-to-job-ticket time, preflight exception rates, and CSR hours per job before and after any automation initiative. The data also builds the case for the next investment.

The print operations that will be most competitive in the next few years are not necessarily those with the largest software budgets. They are the ones that have systematically closed the gap between a customer's request and a press-ready job ticket, with as few manual steps, reentries, and interpretations as possible. The tools exist. The integrations are increasingly achievable without large services budgets. The question is whether the front door of your operation is as capable as the equipment behind it.



Gelato AI Estimator

THE BUILD, BUY, OR PARTNER CONUNDRUM

What is the best approach to technology renewal?

BY CARY SHERBURNE

I'm old enough to remember when most companies in our industry built everything themselves, considering that a competitive advantage in the marketplace. But these days, both producers and suppliers to the industry are increasingly looking for ways to balance cost, competitiveness, and innovation through partnering or acquisitions as a means of keeping up with rapidly advancing technological innovations—a requirement for continuing to meet evolving customer needs. What is not addressed in this article is the long-term effect of AI on these strategies ... a path too new about which to make broad assumptions, but which ultimately is likely to have an impact on these types of business decisions in the not-too-distant future.

There is no question that technology innovation is moving faster than ever. For companies, both producers and suppliers to the industry, the challenge lies in both staying up to date on the latest technologies, and then determining how or whether to incorporate them into an ever-evolving business model.

Back in the day, as JDF was coming into play and printing companies were looking to start automating some of their work, home-grown systems were often de rigueur. These often consisted of complex Excel spreadsheets, or in some cases, applications crafted by consultants or internal IT staff—the latter being not as common back then.

During the heyday of the dot-com boom, a growing number of packaged solutions to help manage both production and business operations began to come into the market, gaining popularity in some segments of the market. One of the biggest issues with home-grown systems—although they could be crafted to

pretty nearly meet all the organizations requirements—was the maintenance factor. How do you make sure the code stays up to date and is well documented? What happens when the owner's brother has bigger fish to fry and doesn't want to support the application anymore? These and other struggles have moved more companies to packaged solutions, that can be at least somewhat customized to their needs, and for which someone else takes responsibility for maintaining the solution and providing support when something goes awry.

TRANSFORMATION

Today, the situation is perhaps even more complex. It's not just solutions for running internal operations that are key—and there are plenty of those on the market. It's also truly understanding what customers want or need—and often they don't know exactly what they need—and building products and services around those

AlphaGraphics Kansas City



what the possibilities are. It's the producer's job to listen, learn, and find ways to meet as many of those needs as possible, even the ones the customer didn't realize they had!

I recently spoke with Haley Haar, President and Owner of AlphaGraphics in Kansas City. A couple of comments she made are worth restating here. As a backdrop, Haley and her husband, Matthew, purchased the

AlphaGraphics Kansas City store in 2009. The company's most recent annual revenues were \$450,000. Today, her annual revenues are close to \$2 million. So what she is doing is obviously working!

Very early on, I determined that I

needs. It's still about the analog-to-digital transformation. It's also what to do about artificial intelligence (AI), or whether to do anything at all. And it's about new skill sets that are required to meet these emerging requirements.



FOR PRODUCERS...

Producers—or firms manufacturing printing, packaging, display graphics, promotional items, textile-based products, etc.—the first step is spending time with customers, listening to their needs, what they like and don't like about working with a producer, what they are buying today, and what they might be interested in buying in the future. Back when I worked for Xerox, we called this a Customer Needs Analysis, and we had a formal process to use. This sounds like Sales 101, but sometimes this step is skipped, with the sales person promoting only the items in their bag, leaving the customer to figure out the rest on their own. And sometimes, customers don't really know

liked being in a niche where we would say yes to just about anything, the craziest ideas, the things that a lot of other printers turn away. I'd say yes, let's figure out how to do it. What I've always said is our business is about solving problems for our customers, and that looks different for everyone because every customer has a different problem. We just happen to be flexible enough to meet those needs where they are.



Saying “yes” often meant outsourcing, either because she didn’t have the capabilities internally, or because she didn’t want to develop them. An example of the latter is direct-to-film, which she prefers to outsource to a trusted partner. And that’s the key to successful outsourcing that ensures you can still meet customer timelines and quality requirements. Of course, sometimes she outsources to another AlphaGraphics center. But often she uses local providers, and is careful to be considerate of their needs as well—don’t push something as a rush job if it really don’t need the rush, for example. Then when a rush job comes along, the outsourcing partner is more likely to put other things aside to help meet the timeline. Over time, as she has built her technology infrastructure, she is outsourcing less; but she still relies on those partners to be able to confidently say “yes.”

And what about the future? She says:

I’m continuing to focus on growth, and we’re learning to do a lot more project management, particularly in the signage arena. I also focus on the global scope of what customers need. How do we get it to them? What is their ordering process. We have a lot of clients for whom we manage their indoor and outdoor imagery, often across several locations. Those are not the sell-it-and-deliver-it kinds of projects. I’m going to sell it, deliver and/or install it, and then come back and uninstall it. And I’m going to keep everything looking good. And then we might go back and install the next one, maybe a Christmas display. It’s not one and done. These are long-term commitment types of projects.

Another advantage for producers is to be able to call on peers to help them sort through the technology offerings, what works, what doesn’t, what’s worth the investment,

what’s not. In Haley’s case, that is built in to being part of a franchise network. But she also belongs to a local peer group—which she highly recommends as valuable both in gaining insight and information, and in finding reliable local partners.

Sage advice for any producer.

FOR SUPPLIERS TO THE INDUSTRY

This one is a little trickier. Some manufacturers choose to invest in building, rather than buying or partnering. A recent example is Durst’s announcement of a \$2 billion investment in a brand-new facility focused on digital textile printing. Durst Como, according to the company’s press release, is a state-of-the-art production and innovation hub dedicated to digital textile printing. “Durst Como will be our innovation center for the textile future—a hub that unites technology, software, and passion,” said Christoph Gamper, CEO and co-owner of the Durst Group. The facility is designed to champion innovation that not only accelerates operational efficiency but also firmly embeds sustainability and ethical practices at the core of textile manufacturing. While the company historically uses Ricoh and Kyocera printheads, it is likely, but not certain, that the company will continue to outsource these and other components.

Durst has also expanded its portfolio through acquisitions, including Spanish cutting systems company Hasler, Vanguard Digital Printing Systems, callas software, and Aleph SrL, an Italian company providing water-based inkjet solutions for direct-to-fabric and paper printing. The acquisition of Aleph was a key element of the Durst Como launch.

Kornit Digital is another example of a company acquiring to expand its capabilities. Most recently, Kornit acquired PrintFactory. Its cloud-native workflow enables Kornit to offer a unified software ecosystem that controls color quality and job routing, even for plants that do not own Kornit printers—a source of revenue, but possibly a door-opener for later placing Kornit gear. Although it appeared that Kornit had been taking a build-your-own software strategy, this acquisition, and the 2020 acquisition of Custom Gateway, a cloud-based web-to-print workflow software platform, indicate a rethinking of that approach.

Canon manufactures its own printheads in-house, and in fact,



Rendering of the Durst Como technology and industrial hub dedicated to textile printing. (Image courtesy Durst)



it appears that almost all components are internally developed, making Canon unusual in controlling the entire R&D and manufacturing cycles. Notably, Canon files a large number of patent applications each year, with an estimated 2,623 U.S. patent applications filed in 2025 alone for its printing businesses (comprising 45 to 55% of all of its patents filed). Canon does, however, source select entry-level models from third-party manufacturers in Asia to control production costs.

Companies like Heidelberg, Ricoh, EFI and others are expanding their portfolios through partnerships or distribution agreements, which is another way to add technology that customers are looking for, and/or increase their sales footprint without the need to bear all the costs themselves.

Ricoh is an example of a company that has a more aggressive partnering stance. The company filed an estimated 1,200 to 1,600 applications in 2025 dedicated to printing equipment, and also set a strict target (<https://www.ricoh.com/technology/rd/ip>): more than 60% of all new patent applications must be for digital services and process automation, with traditional hardware like printing equipment now accounting for less than 40% of Ricoh's new patent filings.

The company also provides printheads to the likes of Mimaki, Fujifilm, Agfa, EFI, and others. And its partnerships are even more entwined, with, for example, Ricoh maintaining a master reseller agreement with EFI for its Pro Series hybrid flatbed printers and higher-end VUTEk printers. These types of robust, bilateral partnerships provide significant benefits to both parties. Ricoh also partners with Flora Digital in EMEA to fill gaps in its catalog with co-developed, small footprint, hybrid printers. Ricoh also has partnerships with Brother, Plockmatic, Duplo, Horizon, and others, enabling the company to deliver integrated total solutions that can be customized to specific customer configurations, to some extent.

Epson is also a trusted partner for a number of printer manufacturers, providing customized printheads to the likes of Roland DG, Mimaki, and Mutoh. As a result of EFI's spin-out of its Fiery business and its subsequent

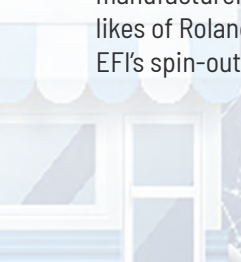
acquisition by Epson, one might expect to see future synergies there as well.

It is also of note that historically, Heidelberg offered somewhat of a closed system, with both internally developed equipment and software, as well as leveraging acquisitions to expand its portfolio. However, the company entered into a partnership with Ricoh for Heidelberg to sell Ricoh products in 2011, initially under the Linoprint brand, and then later (2016) under the Versafire brand after having worked with companies like Presstek and Kodak in the past to co-develop digitally-enabled solutions. These launches coincided with drupa 2012 and 2016, respectively. This partnership, now 15 years old, enabled Heidelberg to offer both analog and digital solutions without the need to fully develop (or co-develop) the digital solutions internally; although, of course, Heidelberg does add its own secret sauce in terms of integration with the overall platform, including proprietary workflow and other software.



SO WHAT'S THE ANSWER?

For most companies, whether they are producers or suppliers, finding trusted partners who have expertise lacking in their own organizations can be a winning approach. Acquisitions to bring needed technologies in house is another option many companies in the printing and packaging industries are taking advantage of. Increasingly, though, the go-it-alone strategy of building everything in-house is less common as many companies put aside a competitive mindset in lieu of what one might call coopetition...they still compete, but they also collaborate on some level.



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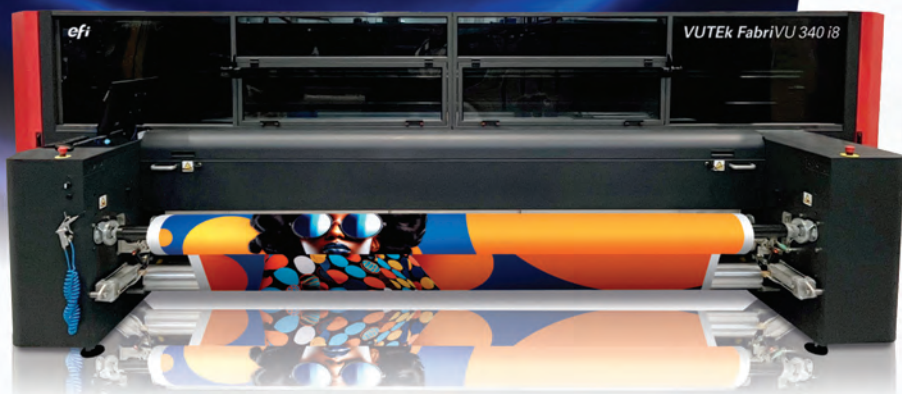
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- Application versatility—Direct printing on polyester-based materials up to 3.4m wide
- Smoother gradients, richer tones, finer detail with the addition of light inks, four-level grayscale, variable 4 pL to 18 pL drop sizes, and resolutions up to 2400 dpi
- Inline fixation—Print and sublimate in a single step with EFI's integrated platen and extraction technology
- Lower ink consumption and waste—Improve job economics with EFI water-based, dispersed-dye inks, featuring higher dye concentration and less water for easier drying, plus up to 30% lower ink consumption
- Fiery driven



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PRINTING OUTLOOK 2026-27

The **Printing Outlook 2026-27** report provides detailed analysis of the latest WhatTheyThink Printing Industry Survey, the latest industry economic data and macroeconomic trends, as well as industry and cultural technological trends to look out for in the latter half of 2026 and beyond.



23% of print businesses surveyed said that revenues for 2025 had increased more than 10% compared to 2024.



Profitability lagged behind revenues.



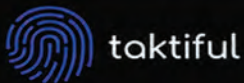
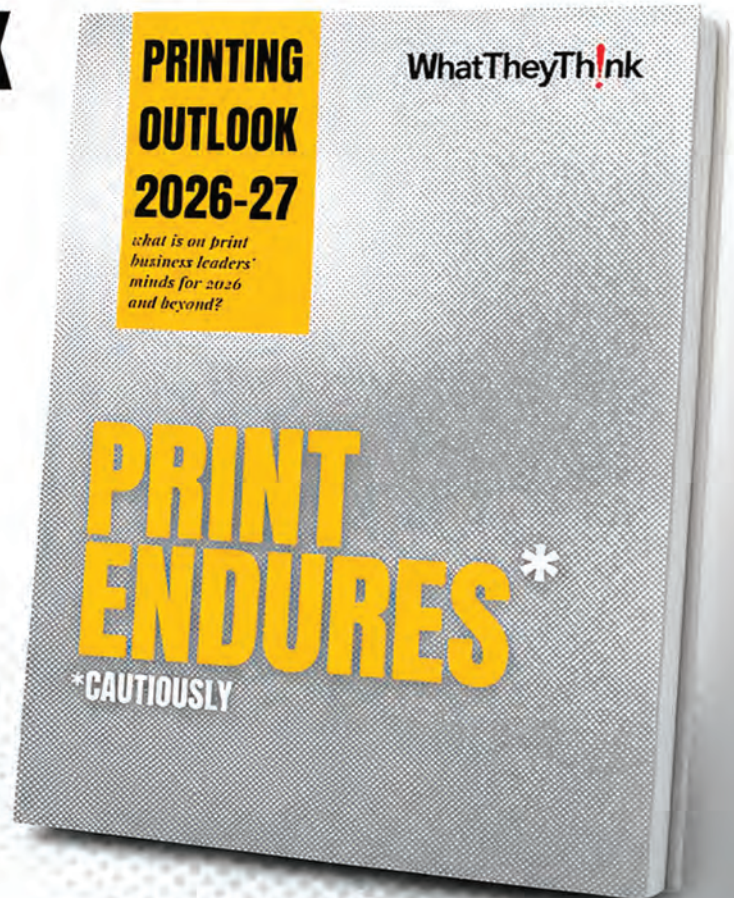
"Pricing pressures and price erosion" was our survey respondents' number one challenge, with "national economic conditions" a close second.



Geopolitical issues were of greater concern in this survey than in the history of our Outlook reports.



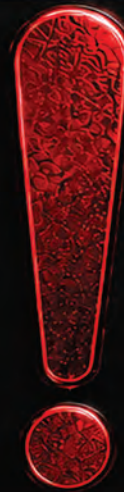
"Diversifying print product/application offerings" and "customers outsourcing more work to us" were respondents' top business opportunities for 2026.



What
They
Think

2026 DIGITAL EMBELLISHMENT STUDY

The new 2026 Digital Embellishment Study provides detailed analysis of how current users of embellishment technologies are utilizing them, what the response from customers has been, how satisfied print providers have been with the sales and profitability of these jobs, where the challenges lie, and their general feelings about the future of digital embellishments.



41% of respondents cited profit generation as their primary reason for investing in digital embellishment capabilities, down from **54%** last year, while "application-specific demand" was selected by **22%** of respondents, up from **15%** last year.



In 2026, **75%** of respondents are satisfied (**34%** very satisfied) with the profits they make off digital embellishment jobs, while **66%** are satisfied (**13%** very satisfied) with the sales of these jobs. These satisfaction figures are improved from 2025.



66% of respondents said they have seen more demand for digital embellishments in the past year—up from the **29%** who said this in 2025.



89% of respondents use embellishments at least "sometimes," **28%** "usually" and **18%** "always."



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EPR TIDE RECEDES, BUT OTHER WAVES OF REGULATION ARE LIKELY TO FOLLOW

BY PATRICK HENRY

Progress in expanded producer responsibility (EPR) legislation for packaging appears to have stalled, but that doesn't mean anyone should let the subject fall off the radar. The concept remains alive, well, and attractive to eco-ambitious lawmakers.

Legislation aimed at creating extended producer responsibility (EPR) programs for packaging hit something of a speed bump in 2026. This year, lawmakers failed to pass packaging-focused EPR bills in six states—just one shy of the number of states that have EPR laws for packaging on their books.

That ought to come as a relief to printers and converters of labels and packaging, but in many cases it won't. This is not because the news isn't positive. It's because all too often, printers and converters are only vaguely aware of what EPR is and how it could affect their relationships with customers to whom they supply packaging and labels.

Groups on both sides of the EPR debate want to raise the industry's awareness: advocates by passing laws to

(Image courtesy Adobe Stock)



impose EPR requirements that no one subject to them can afford to ignore; opponents by warning printers and converters of what the intended and unintended consequences of the EPR movement can be.

GAINING A Foothold

EPR first emerged as a regulatory strategy in Europe in the 1990s. Initially aimed at difficult-to-recycle products like batteries, electronics, and automobiles, the doctrine has been increasingly applied to consumer packaged goods.

EPR's legislative reach in the U.S. is extensive. The Product Stewardship Institute (PSI), a proponent of EPR, says it has helped to enact 150 EPR laws in 34 states and the District of Columbia across 22 product categories including packaging.

California leads PSI's list with a dozen EPR laws passed since 2004, including what probably is the nation's strictest one for packaging, the Plastic Pollution Prevention and Packaging Producer Responsibility Act of 2022.

Joining California as states with mandated EPR programs for packaging and paper are Colorado, Maine, Maryland, Minnesota, Oregon, and Washington. Their requirements vary, but all set calendar targets for achieving specified recycling rates and establish fee structures for producers of the materials.

ONUS ON SOURCES

The idea behind EPR is to require producers of paper and packaging to fund and manage programs that ensure these materials are collected and recycled responsibly.

Central to this is shifting the cost burden of collection, recycling, and end-of-life management for paper and packaging from local governments and taxpayers to the producers. This entails holding them accountable for the entire packaging lifecycle in which their products are sold and shipped.

The laws require producers to fulfill their EPR obligations under the supervision of a Producer Responsibility Organization, or PRO. The PRO develops the implementation plan, secures its approval from the state's regulatory agency, puts the plan into operation, and collects the producer fees.

Payment of the fees, which are based on the types and weights of the packaging covered by the state's EPR law, is designed to be phased in over time as the program takes shape.

These concepts didn't find favor with sufficient numbers of lawmakers in Georgia, New Hampshire, New York, Rhode Island, Tennessee, and Wisconsin, each of which failed to enact proposed EPR legislation for packaging before the end of its 2026 legislative session. Hope for EPR remains alive in New Jersey, where a bill could come up for additional consideration this year or in 2027.

THIRD TIME WASN'T THE CHARM

Dan Felton is President & CEO of the Flexible Packaging Association (FPA), which took particular aim against the New York EPR bill and its proposed ban on advanced recycling technologies for flexible films and packaging.

He points out that although the New York bill is almost certain to be revived in the state's next legislative session, "this is now the third session in a row that it's failed to get across the finish line, and it actually did not get as far this year as it did last year."

Felton acknowledges that this year's version contained some positive changes that would have made compliance less burdensome for his members. He notes, however, that "the baseline performance goals still remain problematic." While it was good to get some flexibility on the implementation timetables, "they were still

unachievable performance targets,” Felton says.

Tim Freeman, Co-President of the Print & Graphic Communications Association (PGCA), also sees the New York bill and its New Jersey counterpart as fundamentally unworkable.

“PGCA supports responsible recycling and environmental stewardship, but we remain opposed to EPR proposals that impose significant new costs and regulatory burdens on manufacturers without adequately considering the impact on jobs, competitiveness, and the cost of goods,” said Freeman in a written statement.

“Measures such as New York’s Packaging Reduction and Recycling Infrastructure Act and New Jersey’s Packaging and Paper Product Stewardship Act would create substantial compliance obligations for businesses throughout the supply chain while offering uncertain environmental benefits. Both of these proposed laws were successfully opposed, to date, by PGCA.”

DRAWBACKS AND SHORTCOMINGS

Gary Jones, Vice President, Environmental, Health, and Safety Affairs, and Sara Osorio, Environmental, Health and Safety Affairs Coordinator, PRINTING United Alliance, are EPR watchdogs on behalf of the group’s nationwide membership base.

According to Osorio, the biggest drawback of existing EPR programs is that the fees they collect aren’t being used to build the additional recycling infrastructure their states need to facilitate recycling in the first place.

She also warns about programs, such as California’s, that make business-to-business (B2B) packaging as well as consumer-facing packaging subject to the rules.

B2B packaging, Osorio explains, is the “packaging for the packaging”: plastic wrap, shipping containers, pallets, corrugated boxes and whatever else is needed to transport packaging to the business that ultimately will use it. By this definition, the manufacturers of the B2B packaging become producers with compliance obligations to meet and potential penalties to worry about.

“INFINITE” LEVEL OF COMPLEXITY

Jones points out that EPR programs aimed at individual products—for example, mattresses, electronics, and tires—are “a lot cleaner and a lot easier” to administer than EPR programs that target packaging and printed paper and cover a multitude of products.

“When you step into packaging,” says Jones, “it makes it very complex and opens up a tremendous area of controversy as well as coverage.” Given the wide variety

of materials that packaging consists of, having to figure out what’s excluded and not excluded from the rules “raises the complexity level to an infinite level.”

Another flaw in some of these programs, says Jones, is that “they use collection and separation interchangeably with the word ‘recycling.’” Claiming that collection rates have gone up “doesn’t necessarily mean it’s actually being recycled because in many instances there’s little or no infrastructure in order to actually take the material and turn it into something else,” Jones says.

BURDEN IS ON BRANDS

The burdens of compliance that EPR laws place on producers of packaging vary considerably from state to state. To be kept in mind here is that in EPR terms, the “producers” are the brand-owning manufacturers of items sold in or with packaging at physical retail locations within a state.

By classifying brand owners as producers, the EPR laws now in place generally put the bulk of responsibility for compliance on brands, not their packaging suppliers. These so-called producers, however, will lean heavily on their suppliers for help in complying with the requirements.

Felton calls California’s EPR mandate “a very onerous law in terms of the way it views plastics.” Its performance targets “set up a possibility that certain types of packaging, including some film and flexible plastic packaging could conceivably be banned by 2032.”

Felton says that although Oregon’s law is “quite bureaucratic,” it still provides “a decent path forward for film and flexibles” in its provisions for the way these materials will be collected. Minnesota, Maryland, and Washington State “have even less onerous performance requirements” thanks to performance metrics based on the realities of collection and recycling in those states.

Also in the industry’s favor are the 90% caps that the three states have placed on the producers’ share of the funding for EPR programs. The remaining 10% is to come from municipalities and local governments. “We think it’s appropriate for them to have some skin in the game,” Felton comments.

CUSTOMERS WILL CALL

Osorio notes that because only two states, Colorado and Oregon, have their EPR programs fully up and running, compliance issues haven’t yet arisen. But what printers and converters need to prepare for, she advises, are calls for help from customers facing compliance requirements as producers of the materials in question.

Compliance involves heavy data reporting, and “a lot of obligated producers in some states are now realizing that they don’t have all the data to report, and the data



that they do have maybe is a little clunky," Osorio says. This means that they'll expect their packaging suppliers to fill in the gaps with details about types and tonnages of substrates used, among other data points.

That's where a lot of the questions and inquiries are going to come from," Osorio says.

It's important for printers and converters to recognize both the direct and the indirect impacts of EPR compliance, Jones observes.

A direct impact is the burden a company would face as the manufacturer of B2B packaging shipped into or within a state where B2B packaging is covered by EPR rules.

Firms in this situation "have to register as a producer and pay a fee on the volume and the type of packaging that they're shipping," Jones says. "That's what's probably the biggest overlooked and maybe misunderstood aspect of this from the direct perspective."

WHERE PRINT GETS PINCHED

Indirect impacts stem from the financial pressure that EPR compliance puts on customers that are required to register and pay fees as producers. This could encompass "literally tens of thousands of companies" that buy labels and packaging from printers and converters, according to Jones.

"If my customer now has to pay more money for me to print and distribute their product, are they going to come back to me and say I need you to cut your costs, because otherwise I can't afford to print," Jones explains. "Or I'm going to have to cut back on the volume of printing."

Felton says the FPA keeps a close watch on the progress of EPR legislation in all the states where bills have been proposed. This year, he notes, there has been very little progress to report. He says that although it might be possible to pass EPR laws in two or three additional states over the next two to three years, the likelihood of adoption by all 50 states is small.

According to Jones, the failure of EPR bills to advance this year can be traced to one word: affordability.

In a year of Congressional midterm elections, "affordability is all you're going to be hearing about," he says. "The overall impact that these types of bills have is to raise the cost of consumer goods. Even though the theory is that those costs will not get passed along, they will get passed along."

With the escalating costs of compliance that EPR regulations impose, "there's no way that a producer's going to absorb the fees associated with it," states Jones. "Those fees are crazy high, and they're not going to go down."

SUPPORTERS STILL DETERMINED

But just because progress in EPR legislation appears to have stalled doesn't mean that anyone should let the

subject fall off the radar. Proponents of the concept are far from giving up, and political realignments in state legislatures are bound to change lawmakers' appetites for codifying producer responsibility.

Dawn Timm is the Chair of the Board of Directors of the New York Product Stewardship Council (NYPSC), an advocacy group that promotes solutions for reducing disposal, strengthening recycling systems, and shifting waste management costs away from taxpayers. In a written statement, she advised against reading too much into EPR's current legislative scorecard.

"The fact that several states were unable to enact packaging EPR legislation in 2026 should not be interpreted as a rejection of the concept," she stated. "Rather, it reflects a growing recognition that manufacturers and producers must play a larger role in addressing the packaging they introduce into the waste stream."

From NYPSC's perspective, "there is still meaningful progress occurring even when legislation does not pass," Timm said. "The NYPSC feels that momentum has not stalled, rather, it is gaining. With each passing year the policy landscape continues to evolve as stakeholders learn, adapt, and refine approaches to implementation."

"The challenges facing packaging waste are not going away, and neither is the conversation about producer responsibility," Timm declared.

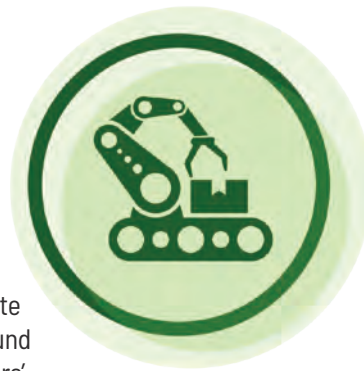
"THE BILL IN THE MAIL"

At PRINTING United Alliance, Jones isn't underestimating EPR's appeal to lawmakers. He thinks that as many as 13 states, including the ones that were unsuccessful this year, could introduce EPR bills in their next legislative sessions. Lawsuits against EPR enactments in three states could further complicate the picture.

All of this could come as a surprise, and not a pleasant one, to unwary providers of labels and packaging. Jones notes that although he and Osorio have been tracking and reporting trends in EPR for years, the level of awareness in the industry at large is still nowhere near theirs.

"There are so many companies that have no idea this is happening," he says. This is because EPR is the kind of thing that no one wakes up to "until you get the bill in the mail."

"Now that we're starting to see implementation and more enforcement happening, people are going to say, what's this EPR? What do you mean I'm covered? We've been letting people know, hey, this is coming."



I, ROBOTICS: ROBOTS ARE HERE AND COMING TO A PRINT SHOP NEAR YOU

BY RICHARD ROMANO

The word “robot” was coined in 1923 via the English translation of Czech playwright Karel Capek’s 1920 play R.U.R. (Rossum’s Universal Robots). According to the Online Etymology Dictionary, it comes from the Czech word robotnik which means “forced worker,” which itself derives from robota (“forced labor, compulsory service, drudgery”) which in turn comes from robotiti (“to work, drudge”). If at some point we begin having conversations about such things as “robot rights”—a common theme in science fiction—it’s an etymology we’ll have to conjure with.

ROBOTS PREDATE SCIENCE FICTION

Science fiction has given us our image of what a “robot” is: a usually humanoid or at least bipedal mechanical entity, and while humanoid robots have made the transition from fiction to fact (and are now competing in marathons), when we use the term “robot” in the context of a manufacturing or production environment, we are often referring not to entire humanoid forms but rather robotic body parts, arms and hands, usually.

The idea of robotics actually predates 20th-century science fiction; it can be traced back to ancient China, where King Mu of the Zhou Dynasty, who ruled from 976 to 922 B.C.E., one day found himself in the presence of Yan Shi, an “artificer” (aka “mechanical engineer”) who demonstrated to the emperor what was essentially a life-size humanoid automaton.

ROBOTS START WORKING

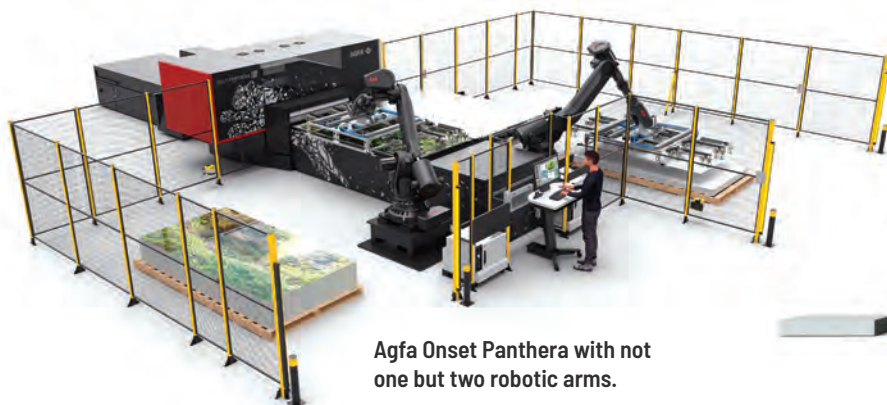
So while the concept of mechanized beings is not new, it wasn’t until after the Industrial Revolution and into the

20th century that the idea of using mechanical workers on assembly lines to boost production started to take off. Autodesk has a comprehensive history of industrial robotics (<https://www.autodesk.com/design-make/articles/history-of-industrial-robots>), identifying the first true industrial robot as being developed in 1930 by model construction system Meccano. They say:

The number of industrial robots in use in America grew from about 200 in 1970 to nearly 4,000 just 10 years later—and then jumped to 1.6 million by 2015. Today, there are estimated to be close to 3 million industrial robots in active service worldwide. After its humble beginnings, this has been among the most impactful advances in the history of making things, becoming an indispensable part of society and the global economy.

But while robots and robotics have been an integral part of manufacturing in general since the latter half of the 20th century, it is only in the past decade that we have seen any incursion of robots into print production workflows, initially in wide format. Cutting table manufacturer Zünd first started including a robotic arm as an option for its S3 series of tables in the 2010s, and soon other cutting table manufacturers such as Kongsberg started following suit.

Wide-format printing—specifically flatbed—workflows are an ideal environment for these kinds of robotics: they can quickly, accurately, and tirelessly load and unload boards from, at first, cutting tables and eventually printers. The Inca Onset, originally the purview of Fujifilm before its acquisition by Agfa and renaming as the Onset Panthera, was one of the first wide-format units—if not the first—to feature robotic loading and unloading systems. (The current iteration is called the Onset Panthera Autoloader, which can be combined with Agfa’s MAX Bot unloader.) These systems don’t just boost production, but also



Agfa Onset Panthera with not one but two robotic arms.



Durst P5 Robotics.

promote health and safety, as they can carry and move what can be heavy loads without injury, so the meat-based workers can focus on low-impact tasks such as operating and monitoring the printer.

Agfa has added its 'bots to its other wide-format systems. The MAX Bots offer fully automated loading for its Jeti Tauro H3300 and other Tauro presses. And robotics are not just for rigid substrates; the MAX Bots can be complemented by Agfa's MAX Flex RTR module to handle rolled media as well.

Durst has also added robotic loading to its P5 platform via its P5 Robotics, a feeder/stacker unit comprising two KUKA robots to handle unmanned production for a complete shift. The robots can pick up media from different pallets up to 180 cm in height, feed them, and stack them separately. Printed media can also be turned 180 degrees for perfecting and fed into a second printing system. It can also be used for thinner substrates.

(By the way, KUKA Robotics manufactures robotic systems for a variety of industries. They even offer "used robots," and if that isn't fodder for a sci-fi story, I don't know what is.)

THE ROBOT ARM-Y: FROM PREPRESS TO FINISHING

Robotics are starting to appear in other corners of the print industry. In 2023, ECO3 introduced a plate-loading robot for its Avalon VLF platesetters. A bespoke solution, the robot is designed and built based on a particular plant's precise needs. According to the company, the autofeeder



can simultaneously feed multiple plate lines with a speed of up to 80 printing plates per hour, regardless of plate size. The robot can also be integrated with ECO3's Apogee software.

At the other end of the workflow, at drupa 2024, Horizon was demonstrating its robot arm system for book production.

Packaging—specifically corrugated—is also a prime target

for robots. To that end, in 2023, BOBST had announced that it had acquired a majority share in Dücker Robotics, a developer of robotic systems in both loading and palletizing in the corrugated board sector as well as folding cartons and perhaps even labels. In their announcement, BOBST indicated a vision for the future of packaging production in which the entire production line will be connected and automated—and robots are a part of that. They have since introduced a robotics portfolio that includes ROBOLOADER and ROBOPALLETIZER systems for three corrugated board product lines: folder-glue, flatbed die-cutters, and flexo folder-glue.

More recently, Koenig & Bauer partnered with Rigorous Technology, a Williston, Vt., robotics and technology company, to tailor its RIG palletizer robot for corrugated and folding carton workflows, integrating with Koenig & Bauer's line of folder glue.

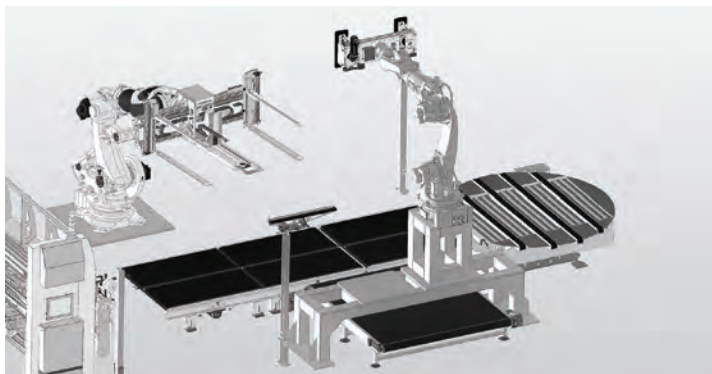
Rigorous Technology is also the manufacturer of the Box Hopper—designed to feed corrugated boxes into folder-glue—that I mentioned at length in an earlier article on robotics. (See Richard Romano, "Here Come the Robots: There Are a Multitude of Robotic Solutions for our Staffing Shortage," WhatTheyThink, December 14, 2023, <https://whattheythink.com/articles/117549-here-come-robots-there-are-multiple-robotic-solutions-our-staffing-shortage/>.)



ECO3's plate-loading robot for its Avalon VLF platesetters.



Horizon's robot arm system for book production.



BOBST ROBOLOADER Folding-Gluing is designed to handle square e-commerce boxes, has a gripper capacity of 550 mm and speeds of up to 96,000 boxes per hour.



(L-R) Tom Fitzgerald, director of postpress and corrugated products at Koenig & Bauer (U.S.); Diane Abruzzini, COO of Rigorous Technology; and Colin Riggs, CEO of Rigorous Technology; at their facility in Williston, Vt. (Image courtesy Koenig & Bauer.)

MOVING STORIES

But perhaps the “killer app” for print shop robotics is not necessarily loading and unloading, but material movement in general. The robot category of automated guided vehicles (AGV) (see the “Know Your ‘Bots” sidebar) comprises what are essentially self-driving forklifts that trundle about the shop or warehouse floor moving substrates to the press, or finished printed materials from the press to the bindery or to fulfillment.

To cite two examples:

In 2022, Konica Minolta partnered with NEC Corporation to develop an automatic control system for AGVs using an object detection algorithm which is part of Konica Minolta’s “FORXAI Imaging AI” technology.

MovieGo Robotics offers the Sharko5 AGV that is also starting to gain some traction.

There are other assorted tasks for which robots are being deployed. One robot I bumped into (almost quite literally) at a PRINTING United show was the Robot S7 by Robopac, which is a self-propelled robot for stretch wrapping.

It will only be a matter of time before robotics become a common sight in print businesses—



Robopac’s self-propelled stretch-wrapping robot.

maybe not in the smallest of shops, but certainly mid-size and large establishments are prime territory for ‘bots of various configurations.

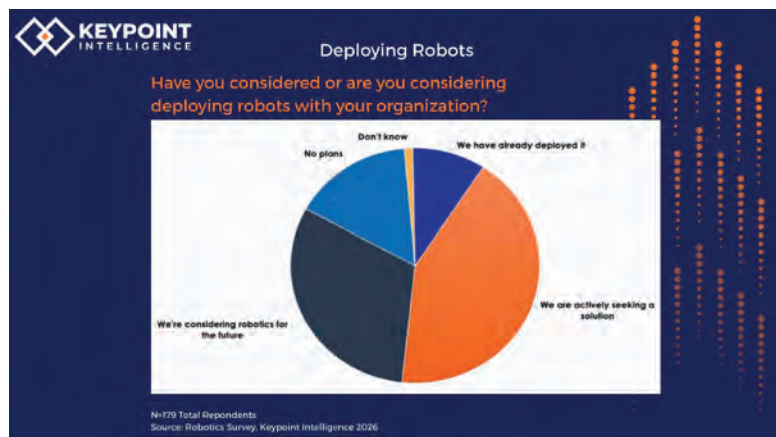
ROBOTS WHO PRINT

Robots are nice and are certainly proliferating, but do they have practical uses in your everyday printing business? Or are they a solution in search of a problem?

In the past year, Keypoint Intelligence has been conducting several studies and surveys on the interest in robots and robotics in the printing industry, and it may be surprising to learn that the industry is more ready for robots that we would have thought, particularly among inplants.

Early last year, Keypoint conducted a survey with the IPMA (In-Plant Printing and Mailing Association) specifically on robotics, and found that nearly half of print operations are actively planning to invest in robotic process automation.

And in their recent Robotics Survey, Keypoint found that



while fewer than 10% of surveyed print business owners have already deployed robotics, nearly three-quarters were actively seeking or at least considering a robotics solution or considering one for the future.

Of those who have deployed a robotics solution, what specifically have they deployed?

Not unexpectedly, it is primarily material movement:

Transporting media to and from presses, loading substrates, and moving inventory across the production floor. That matters because it shows PSPs are using robotics to reduce operational drag and stabilize workflows rather than creating fully autonomous factories. (Mark Boyt and Bridget Dedian, Keypoint Intelligence, "10 Things PSPs Should Consider Before Adopting Robotics: What You Need to Know to Begin the Journey," WhatTheyThink, May 22, 2026, <https://whattheythink.com/data/130418-10-things-psps-should-consider-adopting-robotics-what-you-need-know-begin-journey>.)

AT THE END OF THE DAY

Perhaps the biggest argument against the proliferation of robotics at the moment is the expense. And it's not just the hardware, but the extensive level of programming involved. A robot—especially an AGV designed to tool around your shop floor—can't just be ordered from Amazon and turned loose. But as we have seen with many, if not most, technologies, once demand, then manufacturing, then economies of scale kick in, they become affordable and everyday.

While some shops are working with robotics vendors directly to develop bespoke systems, depending on what kind of system you're looking for, it's best to get one's equipment vendor involved, especially if it's a robotic system that is going to be integrated with other equipment such as a press (i.e., you don't want to fall afoul of warranty conditions).

As we become ever more challenged by staffing shortages, robots can take up some of the slack. Robotics is one of the more exciting new technologies that are starting to proliferate, and it will be interesting to see what the conversation will be when we publish next year's Technology Outlook.

KNOW YOUR 'BOTS

BY RICHARD ROMANO

There are three general classes of robotic solution and there is some degree of overlap between and among these categories.

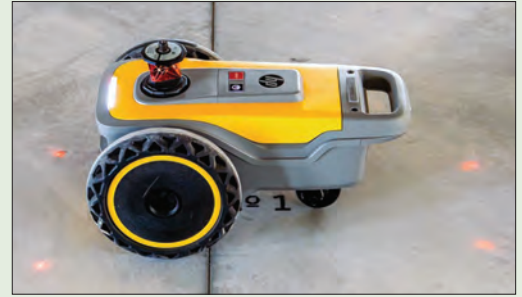
Robot: A machine that can automatically carry out a series of actions, especially complex ones. When we think "robot" we think of humanoid robots or something along the lines of the bipedal but not-humanoid Robbie the Robot from Forbidden Planet or the "Danger, Will Robinson!" robot from Lost in Space, but the term can refer to any autonomous task-performing machine, such as a Roomba vacuum cleaner or the HP SitePrint. In most industrial robotic applications, the robot works in isolation from humans, usually for safety reasons (that is, safety for the humans). In cases where robots need to work near humans, the human may need to wear a "robotic tech vest (RTV)," which is rather like a high-visibility vest that, say, highway workers wear, except that the vest communicates wirelessly with the robotic system to create a safety zone around the human.

Cobot: Short for "collaborative robot" or "companion robot," it's a robot specifically designed for close human-robot interaction within a shared space. The safety protocols for cobots can include them being made of lighter-weight construction materials than industrial robots, more rounded edges to avoid flesh-rendering, limited operating speed and force, and/or sensors and software that protect the human.

Mobot: Short for "mobile robot," it's a robot that is capable of independent movement. Think of a Roomba or HP SitePrint. Also, this is a bit beyond the scope of this article, but the interplanetary rovers trundling about on Mars are mobots.

Automated Guided Vehicle (AGV): Also known as an autonomous mobile robot (AMR), it's a variety of mobot that functions essentially as a kind of self-driving forklift, used in warehouses, factories, and other industrial locations to move heavy materials. These types of robots are, at present, the "killer app" for robotics in print businesses.

Robotics—be they robots or cobots—are often placed in a "robotic cell," or their specifically delineated shop floor space. This "fence" is a safety precaution that keeps human from blundering into the path of a robot. One of the biggest areas of development is "fence-free" cobots, which means that the machine can work safely beside a human without the need for a cell.



HP SitePrint "mobot" for printing architectural specs on the floors of construction sites.



(Image courtesy Google Gemini (Nano Banana), generated by Nima Hunter Inc.)

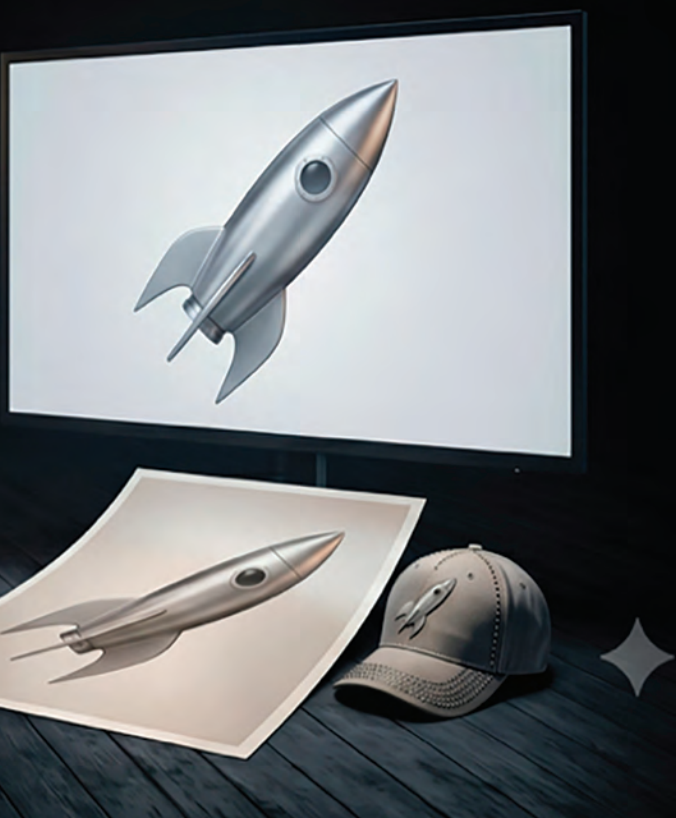
WHO OWNS THE WAY YOUR PRODUCTS LOOK?

Brands spend millions creating digital twins and perfecting how products appear online. Maintaining that appearance across packaging, print, textiles, embellishment, retail, and in-home environments is far more difficult, and responsibility for getting it right remains surprisingly unclear.

BY DON CARLI,
SENIOR CONSULTING EDITOR

The premise for this article seemed obvious. Brands build photorealistic digital twins of their products, approve them on a screen, then watch the physical versions reach stores looking wrong. I assumed the cause was a missing file format or API. But I was wrong, and looking for the wrong thing.

Most of the file formats and standards needed already exist. What does not exist is an answer to a simpler question. *When a product looks different in person than it did on screen, who is responsible for the difference? That question is the subject of this article: Whether a physical product*



A product that looks different
from screen to screen costs
sales and trust.

matches the appearance approved in its digital twin, and who is answerable when it does not.

THE SCREEN-TO-SCREEN MATCH IS LARGELY SOLVED

Start with what already works. The 3D commerce world has built a trust in on-screen appearance that did not exist a decade ago. glTF, the runtime format the Khronos Group calls the JPEG of 3D, became an international standard, ISO/IEC 12113, in 2022, and Khronos certifies viewers so a digital model renders the same way across devices. OpenUSD, the scene description technology Pixar created, now stays aligned with glTF through a formal liaison and material definitions are converging through MaterialX and OpenPBR.

The Khronos 3D Commerce group consists of more than seventy retailers and brands, including IKEA, Amazon, and Wayfair. They funded it because a product that looks different from screen to screen costs them

sales and trust. On screens, that problem is largely handled.

THE SCREEN-TO-PHYSICAL PRODUCT MATCH IS NOT

When a product becomes physical, a different world of standards takes over, and the two do not yet speak to each other. Color at the press runs on ICC profiles, the workhorse since the 1990s. ICC version 4 is colorimetric, built for a fixed viewing condition, and cannot predict how gloss, foil, varnish, metallic inks, or substrate behave under the shifting light of a store, shelf, or living room.

More capable tools exist for that. iccMAX can encode spectral data and surface reflectance. CxF, an open ISO standard, moves spectral spot color through packaging workflows. The tools are real. What they lack is a connection to the digital side, and for iccMAX, support in the presses, operating systems, and rendering software. Even so, the approved appearance intent does not travel the chain as a measurable record. It stops at sign-off and

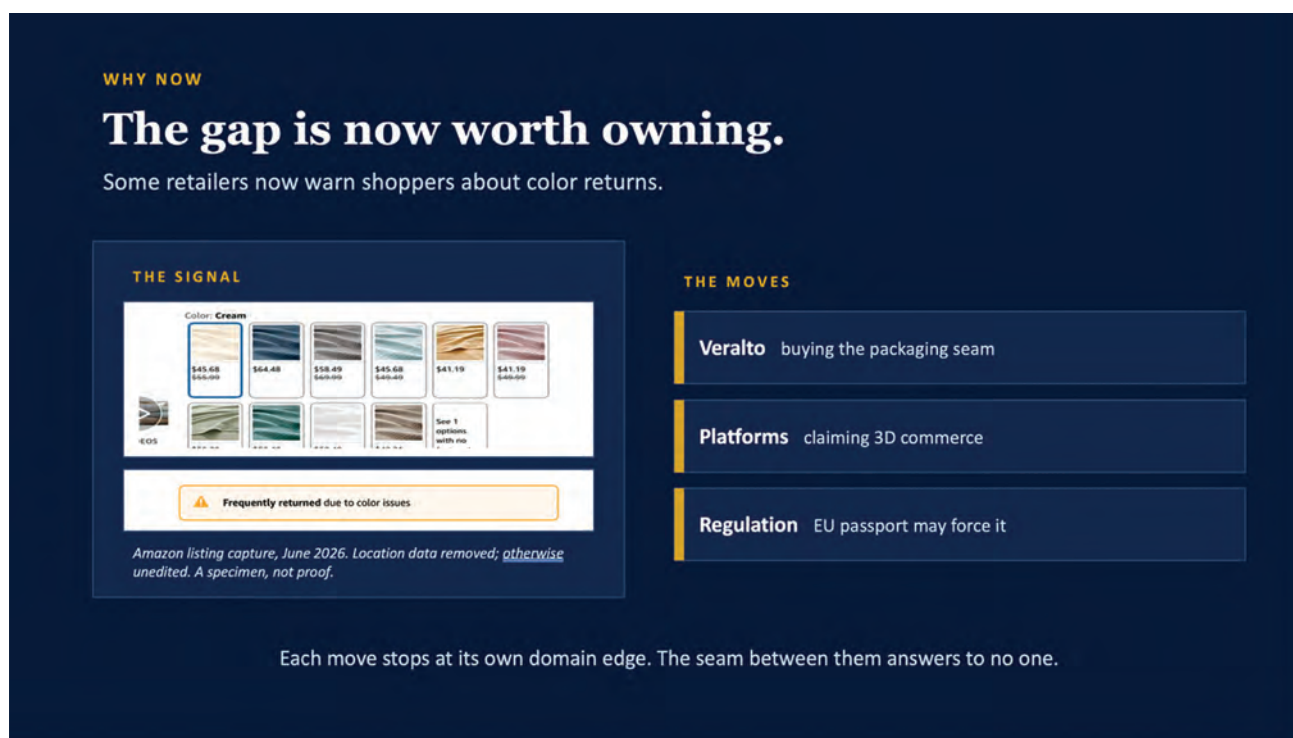


Figure 1. An Amazon product listing displaying a “Frequently returned due to color issues” warning. The exhibit does not establish prevalence or root cause, but it shows appearance-related dissatisfaction is visible enough for retailers to surface it within the shopping experience.

is typically rebuilt via rework and workarounds at each stage that follows.

The problem shows each reader a different face. A packaging converter hits a brand color in spectral data and still watches a matte finish pick up a sheen under store lights. A digital embellishment provider is told to match a sample from another shop, with no way to see what foil or process made it. A textile printer is most exposed: substrate, dye lots and metamerism can mean a print that was right on the roll fails in-store or at home. The attribute changes by audience but the gap does not.

The audience already senses this. In WhatTheyThink’s 2026 Printing Outlook, print service providers ranked added packaging and digital label capability lowest among the opportunities they value, and named embellishment the thing they pursued most while doubting it as a durable business. That is not technophobia. These categories do not yet scale because the appearance they sell cannot be specified, approved, and reproduced across the places customers actually see it.

ONE PROBLEM, GOVERNED IN PIECES

From the customer’s side, this is one problem. The product either looks the way it was approved and expected, or it does not. From the industry’s side, it is

not governed as one problem. It is governed in pieces, by mature systems that each control one stretch and stop at the edge of the next. 3D commerce governs rendering consistency. Print governs proof-to-output reproduction. Packaging governs color. Textiles govern shade and substrate. Manufacturing governs repeatability. Retail experiences the consequences.

Retailers are beginning to expose some of those consequences to shoppers. Amazon and Wayfair now display warnings on certain listings indicating that an item is “frequently returned due to color issues.” These notices do not establish root cause or reveal whether the mismatch originated in photography, rendering, manufacturing, lighting, merchandising, or customer expectations. They show appearance-related dissatisfaction measurable enough to surface in the commerce experience itself. The retailer can see the outcome.

The chain of decisions, representations, approvals, and production steps that produced it is often hard to reconstruct. That is where the governance issue hardens. At what point does a color mismatch stop being subjective dissatisfaction and become a legally actionable “not as described” defect?

Without a shared way to define, measure, preserve, and trace approved appearance across the value chain, that question is hard to answer before the dispute reaches the

customer. ICC, iccMAX, Graphic Measures International (GMI), and other frameworks are competent inside their own stretch, but none governs the complete path from the approved digital file to what a customer sees in a room. None defines what an end-to-end appearance match means. None owns the full outcome. The deeper question is not who controls the tools, but who is accountable when the result is wrong.

SOMEONE IS ALREADY BUILDING IT

No party is accountable for that match across the chain, because its cost is split so everyone can live with it. The converter absorbs a reprint. The brand absorbs a complaint. The retailer absorbs a return. The municipality absorbs the landfill. No one sees enough of the total to fix it alone, and the data that would size the problem does not exist in shared form.

That diffusion of accountability is why some players have stopped waiting for the job to be assigned. In 2023, when Danaher spun off Veralto, it placed four brands under one roof. Esko designs the packaging. X-Rite measures the color. Pantone, through PantoneLIVE, holds the spectral values of many brand colors. Enfocus automates the PDF that moves between them.

Veralto markets these as one connected color and workflow ecosystem for packaging. It is a rational response to a problem no one else took responsibility for, but it is proprietary and only for packaging. Read it as evidence, not destiny: the gap is now valuable enough to commercialize, yet a bridge inside one domain still leaves the path from screen to shelf answerable to no one.

A different kind of bet is visible elsewhere. Eclat Digital builds a rendering engine called Ocean that it describes as physically accurate rather than physically based, tracing the full spectrum of light through measured materials rather than approximating the look. It measures real samples, models how they behave under defined lighting, and predicts appearance before a physical prototype exists. Its markets are transportation, architecture, and product design, not packaging. Where Veralto consolidates an existing packaging workflow, Eclat is investing in the measurement and prediction end of the same problem. Neither spans the full chain. Both are evidence that the gap is now worth building for.

WE HAVE CLOSED GAPS LIKE THIS BEFORE

Industries have closed gaps like this before, and not by waiting for technology to improve. Food safety once relied on inspecting the finished product. The Hazard Analysis Critical Control Point (HACCP) management system shifted it to a system that identifies hazards at

points along the production chain and makes someone answerable for controlling each one, before the finished batch is judged. When Target and Lowe's required GMI certification of their private-label packaging suppliers, they wrote it into purchase orders, and it became a baseline within a few years.

Pieces of the infrastructure required for appearance accountability sit on both sides of the open line. glTF and CxF are open; X-Rite's AxF and PantoneLIVE are proprietary. What none settles is harder: the layer connecting the digital and physical sides has no one answerable for it yet.

You cannot hold anyone accountable for a match no one has defined. Accountability rests on a consensus the industry has not yet arrived at: how appearance is de-fined, what counts as a match, how to measure it, and what an acceptable result looks like where a product is seen. That absence is the likeliest reason the gap has outlived so many standards. A format can carry a value. It cannot settle what the value should be, or who decides.

This is not a call for a new standards body. The push for a definition will most likely come from buyers or from regulators. Brand owners reach across packaging, labels, print, textiles, ecommerce, and retail. They pay for the mismatch at every seam, and they can put a requirement in a purchase order. Regulators are the other lever. The EU Digital Product Passport requires structured product data, and appearance data could possibly ride along with it.

Veralto's moves in packaging, Eclat Digital's predictive simulations, and other proprietary solutions are signs that the gaps have been recognized and are beginning to be filled. The contest for appearance accountability across the rest of commerce remains open: proprietary platforms moving to capture the space between screen and shelf, brands advancing shared open frameworks, or regulators drawing the accountability line that brands and platforms have declined to draw themselves.

One question sits beneath everything in this article: What does appearance consistency actually mean, stated precisely enough to be specified, measured, managed, verified and accounted for across a supply chain? Not a color number. Not a ΔE tolerance. A definition that holds from the approved digital asset to the product in a customer's home.

When appearance becomes a managed layer of commerce, print providers, converters, embellishment vendors, textile producers, and OEMs are either at the table where it gets defined, or they will be in the supply chain governed by it. If your organization is seeking that definition, or building it, and think there's more to the story let's compare notes.

Send your comments and questions to carli@nimahunter.com.

SEE IT SHINE

WITH EMBELLISHMENT VISUALIZATION TOOLS

BY JULIE SHAFFER

Printed pieces with metallic foils, embossing, textures, UV coatings, or other special effects are known to boost engagement, perceived value, and sales. Yet many creative professionals struggle with incorporating print embellishments.

THE CHALLENGE: DESIGNING FOR EFFECTS YOU CANNOT FULLY SEE

It is not that designers are resisting print and embellishments. Sabine Lenz, founder of PaperSpecs (and widely acknowledged “Paper Queen”) says it is simply that many designers do not design for print every day and “the industry has not always made it easy for them to understand what is possible or to visualize the finished result.”

Part of the problem is that common design applications do not accurately show how a special effect will appear in the finished piece. Except in some proprietary packaging tools, designers usually rely on placeholder colors to indicate embellished areas.

This is changing. A growing category of software allow creative professionals and brands to preview foils, embossing, or other dimensional effects on screen—under different lighting conditions and viewing angles—before anything goes to press.

Here is a rundown of some of the software platforms in this category that address the challenge of previewing print embellishments digitally.

VISUALIS3R (BY COLOR LOGIC™)

Created by the developers of Color-Logic and Touch7, Visualis3R officially launched in April 2026. Color-Logic has long offered a proprietary viewing tool, FX-Viewer, to preview metallic and decorative print effects on-screen in a 3D virtual environment before sending files to press.

The new Visualis3R platform opens up advanced embellishment previews to anyone. It is compatible with any PDF file and supports most print embellishments including foil, metallic, white, and invisible inks/toners, coatings, lamination, glitter, embossing/debossing, and branded spot colors, providing true-to-life digital previews. It shows how each finish interacts with substrates, light direction and viewing angle. The list of options continues to grow, with the ability to accurately preview printing on cans



Viewing a trading card with a hard case metallic shell through Color-Logic's Visualiser3R.

recently added.

Visualis3R is a licensed product, with single seat or team license options. Anyone can try Visualis3R for 14 days at no cost by downloading the software from www.v3r.studio.

REAKTOR (BY TAKTIFUL)

Reaktor is a cloud-based, interactive 3D platform designed to convert “embellishment-ready” PDFs into shareable digital prototypes. Launched in April of this year, Reaktor is one of a growing suite of integrated software solutions developed by the digital embellishment experts at Taktiful. PRINTING United Alliance recognized Reaktor with a 2026 Pinnacle Technology Award.

Taktiful launched Reaktor to help print shops sell more decorated products under the mantra “show, don’t tell.” This focus matches the firm’s core work in coaching, training, and growing the digital enhancement market.

As an open, browser-based solution, Reaktor is machine-agnostic and hardware-neutral. It uses optimized web-rendering architecture to deliver 3D graphics and lighting interactions directly inside a standard web browser. Reaktor supports a broad set of embellishment effects and production categories, including flat spot and raised tactile UV, raised foil, gold silver, white, pink, and clear toner, flat metallic sleeking, screen printing, and foil stamping.

Users can send 3D preview links to clients for design review, and the system generates print-ready files without manual layer configuration.



Looking at the embellishment effect on the cover of this magazine under different lighting conditions with Taktiful's Reaktor.

Visit taktiful.com/reaktor to learn more about the product and download a free 14-day trial to give it a test drive.

DREAMCOMPOSER® (BY LEONARD KURZ)

Following a soft roll-out to select industry partners in early 2025, KURZ launched DREAMCOMPOSER to the industry in September 2025. It is a web-based platform intended for designers wanting to evaluate real-world metallic transfer effects early in the design cycle and geared toward the packaging market and features embellishments from the KURZ catalog.

With DREAMCOMPOSER, users can design packaging formats such as cardboard boxes, bottles, mascara tubes, and jars through a simple interface. In just a few steps, a flat PDF is transformed into a fully designed, shareable 3D model. Users can also capture and share 4K screenshots for reviews and approvals.

The DREAMCOMPOSER platform uses real, physically matched data profiles instead of generic digital colors, providing confidence that the final piece will match the digital artwork. The program detects specific design layers and allows designers to bind a KURZ product number or effect directly to a vector path so physical dies and hot, cold, or digital transfer foils match the exact visual boundaries evaluated in the mockup.

Download a free basic version of DREAMCOMPOSER for a 30-day free trial at dreamcomposer.de/en.

ESKO STUDIO

Esko Studio is no newcomer to the market, having launched 20 years ago. Esko Studio functions as an integrated plugin suite for Adobe Illustrator, connecting flat packaging artwork with three-dimensional structural visualization.

At the center of its value for production-focused workflows is a proprietary rendering engine that models how light behaves across intricate substrates and surface finishes, offering designers a mathematically based

preview of the final printed result.

Rather than just visualizing effects, Studio builds a literal “digital twin” of a package. The software processes technical artwork layers—such as separation plates for die-lines, varnishes, and foils—and maps them directly onto structural models, such as ArtiosCAD or collada files.

Esko offer a free trial of Studio Advanced at <https://site.esko.com/en/downloads/trials/studio-advanced>.

IC3D (BY HYBRID SOFTWARE)

Originally developed by Creative Edge Software, Hybrid Software acquired iC3D in March 2022. Today, iC3D functions as the front-end 3D rendering and digital mockup engine for Hybrid's product stack. The software is integrated with Hybrid tools like its PDF editor PACKZ and CLOUDFLOW workflow automation, allowing for real-time visualization of labels, shrink wrap, and flexible packaging directly from the production artwork files.

It boasts an easy-to-use 3D modeling tool for designing containers, display units and packaging components using a range of materials, including plastic, metal, glass, and paper carton. It contains advanced warping technology to accurately map and display distortions on metal cans and integrates seamlessly with Hybrid Proofscope for viewing and approval.

You can request a free trial at <https://hybridsoftware.com/hybrid-product/ic3d/>.

REALVIEW (BY SCODIX)

Announced in June of this year, Scodix RealView is a new addition to the embellishment visualization software category. It launched in conjunction with the Scodix Ultra 7000 SHD press to show realistic previews of complex print embellishments achievable with the Scodix press.

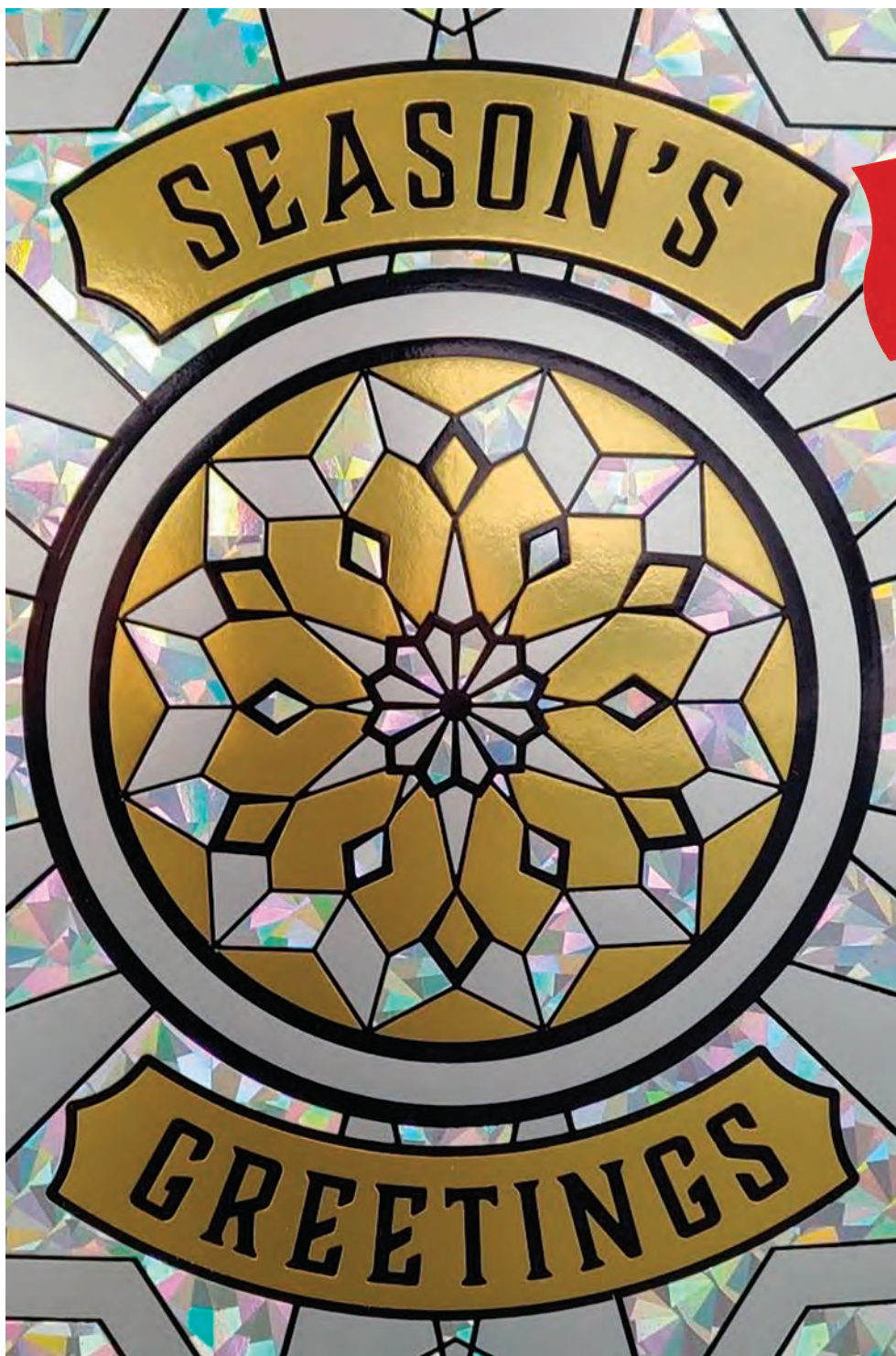
RealView bridges the imagination gap by showing accurate reflections, lighting, and dimensional depth for effects like Scodix Sense™ and Scodix Foil™. Integrated with web-to-print platforms, it is a sales engine for Scodix customers to show how tactile print features will look in advance of printing, minimizing the need for physical proofs and reducing design approval stages.

VISUALIZATION TOOLS FOR THE WIN

Visualization does not replace expertise or physical samples, but it gives designers a far better starting point for exploring embellishments—and advocating for them. These, and there will likely be more to come, are bound to help push creatives and brands to use more of the embellishment options available and help salespeople better sell them. A win-win on all sides.

TRADITIONAL FINISHING/EMBELLISHMENT TECHNOLOGY IS STILL RELEVANT

BY JEFF PETERSON, EXECUTIVE DIRECTOR, FOIL & SPECIALTY EFFECTS ASSOCIATION



Digital embellishments certainly have stolen the headlines in recent years with the growth and expansion of technologies and equipment in this sector. The term “digital embellishments” can take on different meanings, from the use of digital inkjet technology for raised digital foils and coatings or the creation of flat digital foils using a toner-based adhesive to the utilization of metallic paper/board with white ink and CMYK on a digital press.

While this digital sector has seen significant growth, the traditional print embellishment technologies remain highly relevant and often are the best choice for print finishing/embellishment applications.

MCD, Inc., a leading print finishing provider in Madison, Wis., has continued to see opportunities for the more traditional print finishing and embellishment processes. “Digital embellishment has opened new opportunities for short runs, personalization, and

Foil stamping creates metallic decoration on paper. (Image courtesy MCD.)

Foil stamping can also be combined with embossing to add more dimensional effects. (Image courtesy MCD)

rapid turnaround,” stated MCD, Inc. President Troy Serven. “However, conventional foil stamping, embossing, and UV coating continue to deliver unmatched visual impact, tactile quality, and cost efficiency for premium brands and larger production runs.”

HOT FOIL STAMPING

Traditional hot foil stamping still is the most common and versatile process for creating metallic decoration on paper. Foil stamping can be applied to a wider variety of paper stocks, from coated to uncoated and even recycled stocks, keeping its brightness and shine on all types of surfaces. Although other methods of applying foil have been found to work on certain uncoated or digital papers, neither digital foil processes nor cold foil transfer applications provide the flexibility of hot foil stamping.

Additionally, one of the prime advantages of foil stamping is having the ability to foil and emboss the image in one pass (combination foil/embossing). For applications where the brand or end user is asking for an embossed, foiled image, foil stamping mostly likely will be the process of choice.

Hot foil stamping also provides flexibility in the type of equipment available, depending on the specific application. There are a number of hot foil stamping presses on the market, from small desktop units to large platen presses that foil stamp a 28 x 40-in. sheet at speeds as high as 7,000 or 8,000 sheets per hour. The

sheet size and job quantity will determine the best equipment choice.

COLD FOIL TRANSFER

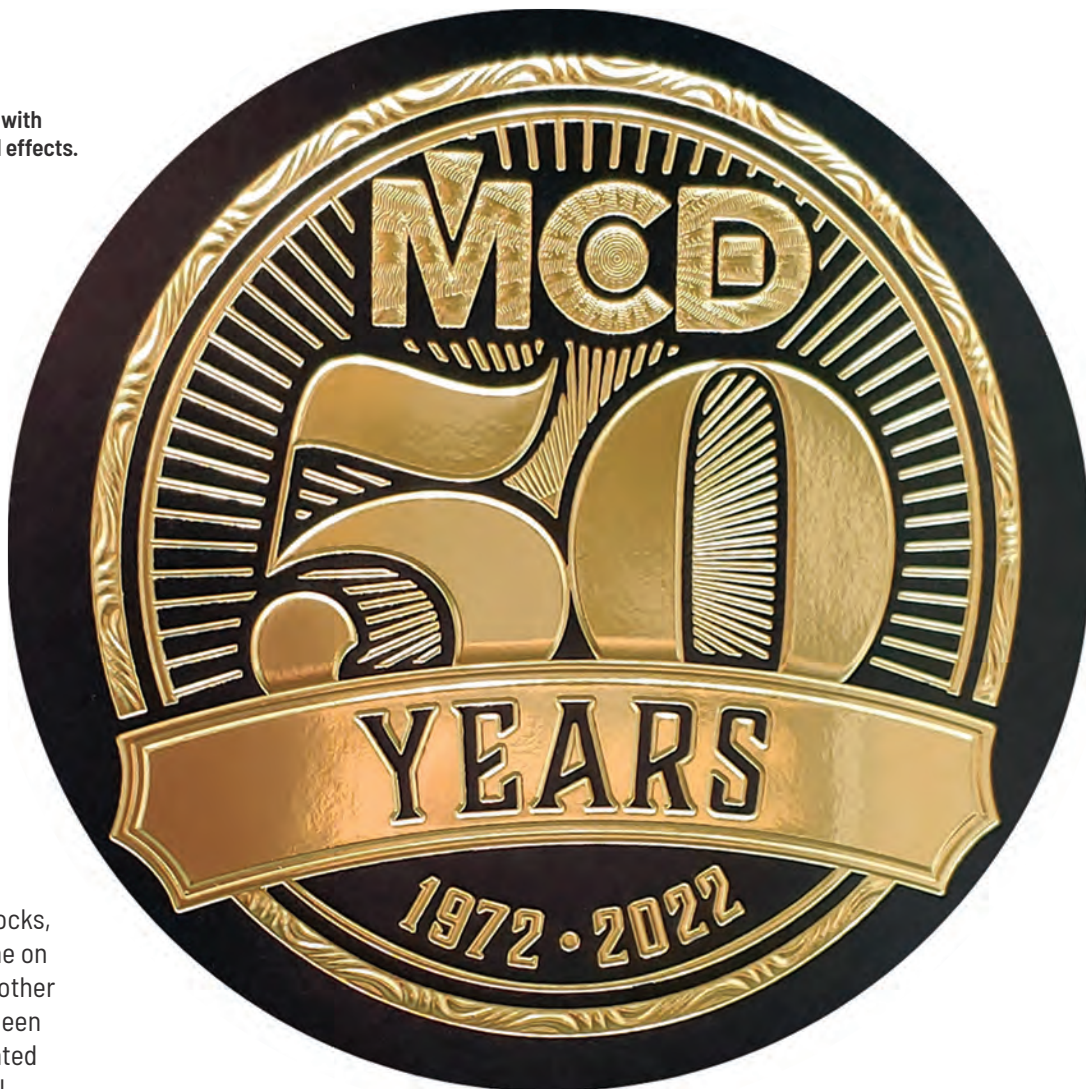
Cold foil transfer has been available for some time, but it had not caught on as a quality choice for metallic decoration until in more recent years—especially for sheetfed offset printing/cold foil applications.

The use of cold foil has gained momentum due to better foils for the process that can run at higher speeds, as well as the development of higher-quality adhesives for the application of cold foils. In addition, as cold foils have continued to develop, they now create brilliance and shine comparable to hot foil stamping, which was not the case in

the early stages of the process.

The advantage of using cold foil is the ability to apply the foil in-line with the printing process, meaning it can all be accomplished in one pass on press. In addition, by applying a silver metallic or rainbow holographic cold foil in one of the first stations of an offset or flexo printing press, a multitude of metallic colors can be created through translucent CMYK printed in-line over the cold foil areas of the printed sheet.

For medium to large-run applications, including labels, cartons, book/magazine covers, and trading cards, cold foil can be the best and most feasible choice for adding a metallic finish.



SPECIALTY UV COATINGS

In digital inkjet embellishment applications, a spot-raised coating can be applied to a printed sheet. This same effect also can be accomplished with screen coating equipment, and this is likely to be the most reasonable choice for larger runs where the speed of a screen UV coating machine will run as fast as 3,000 to 4,000 sheets per hour. This can be significantly faster than offline digital coating equipment.

Screen UV coating equipment also provides the flexibility to apply a variety of different standard finishes, including gloss, matte, and satin. It also provides the opportunity to use specialty UV coatings, such as glitter, soft touch, pearlescent, and even scented coatings for certain print applications.

CONCLUSION

Although digital methods have grabbed the headlines as they pertain to print finishing/embellishments, more conventional methods, as described above, continue to be the best choice for many applications. This especially is true for larger runs and for print jobs where hot foil stamping, cold foil transfer, or screen UV coating provide the quality, efficiency and flexibility required by the customer.

"The increased focus on print embellishments has elevated the value of print as a whole, helping brands recognize the power of visual and tactile differentiation," explained Sherven. "Rather than one technology replacing another, both digital and conventional embellishment methods have

benefited by expanding the range of creative possibilities available to designers, marketers, and brand owners."

ABOUT THE AUTHOR

Jeff Peterson is the Executive Director of the Foil & Specialty Effects Association and Editor-in-Chief of PostPress magazine. He has 30 years of experience in the foil and embossing industry and has conducted numerous seminars on the subject for various trade shows and conferences. He also is an accomplished writer, responsible for many technical articles in PostPress as well as in other industry magazines and publications. For more information on FSEA, visit www.fsea.com.



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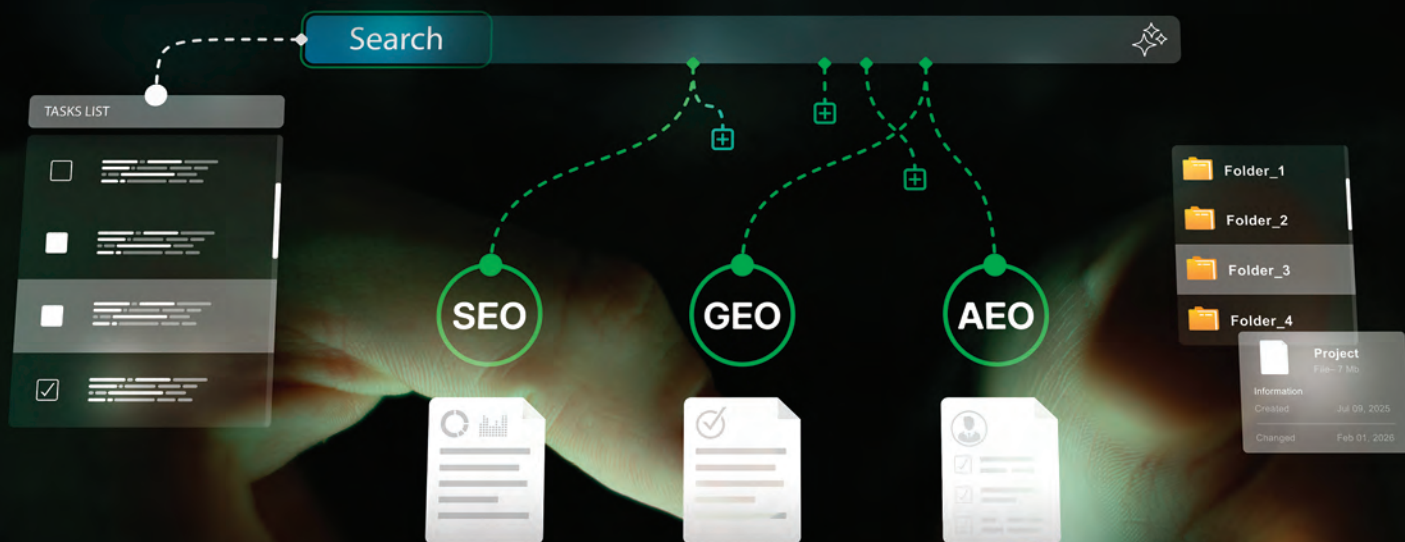
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AEO VS. SEO: THE BATTLE OF THE ALPHABETS

BY HEIDI TOLLIVER-WALKER



(Image courtesy Adobe Stock)

// I just hung up with a potential new client that found us using Gemini. We popped up first! Now I just have to price it to get it, but IT'S WORKING!!!!"

This is an actual email from Patty Brantley, managing director of The Hartley Press (Jacksonville, Fla.), to Patrick Whelan, president of Great Reach Communications (Lawrence, Mass.). The subject line: "Got another one!" She had just landed a client who found her via Answer Engine Optimization (AEO), a week after landing another via traditional SEO.

So should printers be rushing to optimize their

websites for AI search too? What's the difference between it and SEO?

SEO VS. AEO: MATH VS. ART

The difference between SEO and AEO is a lot like the difference between math vs. art.

Traditional SEO is math. Keywords in the right places, at the right frequency. Meta descriptions, URLs, subheads—all of it follows a formula.

AI Engine Optimization (AEO) is more like art. Answer engines like ChatGPT, Gemini, and Perplexity are detectives.

Someone asks a question, and they search the web to find the best answer. To decide which answers to give, these engines try to determine what you do, whether you're an expert, and what makes you different from the other guy. They're looking for E-E-A-T: expertise, experience, authority, and trust. They take these signals from your website and from elsewhere around the web. Trying to figure out what AI engines are looking for (as opposed to last week or even five minutes ago), how they rank the options, and to get them to "see" you is a moving target. It's as much divination as it is science.

So is optimizing for the questions buyers are asking. Sometimes buyers' searches are as simple as "print shop near me." Other times they ask detailed questions based on problems they are trying to solve: "My last printer missed my in-home window and ruined my campaign. Who can I trust?" This is the intersection of art and science where AEO thrives.

WHAT DOES AI ACTUALLY WANT?

When deciding which companies to surface in their summaries, what are AI engines looking for? Details. Comparisons. Case studies. Customer stories. Vague language like "We offer great customer service and you'll love our prices" is invisible to AI. But say "We've been serving Arlington businesses for 35 years and have over 300 five-star Google reviews," and the answer engine pays attention.

Unlike SEO, where you get a good result as long as you plug the right words into the right boxes the right number of times, surfacing in an AI search does not depend on formulas. Nor does it depend on what you say about yourself ("we're great!") Rather, AI wants you demonstrate that you're great (and great at what) through detailed, substantive content, internally connected content (called "topic clusters"), and what others say about you. It loves case studies. Testimonials. Comparisons. Backlinks from trusted authorities. (Just don't try to trick the algorithm. AI knows the difference between a real publication and one created to manipulate it.)

"The biggest problem printers face with their websites isn't AEO vs. SEO," he says. "It's having any kind of good, substantive content in the first place."

AI is checking other sources too. You might have 150 five-star Google reviews, but if the online hiring site Indeed shows former employees bashing you, red flags go up. High percentages of negative reviews undermine trust signals, even if the reviews average out to the positive. Inconsistencies matter to AI.

Many things that AI engines "score" to decide whether to surface your company in its answers are within your control. But not all of them. Wise (Alpharetta, Ga.), for example, discovered it was being flagged by AI as having low trust signals, even though it has an excellent reputation in the marketplace, because of global financial company also named Wise was associated with pages of complaints.

"There is nothing we can do about another company's reputation," says Bob Saunders, vice president of sales for Wise. "What we did was add a line in our 'About Us' section indicating that Wise Business Forms (our formal business name) is 'commonly known as Wise.' This helps answer engines use context to distinguish between us."

BEWARE THE AI SLOP SHOPS

Getting surfaced in AI answers is a complex, multi-factor process, and it's always changing. Successful companies have the knack of finding the right balance between what AI "likes" and creating a match between a company's online content and the questions potential buyers are most likely to ask.

This is why, before creating any content for its AEO clients, Great Reach Communications does thorough research into how each client positions themselves and what makes them truly unique—things that will stand out to AI engines. It researches how the client is perceived in the marketplace, how AI engines "see" the content on their websites, and conducts detailed interviews with owners and executives about their marketing goals and what content is required to fill in the gaps. "Writing the content is the easy part," says Whelan. "It's the background and positioning that's most time-consuming."

This matters because companies are popping up everywhere claiming they can optimize your website for AEO using an automated process through their platform. Whelan calls these "AI slop shops." "Automating AEO is easy and inexpensive, but it doesn't mean it's going to work," he warns.

Another red flag: when platforms can't tell the difference between your commercial printing plant and online players like Vistaprint or equipment manufacturers like Konica Minolta. "If their

platform lists those as your competitors, I wouldn't trust it," Whelan says.

THE LEAD QUALITY QUESTION

But even when AEO is done right, don't expect the inbox to be suddenly overflowing. For Whelan's clients, it's quality over quantity. "We have clients who, in less than two months, are already getting quality leads, but it's not necessarily in volume," says Whelan. "They tend to be either better quality leads or in geographic areas they wouldn't otherwise reach."

He gives the example of two of his clients in Florida, one who used AEO to land an account in Virginia and another to land an account in southern New Jersey. "AEO may develop fewer leads than SEO, but they're often higher value," Whelan notes. "Our clients find that SEO is good for transactional printing like business cards. AEO lends itself to solutions selling."

But before you think either SEO or AEO is the answer to the phone not ringing, Chuck Stempler, CEO of AlphaGraphics Seattle, suggests there might be a simpler reason. "The biggest problem printers face with their websites isn't AEO vs. SEO," he says. "It's having any kind of good, substantive content in the first place. Most printers have very little content on their sites at all. Then they wonder why they don't surface in any type of search except the online Yellow Pages."

TRACKING EVERYTHING

Stempler tracks leads from all sources and maintains balance between focusing on SEO and AEO. "Most people aren't sophisticated in how they conduct their searches," he says. "AEO shines when customers have a problem they're trying to fix. But most people aren't putting in that kind of detail into the search box. AEO technology is ahead of how people are actually using it."

Stempler shared a real-life example of a lead that recently came in through his website from ChatGPT: 10,000 A7 wedding envelopes with gold

glitter. "It's a meaningful contact, but the request itself is not that unique," he says.

Whelan acknowledges that many AI searches are still simple, but he believes that the shift is coming—fast. "Every day more people use AI for the first time," he says. "Every day AI gets better. The better we get at using it, the better results we get, the more we use it. It's as simple as maps to GPS. It's inevitable."

His own experience reflects this. He went from 20% of his internet time using AI in December to 80% by May.

CAN YOU DO IT IN-HOUSE?

Do you need to farm out AEO-optimization work to an agency? Or work through an online platform like HubSpot? Not necessarily. Al Kennickell, president of The Kennickell Group (Savannah, Ga.), is building out AEO in-house. He worked with his web team to configure his site for AI search, then asked ChatGPT to audit it. The engine gave him a list of missing elements. He sent it back to his team for changes.

Others, like The Hartley Press, don't have the resources in-house. Nor do they want to divert critical internal resources to a project that requires ongoing monitoring and expertise.

"But however you do it, it's something printers need to do," says Brantley, who is excited about the new AEO-optimized content from Great Reach Communications that went up on her website in June. "We are already seeing results from our investment. Often, it's coming from areas where we know we didn't have marketing reach before."



GOT THE URGENCY BUG?

Kennickell has urgency about AEO, as well. The Kennickell Group has recently invested in a robust embellishment capability and wants to get the word out. Kennickell is already heavily invested in AI at various levels of the business (including meeting monthly on AI topics with a peer group), and when he was on a recent call where designers kept asking: "Who's a printer who does this? How can you introduce me?" Kennickell realized that he needed to get key sections of his website AEO-optimized, fast.

This is the fundamental tension in AEO. The technology is efficient and takes the path of least resistance. Your job is making sure the right path is also the easiest path for the engine to find.

"We have content related to embellishments on the site already, but it's not on the landing page," he explains. "AI is lazy. It wants to do the least amount of work possible. I want the landing page to say we print embellishments because that's where AI will look first. It won't work any harder than it has to."

This is the fundamental tension in AEO. The technology is

efficient and takes the path of least resistance. Your job is making sure the right path is also the easiest path for the engine to find.

THE WORK REQUIRED

None of this is automatic or one-and-done. Whelan's most successful clients are regularly uploading content, monitoring traffic, and making adjustments as they go. "They're looking at it weekly at least, sometimes daily," he says.

The payoff can be measurable. Wise, for example, tracks referrals through HubSpot and recently had a visitor from ChatGPT who spent 8.4 minutes on their website. "If they spend 8.4 minutes on our site, they're going to remember us," says Saunders. "We recently had a commercial printer contact us about being their label manufacturing backup. That's not a casual ask. You do your homework before reaching out about something like that. I wonder if that's who spent 8.4 minutes on our site."

But it's not all about AEO. Smart search strategies continue to include SEO, as well. Not just because people still use traditional search to find print-related services, but because SEO is the foundation of good AEO.

"We find that clients who had success with SEO understand the inbound lead process better," Whelan says. "For them, tuning for AEO is a natural progression. Not just from a structural perspective on their websites, but from a business perspective. They get it. They're the ones doing the best, both because their websites are optimized for AEO, and because they understand the need."

"Deepen your content. If you have good content, you are more likely to surface in whatever search the customer uses."

But before you get overwhelmed with all of the alphabets, Stempler's advice is to back up and focus on the basics: substantive content regardless of search type. "I continue to go back to the fact that printers overall tend to have very superficial websites," he says. "Deepen your content. If you have good content, you are more likely to surface in whatever search the customer uses."

Still, optimizing for both AEO and SEO is the ideal approach. The Hartley Press is among those printers for whom AEO surfaced new clients with specific needs that were not geography-dependent. They didn't know The Hartley Press existed until AI found them. When Hartley picked up the phone, both customers were ready to buy. But they only found The Hartley Press because The Hartley Press was ready to be found.





SALES OUTREACH HAS ENTERED THE AGENTIC ERA—BUT HUMAN JUDGEMENT STILL WINS

BY JOANNE GORE

We've all seen it. The cold email that pretends to be personal but isn't. The LinkedIn message that references one detail from your profile but misses the point. The automated follow-up that keeps going long after the buyer has disengaged.

The message may be polished. It may even be technically personalized. But it doesn't feel relevant, useful, or human.

On April 1st at 1 p.m. (no fooling), I sat down with Richard Romano of WhatTheyThink for an AI tutorial session called Prompt: Is it AI Slop or Human? (watch it at <https://whattheythink.com/webinars/307/>). We looked at ChatGPT, Perplexity, and Gamma. More importantly, we talked about how to spot unvetted AI content "in the wild,"

identify the common tells of bad AI, and use these tools responsibly to create higher-quality content.

That conversation got me thinking about what happens when AI slop moves beyond content creation and into the sales process. As more and more AI sales agents enter the picture, one question everyone's debating is: are they friend or foe?

To answer that, we need to look at where they help, where they hurt, and where human judgement still needs to lead.

Yes, AI sales agents can help teams reduce repetitive work, improve follow-up, organize account intelligence, and spend more time on conversations that matter. They can also help companies create more noise, faster.

That's the part we need to take seriously.

WHAT ARE AI SALES AGENTS?

An AI sales agent is software that uses artificial intelligence, automation, and business data to perform sales-related tasks with some degree of independence. That covers a lot of ground. These sales agents might research prospects, enrich lead records, score accounts, draft outreach, prepare a sales rep for a call, summarize a meeting, update the CRM, trigger a follow-up, or help assemble a proposal.

The important distinction is autonomy. Some tools are assistive; they help a human complete a task faster or better. Others are more agentic, moving across systems, gathering information, making decisions based on predefined rules, and taking action with less direct human involvement. That sounds powerful because it is.

But before a company buys, builds, or deploys an AI sales agent, it needs to ask: What problem are we actually trying to solve? Because if the answer is vague, the agent will be too.

WHERE AI SALES AGENTS CAN HELP

Sales teams spend significant time on work that matters but doesn't require their highest-value skills. They research companies, prep for calls, update CRM records, write follow-up notes, sort through leads, look for the right case study, and try to remember what happened in the last conversation.

That work is necessary, but it takes time away from the deeply human parts of selling: listening, asking better questions, reading the room, building trust, navigating objections, and helping a buyer make a confident decision.

AI sales agents are useful when they do the grunt work—research, prep, and prioritization—so salespeople can focus on the conversation. That's the real

opportunity: removing friction from sales so humans can spend more time doing the work that truly moves relationships forward. For printers, OEMs, software providers, in-plants, and other B2B organizations in the print industry ecosystem, that kind of support could be game-changing.

Salespeople are carrying long-standing relationships while trying to reach new buyers, and marketers are often juggling campaigns, events, sales enablement, social media, email, websites, and reporting with limited resources. That makes the promise of AI sales agents appealing, but it also makes strategy and governance more important.

A sales rep with better account context before a call can ask better questions. A marketing team that connects campaign engagement to sales follow-up can move the right leads forward. A company that keeps CRM data cleaner has a better chance of understanding pipeline activity. None of this replaces the salesperson. It supports the salesperson.

And that distinction matters.

WHEN AI SALES AGENTS GO SIDEWAYS

So much of what the print industry sells depends on trust, expertise, and context. It faced massive disruption during COVID-19; 70% of print industry respondents reported significant decline in print volumes, while nearly 80% of remote workers reported printing less and working more digitally. Whether the solution is print, packaging, workflow, software, finishing, signage, customer communications, or marketing support, buyers need more than a templated pitch. They need relevance. They need clarity. They need confidence that the person reaching out understands their business



(Credit: Image generated by ChatGPT (OpenAI))

problem. AI can help prepare the message, but it can't create strategic relevance. If the company doesn't know who it helps, how it helps, and why it matters, the sales agent won't know either.

The danger starts when companies mistake activity for progress. More emails. More messages. More follow-ups. More "personalized" touches. More automated sequences. More activity in the dashboard. But more activity doesn't mean better outreach. In fact, it can make things worse.

Most bad sales outreach doesn't start with the software. It starts with unclear positioning, weak targeting, generic messaging, poor CRM discipline, or lack of agreement between sales and marketing about the DNA of a qualified, pipeline-ready opportunity. When that's the foundation, AI doesn't fix the problem. It scales it. The message may include the prospect's name, company, industry, or recent activity, but it still feels hollow and doesn't show any real understanding of why that buyer should care. That's AI slop in sales clothing.

THE COST AND COMPLEXITY QUESTION

When you're using AI for simple drafting, summarizing, or brainstorming, it can feel inexpensive. It gets more complicated (and costly) when you start building workflows that pull from multiple sources like CRM notes, call transcripts, intake forms, service catalogues, campaign data, previous proposals, website content, and internal documentation.

The more context the system processes, the harder it is to control cost, accuracy, and consistency. The more systems it touches, the more governance you need. The more autonomy you give it, the more clearly you need to define what it can access, what it can change, and where a human needs to step in.

Cost also extends beyond subscription fees or API calls. AI workflows rely on energy-intensive servers and data centers, which matters for any company making sustainability claims. That doesn't mean companies should avoid AI, but it does mean they should use it with intention, especially in an industry where environmental proof points are expected.

If AI is being layered into workflows without understanding its environmental cost, part of the sustainability story is being left out. I wrote about this in more detail in *What AI's Energy Demand Means for Sustainability Claims*.

Beyond environmental impact, the financial commitment is substantial. According to Keypoint Intelligence, 48% of companies surveyed are allocating between 10% and 20% of total annual budgets to document and process automation spending over the

next 18 months. With that much budget committed, companies can't afford to chase trends. They need ROI.

We've seen this firsthand at Joanne Gore Communications. AI can remove repetitive work, improve consistency, and free the team to focus on higher-value efforts, but it only works when there's a clear strategy behind it. Our position from the start has been simple: semi-automated, always human.

Sometimes a simple chat-based workflow is enough. Sometimes a guided process—where a human provides the right files, follows a clear operator guide, and reviews the output—is more practical and easier to control. Sometimes a true agentic workflow makes sense because the value comes from gathering information across systems, reconciling it, and preparing an output that would otherwise take hours.

Different problems. Different solutions.

THREE WAYS TO THINK ABOUT AI IN SALES AND MARKETING

Workflow automation among print service providers more than doubled between 2020 and 2023, rising from 19% to 44%. This dramatic increase shows the industry is already embracing automation. Using it strategically, however, is what separates winners from noise-makers.

One helpful way to separate the noise from the value is to think about AI in three practical categories.

- 1. Basic chat drafting:** brainstorming, rewriting, summarizing, editing, ideating, and creating first drafts. It's simple, accessible, and useful when you know what you're trying to accomplish.
- 2. Guided workflow support:** AI helps with a structured process, but the human drives the work, providing approved sources, instructions, context, and judgement. The AI may help analyze, organize, draft, or refine, but you remain responsible for direction and approval.
- 3. Agentic workflow execution:** AI can retrieve files, pull from systems, assemble context, prepare outputs, update records, or trigger actions with a higher degree of independence.

That third category can be powerful, especially for high-value workflows. For example, a proposal package agent could pull from CRM notes, discovery call transcripts, intake forms, service descriptions, pricing logic, and approved messaging to prepare a first-draft proposal for human review.

That kind of workflow saves time and improves consistency. But it could also create problems if the source material is outdated, the CRM notes are incomplete, the transcript misses context, or the

proposed scope doesn't match the actual business need.

The more agentic the workflow becomes, the more important the guardrails become. What sources can it use? Which files are approved? Who reviews the output? What should it never include? How does it know what's current? What happens when the data is wrong?

These aren't technical details to figure out later. They're strategic and operational questions that should shape the workflow from the beginning.

This applies to people as much as process. The next generation entering print expects AI tools to be part of the workflow, but access to tools isn't the same as sound judgement. They still need mentoring on positioning, audience relevance, message quality, and when a human should override the machine.

WHAT PRINT BUSINESSES SHOULD BE ASKING

The print industry shouldn't ignore AI sales agents, but chasing them blindly won't help either. Before implementing them, you need to get clear on what you're trying to solve:

- What sales friction are we trying to remove?
- Do we have a clear ICP (ideal customer profile)?
- Is our messaging strong enough to support outreach at scale?
- Do sales and marketing agree on what makes a lead worth pursuing?
- Is our CRM data reliable?
- Who owns the final review?
- How will we know whether the workflow is helping?

And one of the most important questions: Does this need to be agentic, or would a guided workflow do the job?

That question matters because more automation doesn't automatically create better sales outcomes. In some cases, the smarter move is to use AI to support a person through a repeatable process. That keeps the work faster and more consistent without handing over too much judgement too soon.

The stakes are real: only 14% of print businesses saw revenues increase more than 10% in 2024. In a market where growth is hard-earned, companies can't afford to scale bad messaging with AI. They need human-guided strategy.

HUMAN STRATEGY STILL MATTERS

AI sales agents can surface useful signals, prepare stronger follow-up, organize account information, and give salespeople better inputs. But someone still has to decide who to target, what message will matter, when the timing is right, and whether the next step makes sense. That's where humans still have the edge: knowing when to slow down,

when to pick up the phone, when to bring in another expert, and when a prospect simply isn't the right fit.

That's the line you need to manage carefully.

The companies that use AI sales agents well will understand where automation adds value and where human involvement protects the relationship. They'll use AI to support better conversations, not replace them. The companies that use AI poorly will simply create more AI slop. Which brings us back to the original question: are AI sales agents friend or foe?

The truth is—they can be either.

They're a friend when they help sales and marketing teams reduce repetitive work, improve timing, strengthen follow-up, and focus more energy on the right opportunities. They're a foe when they scale weak messaging, create fake personalization, increase inbox noise, or make teams think technology can replace clarity.

The companies that get this right won't be the ones that automate the most. They'll be the ones that know what should be automated, what should be assisted, and what should stay human.

The more honestly we talk about what AI can do, what it can't, and where human judgement still matters, the better decisions this industry will make. Yes, sales outreach is getting agentic. But human judgement still wins.

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FROM ZERO TO HERO:

CONTINUOUS IMPROVEMENT IN WASTE REDUCTION

BY RICHARD ROMANO

A term that often comes up in sustainability conversations is “zero waste,” a phrase that over the years has become more aspirational than actual, more metaphor than reality—is depending on how you define it. Whether you are a consumer, much less if you own a business—and a manufacturing business at that—one quickly finds that achieving “zero waste” can be daunting. As a result, companies and organizations, even those committed to achieving sustainability goals, have different ways of defining it and incorporating waste reduction and elimination initiatives into their business.

SGP CERTIFICATION REQUIRES WASTE REDUCTION CONTINUOUS IMPROVEMENT INITIATIVES

“It can be such a confusing topic, and some of the companies that SGP works with at first find it daunting to conceptualize and achieve,” said Birdley James, Chair of the Sustainable Green Printing Partnership (SGP)



(<https://sgppartnership.org>), the “gold standard” for sustainability certification for the printing industry. “But 100% waste reduction is not necessarily a realistic goal at the onset of the certification process.” SGP’s Sustainability Management System certification provides print facilities with a pathway to work towards zero waste by helping them understanding their current state waste metrics, benchmarking their data and setting realistic goals with a continuous improvement initiatives and action plans.

As I always say, sustainability isn’t a final destination, it’s a journey, and as a result different printing companies embark upon that journey in different ways, with different milestones and progress metrics.

DRIVING WASTE REDUCTION THROUGH CLIENT COLLABORATION & SUPPLY CHAIN STRATEGIES

James’ day job is as SGP/EHS Coordinator and Compliance Manager for Miller Zell, a major printer, designer, prototyper, and manufacturer for “brand experiences.”

“When you look at certain business structures, you can see how it’s impossible for them to get to zero,”



said James. “For us [at Miller Zell], we’re always striving for zero. We’re identifying all of our production waste and trying to find the correct and the most appropriate recycling or upcycling stream for it. To get to zero waste can be challenging, so we have a standard target of a 5% reduction year-over-year that we pursue.” And one goal is to increase that reduction over time.

Miller Zell works with major national retailers, many of which are highly sustainability-minded. One of Miller Zell’s strategies is to partner with them on their own sustainability initiatives. A big focus is on end-of-life—when retail displays are redesigned and replaced, what becomes of them? “We’re looking at trying to figure out what does the end-of-life look like for products once they’re redesigned,” said James. “That includes printing, design, logistics, installation—it’s the whole package. When it’s time for a redesign, how do we deal with the waste in the field responsibly?” That is one of Miller Zell’s big focuses in 2026.



Forge Graphic Works specializes in display graphics, signage, and retail three-dimensional displays.

Different print businesses have different strategies and goals when it comes to waste reduction.

FORGING AHEAD

Forge Graphic Works is a 15-year-old business specializing in wide-format printing and three-dimensional retail displays. Comprising about 40 employees, Forge Graphic Works has been an SGP-certified facility since 2018. Echoing what SGP's James said, JuLisa Wright, Operations Manager, said, "We definitely put in our efforts for zero waste, but given the industry that we're in, I'm not sure that it'll ever be zero." Forge's initiatives toward waste reduction center largely around reducing rework—that is, minimizing or, better yet, eliminating jobs that have to be redone. After all, a job that isn't acceptable to the customer is essentially waste the moment it comes off-press.

"One of the things that I think helps with the zero-waste agenda as well as reducing rework and spoilage is optimizing production processes," said Wright. "So, doing that, you minimize your waste through accurate estimating, efficient nesting, and process controls." Forge addresses production shortcomings on a daily basis to identify where improvements need to be made.

Meyers is a Net Zero, zero-waste, sustainable printing company in Minneapolis specializing in folding cartons, pressure-sensitive labels, and RFID-enabled packaging. The company operates on 100% carbon-free electricity and holds certifications from EcoVadis, FSC, and the Sustainable Green Printing Partnership (SGP).

Forge also performs substrate management and reuse. "If a job only takes up three-quarters of a sheet, we inventory that and then apply it to the next job when possible, so that limits what we're throwing out in our cardboard bins or our trash bins," said Wright. This is especially the case for hard-to-recycle materials like acrylics.

Another waste-reduction initiative is inventory reduction combined with careful monitoring of time- and storage-sensitive consumables. "We have really good partnerships with our vendors that allow us just-in-time manufacturing, which helps us avoid overstock that can lead to expired shelf lives or just wasted materials," said Wright. They also keep track of what materials aren't seeing great demand. "Then we let our project

managers and sales team know that, 'Hey, we have a surplus of this material—see if you can't sell it,'" said Wright.

And, of course, Forge actively identifies new and effective recycling options. "One of our key topics is looking for new outlets for recycling because there are a lot of things in the wide-format industry that are harder to get rid of, like release liners and laminates," said Wright. "Fabrics sometimes can be challenging, so we're constantly researching new avenues for recycling." Casual conversations with colleagues at other print businesses at trade shows are also a good way to learn of new waste-reduction strategies. At the same time, added Wright, "manufacturers and vendors are trying to launch recycling



programs and takebacks, so we sit down with them to try and see if we have enough to meet the requirements.”

One of the things that has helped Forge with sustainability in general and waste reduction in particular has been having a dedicated waste reduction manager on staff, charged with spearheading the relevant initiatives. “It definitely helps with accountability and consistency,” said Wright. “Once the momentum gets going, the training is out there, and people know what the initiative is, I think how we staff and how we promote our culture helps kind of bridge that gap.”

THE WHOLE PACKAGE

“To me,” said Michael Dillon, CRO and co-owner of Meyers, “zero waste is a certification that really means landfill diversion. Zero waste doesn’t mean that there is no waste coming out of a manufacturing facility, it just means that you’re doing it responsibly.”

Meyers is a third-generation family business based in Minneapolis, specializing in folding cartons, labels, and printed electronics and primarily serving the food and beverage, health and beauty, and life sciences markets. The company has been SGP-certified for five years and is a “zero-landfill printer.” “We have not pursued a third-party certification around it, because it was not client-driven but internally-driven,” said Dillon. “We looked at it as an executive and ownership team, and said, ‘Hey, what’s the right thing for us to do for the planet? What’s our responsibility as a company that makes a lot of things that end up out in the world that eventually get thrown away?’” Those internal discussions led Meyers on the path to being landfill-free.

Getting to landfill-free involves multiple strategies. The first is, well, not generating waste in the first place. Like Forge Graphic Works, Meyers focuses on improving their production processes. “How do you manufacture more efficiently?” said Dillon. “How do you have a supply chain that is well-suited to the manufacturing you’re doing so that you just don’t create waste to begin with?”

A second strategy is responsibly handling whatever waste is produced, whether that be composting of organic materials within their office and lunchroom areas (we often focus so much on production-specific sustainability that we often forget about the “carpeted” areas of the facility). “We compost whatever we can within the office and we recycle everything that we can get away with,” said Dillon.

Part of any waste-reduction initiative involves developing metrics for tracking progress, and that can be tricky, especially for a company like Meyers that has been growing aggressively over the past several years. “Even if you’re going to normalize it based on, say, million dollars

of revenue, which is usually our go-to normalization, you don’t want to lose track of what the total amount [of waste] is.”

They also track different waste streams. “There’s solid waste that gets converted to energy, essentially it’s incinerated in a way that allows for energy to be recovered,” said Dillon. “There’s hazardous waste, which is a licensed disposal that gets heavily processed, and ultimately that’s converted to energy, too. Hazardous waste can be contained and then go into special landfills.”

For the energy recovery aspect, Meyers has partnered with a third party. “One benefit that we have in the Twin Cities is having access to great infrastructure,” said Dillon. “We’re able to not have to ship it too far to have it managed.”

Geography also helps in that Minnesota and Wisconsin is home to a lot of other printers, which makes it economical for those third parties to serve a lot of manufacturers that have similar waste streams.

Meyers has also found that having an individual in charge of spearheading sustainability and waste-reduction initiatives is supremely helpful. “We have a person here whose focus is EHS and S, environmental health, safety, and sustainability,” said Dillon. “Waste management and setting all of these corresponding sustainability goals is part of what they do here. Everybody here has a responsibility and that’s great, and we all take it seriously, but without a person who’s specifically in charge of accomplishing goals, I don’t think you can hope to be approaching your potential for making progress.”

Ultimately, Dillon’s call to action for everybody in the industry is, “Say to your clients, we know these [sustainability areas] are out there, and that if you want to find them, start working with your clients on them. Join a group, especially an accreditation body like SGP, where you can network with your peers and ask about what they’re finding.

“These are the things that are win-wins,” he added. “Sustainability is good for you financially, it’s good for the planet, and it’s good for your clients.”

AT THE END OF THE DAY

As I said at the outset, sustainability and waste reduction are journeys, not destinations, and as printing industry initiatives they are only going to become more important. Industry events like the upcoming PRINTING United in Las Vegas are great opportunities for research, both via networking with colleagues as well as visiting relevant exhibitors. And getting involved with—or, better yet, certified by—an organization like the SGP can offer a great roadmap for guiding a print businesses’ sustainability journey.

THE DIGITAL PRODUCT PASSPORT IS COMING TO AMERICA

—WHETHER U.S. PRINTERS ARE READY OR NOT



BY DEBBIE MCKEEGAN, *TEXINTEL*

Here is an uncomfortable truth for the U.S. printing industry: a regulation drafted in Brussels is about to dictate how you document, produce, and sell printed textile products—and most American printers have no idea it is happening.

The Digital Product Passport (DPP) is frequently dismissed as a European concern, a piece of continental bureaucracy that stops at the Atlantic. That assumption is not just wrong. It is commercially dangerous. The brands you print for are already preparing. The deadlines are closer than they appear. And the printers who treat the DPP as someone else's problem will find themselves quietly removed from supply chains they have served for decades.

This is not a distant regulatory rumor. It is an incoming mandate with direct consequences for any U.S. printer connected to the global apparel and textile trade. Let me explain why.

WHAT EXACTLY IS A DIGITAL PRODUCT PASSPORT?

At its simplest, a Digital Product Passport is a digital record attached to a physical product accessed through a QR code, NFC chip, or barcode that documents everything about that product across its entire lifecycle.

For a printed textile product, the DPP captures a remarkable depth of information:

- **Substrate details:** the fabric, its origin and composition
- **Inks and dyes used:** including compliance with chemical safety regulations
- **The printing process and technology** applied, whether digital or analogue
- **Environmental impact**, covering water usage, energy consumption and carbon footprint
- **Supply chain traceability**, documenting suppliers and their compliance credentials
- **End-of-life instructions** for repair, resale and recycling

Think of it as a nutrition label for garments. Just as consumers can read exactly what is in their food, the DPP allows buyers, brands, regulators, and recyclers to understand exactly how a product was made and what it contains.

The framework sits within the EU's Ecodesign for Sustainable Products Regulation (ESPR), which entered into force in July 2024. Textiles and apparel have been designated as high-priority sectors, placing them among the very first product categories required to comply.

WHY "IT'S JUST AN EU THING" IS A DANGEROUS MISCONCEPTION

Here is the detail that should stop every U.S. printer in their tracks: the DPP applies to any product *placed on the EU market*—regardless of where it was made.

That single principle dismantles the comfortable assumption that this is a European problem. If a U.S. brand exports garments, footwear, or accessories to any of the 27 EU member states, that brand becomes a responsible economic operator under the ESPR and must comply fully with DPP requirements. Failure to comply

does not mean a fine. It means restricted market access. No passport, no sale.

Now follow the chain of consequence. Those U.S. brands cannot generate a compliant passport on their own. They need verified, structured data from every stage of production—including printing and dyeing, two of the most heavily scrutinized stages in the entire textile supply chain. Which means the brands you supply will turn to you and ask a simple question: *Can you give us this data?*

If the answer is no, you have a problem. Because somewhere in your competitive landscape, another printer is preparing to say yes.

The timeline leaves little room for complacency. The Delegated Act (legally binding European Commission regulation) covering apparel is expected to be adopted in early to mid 2027, with mandatory DPPs for textiles, apparel and footwear anticipated between 2027 and 2028. The EU's broader phased rollout extends towards a fully circular model by 2033, but treating 2027 as a deadline rather than a starting point is precisely the mistake that will catch the unprepared off guard.

HOW IT WORKS END-TO-END: THE TEXTILE EXAMPLE

To understand why printing sits at the center of this, it helps to trace a single garment through its DPP journey.

It begins at the **fiber level**—Tier 4 of the supply chain—where raw materials are grown or produced. From there, the product moves through spinning, weaving, and finishing, with each stage adding data to the passport: material origin, processing location, chemical inputs, and certifications.

Then comes **printing and decoration**—your stage. This is where the DPP demands granular detail: which inks and dyes were applied, whether they comply with chemical safety regulations, how much water and energy the process consumed, and whether digital or analog methods were used. That last distinction carries growing weight, because digital printing typically generates less chemical waste and uses water more efficiently than traditional methods.

Each of these data points connects to a **unique digital identifier** embedded in the finished product—a QR code on a woven label, perhaps, or an NFC tag. Scan it, and the entire verified history of the garment unfolds.

The British fashion brand **Nobody's Child** offers a glimpse of what this looks like when done well. Working with supply chain technology platform Fabacus over three years, they built passports that go far beyond minimum compliance—multi-fiber traceability, environmental impact data calculated with sustainability specialists,



and direct links to repair, rental, and resale partners. Crucially, they treated the passport as a commercial asset rather than a compliance chore, embedding a customer engagement mechanic that rewarded buyers for scanning and registering their products. The result: over 12,500 customers registered first-party purchase data, generating an estimated £250,000 (US\$330,398) plus return on the initiative.

The lesson for US printers is unambiguous. The businesses extracting real value from the DPP are not waiting for deadlines. They are moving now.

WHY THIS MATTERS FOR U.S. PRINTERS SPECIFICALLY

Printing is one of the most scrutinized stages in the entire textile supply chain. It involves chemical inputs, significant water and energy consumption, and processes that directly determine a product's environmental credentials. Under the DPP framework, that scrutiny becomes mandatory disclosure.

For many U.S. printers, this exposes an awkward reality: the data the DPP demands currently sits in spreadsheets, buried in internal systems, or—more often than anyone would like to admit—nowhere at all. Specifically, printers will need to provide:

- **Disclosure of dyes, inks, and chemical substances** used, with compliance to chemical safety standards
- **Environmental metrics**, including carbon footprint, water and energy use, and waste generated
- **Supply chain traceability**, confirming which suppliers provided substrates and inputs
- **Process-level data**, indicating whether digital or analogue methods were used

For businesses built around analog methods with limited digital record-keeping, this transition will be demanding. But for those already investing in digital printing workflows and integrated data systems, the DPP is an opportunity to formalise and showcase what they are already doing well.

This is the reframe that matters most. The DPP is not merely a burden. It is a sorting mechanism that will divide supply chains into those who can demonstrate integrity and those who cannot.

THE COMMERCIAL OPPORTUNITY HIDING INSIDE THE COMPLIANCE

Printers who view the DPP purely as a cost will miss the larger picture entirely. Consider what verified, structured data actually unlocks.

You become a preferred supplier. Large brands now face legal liability for the accuracy of their environmental reporting under directives such as the CSRD (Corporate Sustainability Reporting Directive). They need partners they can trust to supply data that stands up to scrutiny. Printers who can demonstrate verified environmental performance will be chosen first. Those who cannot may find themselves quietly deprioritized—regardless of price or lead time.

You prove your digital investment pays. If you have already moved towards digital printing, the DPP lets you prove your process is cleaner, leaner, and more traceable than competitors still relying on analog methods. Transparency becomes a selling point, not a chore.

You build direct relationships with brands. The DPP creates a new collaborative point of contact between printer and brand. Step into that role as a genuine data partner—not a passive subcontractor—and you deepen relationships that become far harder to replace.

You future-proof against regulatory risk. Penalties under related due diligence directives can reach as high

as 10% of annual turnover. Building DPP-ready systems now avoids both that exposure and the cost of a rushed, reactive scramble later.

WHERE TO BEGIN

The scale of the DPP can feel overwhelming, but the first steps are clear and achievable.

- 1. Audit your current data landscape.** Understand what product and process data you already hold, where it lives, and how reliably it is captured. Identify the gaps between what you have and what a first-phase DPP will require.
- 2. Map your supply chain.** Begin engaging your material and chemical suppliers about their own data capabilities. The DPP is a supply chain challenge as much as a technology one.
- 3. Invest in interoperable digital infrastructure.** Whether through a dedicated DPP platform, a PLM system or an integrated data tool, seek technology designed to connect with the systems of your brand and retailer customers.
- 4. Run a pilot.** Select a single representative product line and test the full data flow—from supplier input to QR code generation and consumer access. Readiness comes from testing, not declaration.
- 5. Use compliance as a commercial narrative.** Do not wait for the regulation to tell your story. If your processes are cleaner and your data is reliable, start communicating that now.

THE WINDOW IS OPEN—FOR NOW

The Digital Product Passport is not an administrative footnote. It represents the most ambitious attempt yet to reshape the relationship between consumers, brands, and the products they make and buy. And contrary to the prevailing assumption in American boardrooms, it does not stop at the EU border. It follows the product—and the product is global.

For U.S. printers, this is a defining moment. The brands you serve are already moving. The deadlines are already set. The only open question is whether you will lead this shift or be left explaining to your customers why you cannot give them the data their business now depends on.

The printers who prepare now—who invest in the right technology, build transparent supplier relationships and treat data as an asset rather than an obligation—will not simply comply with the DPP. They will use it to win. The rest will spend the next few years wondering where their customers went.

The choice, and the advantage, belongs to those who act first.



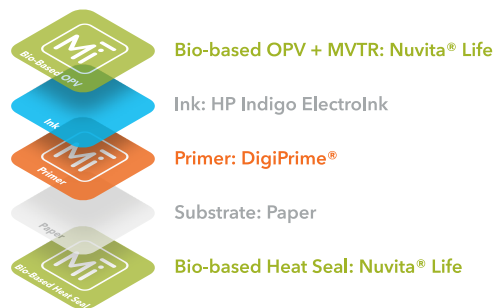
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THINK INK: CHANGES AFFECTING THE MOST FUNDAMENTAL PRINTING CONSUMABLE

BY RICHARD ROMANO

In its most basic form, printing is “ink on paper,” and while Mary Schilling has written extensively about new developments in digital inkjet inks, changes are afoot in other kinds of inks as well—specifically offset and flexo inks. Some of the major changes affecting ink manufacturing—and, by extension, ink use, are:

TARIFFS

The 2025 (and ongoing) “tariffopalooza” has affected virtually every industry, and printing is no exception. Consumables in general saw price increases due to new tariffs, and ink was likewise affected. Many of the pigments used in printing inks come from China (especially titanium dioxide, the pigment used in white ink) and India. “Not a lot of pigment manufacturing and sourcing is done in the US,” said Thayer Long, Chief Strategy Officer for the National Association of Printing Ink Manufacturers (NAPIM). Nitrocellulose, which is used a lot in resins for flexo inks, is also sourced overseas. And even the metal for the cans and drums in which ink is sold comes from overseas. So tariffs on all these materials makes ink manufacturing—and ink buying—more expensive.

END-USE APPLICATIONS

The shift away from traditional commercial and publication print towards wide-format and especially packaging naturally plays a role in what kinds of inks are increasing—and decreasing—in demand. “Just over half of ink demand right now is going into packaging,” said Long.

At the same time, wide-format and textile printing are expanding, and more and more vendors are introducing “direct-to-object” printing systems, which creates demand for different kinds of industrial inks.

ENERGY CURING

UV (ultraviolet)- and EB (electron beam)-curable inks are not new (the annual Print UV Show in Las Vegas has been a longstanding industry event), but are starting to be used in more and more commercial print and packaging applications, often to add special effects (be they visual or tactile) to printed materials, or allow printing on different kinds of substrates not compatible with traditional offset inks. At the same time, aqueous or water-based inks are seen as preferable to solvent inks, largely for reasons of sustainability and employee health. In the wide-format space, the switch from solvent to so-called “eco-solvent” inks (which have milder volatile organic compounds—VOCs—the more aggressive of which can be hazardous if inhaled) has reduced the need for elaborate ventilation systems and has made shop floors generally healthier and more pleasant. Aqueous inks continue that trajectory, especially as substrate compatibility improves.

REGULATORY CHANGES

There have been some high-profile attempts to regulate chemicals used in printing inks—or ban inks that use them entirely. Last year, Washington State decided it wasn’t happy with the EPA’s allowance for iPCBs (“inadvertent” PCBs—generated as the result of other chemical reactions that take place in printing inks or their manufacture) and had floated a potential statewide ban on printing inks containing them. A year earlier, New York State had taken aim at carbon black, with proposed legislation that placed carbon black on a list of toxic substances that could not be contained in packages and labels sold, offered for sale, or distributed in the state. Fortunately, these actions have not gone anywhere...so far. (The risks of both of these chemicals in the amounts found in inks are negligible.)

On the other hand, per- and polyfluoroalkyl substances (PFAS)—so-called “forever chemicals”—do not degrade easily in the environment and have been shown to have adverse effects on human health. At present, 14 states (there likely will not be any action at the Federal level for the foreseeable future) have active or impending bans on

(Image courtesy Adobe Stock)

PFAS in packaging and textiles consumables, including inks. Some of the bans specifically target “intentionally added PFAS” and manufacturers have to either completely remove them or disclose their use to regulators.

TPO (trimethylbenzoyl diphenylphosphine oxide) is a photoinitiator used in UV-curable inks (a photoinitiator is the chemical that jump starts the polymerization process that cures the ink), and the ink industry has concerns that it will be banned, especially as the EU has already banned it for use in cosmetics (it was commonly used in UV-curable nail polish—yes, there is such a thing). While inks containing TPO are currently not banned, the European Printing Ink Association (EuPIA) includes TPO on its “exclusion list,” which means that it’s not recommended for use in printing inks if there is a risk of human exposure. As a result, ink makers have been introducing TPO-free inks, at least in Europe. If there are impending TPO bans in the US (or, more likely, at the state level), there will need to be ink reformulations.

Other inky chemicals of concern include mineral oil hydrocarbons (MOH), which are derived mainly from petroleum distillation and refining, and are categorized as MOSH (mineral oil saturated hydrocarbons) and MOAH (mineral oil aromatic hydrocarbons). Some types of MOH have been identified as carcinogenic (or potentially so) or have other human health consequences.

In all of these cases, the burden mostly falls on ink manufacturers to find suitable replacements for the affected chemicals, but print businesses who have “stranded stock”—inks in their storerooms that still contain the offending materials after the do-not-use-after date—may have no choice but to discard it.

On the plus side, there has never been a better time to be an ink chemist. But that said, the requirement for ink reformulation puts additional costs on ink manufacturers and disrupts supply chains and commodity sourcing. And while eliminating decidedly hazardous materials from inks (or any product) is obviously a good idea, are the risks significant? In the case of Washington’s iPCBs and New York’s carbon

black, the proposed legislation came out of lawmakers not understanding the chemistry behind ink, or overestimating the risks of human exposure—often at odds with what the Feds have determined. For example, in 2005, the EPA declared that carbon black’s risk of toxicity was low when used as a pigment or a colorant, and OSHA has decided that exposure doesn’t occur when carbon black is “bound within the matrix of a product such as printing ink,” as Patrick Henry wrote about the issue in 2024. So is the science behind any proposed legislation solid? Are the bans justified? In some cases, they may be. Remember, radium was once hailed as perfectly safe and used on everything. If you’ve ever read the book or seen the play *Radium Girls*, you know how decidedly wrong that belief was. The goal is to look closely at what the best science says. Sometimes these substances are really bad; oftentimes, they’re not.

So the ink industry in general, and NAPIM in particular, are putting their best scientists on these issues. “At NAPIM, we’re really trying to focus on putting our science forward,” said Long. “We’ve got great teams of scientists and chemists that work for our members, so right now we’re putting together a science advisory panel to really help challenge some of these myths that a lot that these chemicals are harmful or have a significant impact on health.”

And it’s not just US regulations that impact the industry. Products sold in Europe must meet whatever EU regulations exist. NAPIM thus works very closely with the European ink industry to keep on top of all these issues. “Most of the major ink manufacturers are Europe- or Japan-based, so they’re obviously following those trends closely, and we’re following suit,” said Long.

SUSTAINABILITY

Sustainability, as it applies to inks, overlaps to some extent with the above issues regarding potentially hazardous or harmful ink components, but other primary topics include recyclability and deinking. “Sustainability, which is more about recycling and reusability and deinking, is going to continue to be the product roadmap,” said Long.

All of these issues—and more—will be discussed in depth at the upcoming NAPIM 2026 Annual Convention/ Technical Conference, October 5–8 in downtown Chicago. The event features technical presentations, regulatory and safety updates, supplier showcases, tabletop exhibits, and ample networking opportunities. For more information, visit <https://napim.org/napim-events/napims-2026-annual-convention-technical-conference>.

THE INVISIBLE SIDE OF AUTOMATION: INK MANAGEMENT

BY RICHARD ROMANO

Much of this Technology Outlook issue has focused on automation, and a lot has been written here and elsewhere about software automation, production automation, the ubiquitous AI, and even robotics. And yet, offset shops still often have a press operator manually adding ink to the fountain. So one aspect of production automation that often gets overlooked is automated ink management.

"It's a gap in automation," said David Doucette, Director of Sales for Sentinel Ink Management Systems. "We've had this product for decades and it's probably more relevant now than it was when it came out, because it's always been about automating and improving operational efficiency."

The product is the Sentinel Ink Management System, a computer-controlled, fully automated ink dispensing solution that monitors ink levels across an entire ink fountain and automatically adds the correct amount of ink precisely when and where it's required. "It's only adding ink into the fountain where it's low," said Doucette. "It's not just arbitrary, or dumping ink across the whole fountain. It reads the fountain and only adds it where it needs it."

The system lets print businesses optimize their labor, especially given the latest press trends. "Most of the presses we're seeing now are eight colors—we see very few that are less than eight colors," said Doucette, "and they're running faster than they've ever run, which means they're consuming ink faster than they ever have. So when you put together all these colors and the fast speeds, you'd need one guy basically just filling ink if you're doing it by hand." By automating this process, it allows the press operator(s) to focus on the quality of the current job and queuing up the next one. "It's a huge boon for the guys running the press."

And one Sentinel customer has a 14-color Heidelberg—as far as I know, the largest press in the Western Hemisphere. It would be very difficult to monitor and refill all that ink manually.

The advantages to this system are not just in terms of not needing a press operator to manually monitor ink and refill the fountain, but also better color consistency. "Even with the automation to maintain color that the press has, it's chasing it because you can't get away from the fact

that if you have a lot of ink one moment and 20 minutes later you're almost out of ink, it doesn't print the same," said Doucette.

Another advantage of automated ink management is reduced costs—not just labor, but because there is far less ink waste. And of course less waste also translates to better sustainability.

The Sentinel system uses large ink canisters that then feed the fountain, but what happens when the canisters themselves run low? When ink in the canister reaches a certain level, an audible alarm goes off and lights flash—alerts that are pretty hard to miss—and replacing the canister is a 10-second swap.

The Sentinel Ink Management System is compatible with any offset press from any manufacturer, and accepts automated cartridges from all ink vendors and suppliers



The Sentinel System constantly monitors the ink fountain and automatically adds ink only when and where it is needed.



(Above) Swapping out an ink canister takes only 10 seconds. (Right) The Sentinel RemoteLinc adapter draws ink directly from bulk supply drums.



in both 8-lb. and 2kg sizes. It also handles PMS colors—an ink type that in particular benefits from effective ink management. “When you run a PMS color, it’s going to be the most expensive ink you buy,” said Doucette, “so you don’t want to waste it.” And excess ink will keep better and longer in a canister than if it’s put back in a can.

The Sentinel system can even be retrofitted to older presses—even very old presses. “I got a call from a guy who said, ‘My press is really old,’” said Doucette. “I said, ‘How old is really old?’ and he said, ‘It’s 62.’ ‘Yeah, we can set that up, no problem.’ We do a lot of retrofits.”

There are three varieties of the Sentinel System:

- **Sentinel iPro** monitors and dispenses ink, keeping it at a consistent level.
- **Sentinel Ranger** connects to a bulk ink system for uninterrupted flow.
- **Sentinel RemoteLinc** is an adapter that replaces an 8-lb. cartridge and draws ink directly from bulk supply drums via a hydraulic hose to deliver consistent feed pressure.

As we saw in the previous article, a big trend in ink today is a move to energy-curable ink, especially UV-curable ink. “One of the things that we see with UV inks is their viscosity—they’re very thick and don’t want to flow down into the nip in the fountain,” said Doucette. So the Sentinel system always includes agitators called plows

that keep the viscous ink from just sitting in the fountain and get it flowing.

Another major trend in print businesses today is data collection, and Sentinel includes an ink reporting system that shows every station on the press, how much ink is left in each canister, and how much ink has been consumed on the job so far. At the end of the job, the system can print out a report that specifies exactly how much ink was used on each color for that job. This data can then be uploaded to the costing and estimating department to confirm that what was estimated vis-à-vis ink was what was actually used. This can then increase the accuracy of estimates on future jobs, such as reprints.

“I find that the press manufacturers particularly like that because they’re telling me that most of their customers are very data-driven right now,” said Doucette. “They’re looking for all of those data points to be part of their costing model.”

If you’re going to be at the upcoming PRINTING United, Sentinel will be demonstrating their system.

Even if you opt for another kind of ink management system, it’s an important yet often undiscussed aspect of the automation conversations the industry has been having more and more often—and will in all likelihood continue to have.

IS THERE STILL VALUE IN VINYL?

The world of display graphics has evolved. A look at a dynamic marketplace and the role of vinyl today

BY CARY SHERBURNE



Vinyl once was the 800-pound gorilla on the display graphics market. The heart of a sign-making operation was the vinyl cutter or cutting plotter and weeding tools to remove waste vinyl from around and inside the letters. Then letters could be applied to the final substrate and oftentimes laminated for additional durability.

But with the availability of advanced paper-based materials, soft signage (fabric), UV curable inks, and other new developments, vinyl is losing its edge, although it still remains a dominant signage material. While utilitarian, “flat” vinyl can be perceived as cheap or static for premium indoor spaces. Plus, both producers and buyers of signage are looking for materials that are more



Image right courtesy
Monadnock Paper Mills

sustainable, more customizable, and more highly tactile. This is especially true for indoor retail signage, short-term promotional signage, and signage for events.

No, vinyl is not disappearing, but it is evolving to PVC-free solutions that are in compliance with emerging regulations, such as materials made from polypropylene, polyethylene, or polyolefin resins that are set to capture market share conventional vinyl is losing, according to Walki, a European materials company specializing in packaging and engineered material solutions. This is particularly important since the European Environmental Bureau and other bodies, particularly in Europe, are pushing for a blanket ban of the production and use of PVC by 2030—which sounds like a long way off, but it's less than four years away. Of course, lobbyists and other special interests, including the construction industry which has a heavy dependence on PVC, are working against such a ban. However, the EU has been banning some of the chemicals needed to manufacture PVC, making its manufacture legally burdensome, and some industries, such as display graphics, are naturally moving toward other options, including PVC-free resins, fabric, paper, etc., as we describe below.

WHAT'S TAKING THE PLACE OF VINYL, AND WHERE?

So what's taking its place as its market share continues to erode? Soft signage has been a strong competitor for a long time—that is, signage printed on fabric, usually polyester based. Silicon-edge graphics (SEG) are also popular for use in many types of spaces, including retail, galleries, hospitality and more. Vinyl, especially in larger sizes like banners, is rolled up for shipping, and is heavy, while fabric



can be folded, is much lighter weight, and easier to ship. As a result, it also lowers the transport-related carbon footprint. There is an aesthetic value as well, especially when installed under intense lighting, where fabric absorbs and diffuses light, while vinyl reflects light, often creating an unattractive glare.

A recent signs.com block post presents a comparison between vinyl and fabric backdrops for trade shows, which is worth reviewing. Vinyl still has value, including durability and weather resistance. But increasingly, especially for trade shows and events, fabric is taking center stage.

ADVANCED PAPER AND PAPERBOARD SOLUTIONS OFFER A VINYL ALTERNATIVE

A growing number of mills are bringing advanced paperboard solutions to market as a more environmentally sound alternative to vinyl, even PVC-free vinyl. Structural paperboards and other paper-based offerings are becoming more popular for shorter-term

indoor displays. A big advantage is in disposal—100% recyclable and re-pulpable, they can be tossed straight into the recycling bin when the campaign ends, eliminating the need to send vinyl to the landfill, although depending on finishing and other processes, vinyl can be recycled, though not as easily.

There are several of these emerging advanced paper-based products becoming available on the market. Here are a few examples (not all-inclusive and not presented in any particular order):

- Monadnock's Ultrahide PC 100 Blockout Poster is a heavy-weight, 100% post-consumer recycled, 100% opaque paper-based stock the mill has developed with a goal of completely replacing PVC vinyl banners and plastic films in retail windows, hanging displays, and double-sided POP signage.
- Neenah Paper offers Blox-Lite® & Blox-Lite® UC, arguably Ultrahide's strongest rival. Blox-Lite is a cellulose-based, 100% opaque, heavy-weight banner and poster media designed to replace PVC blockout vinyl. It is FSC-certified and handles two-sided printing. Neenah also offers specialized versions that Monadnock doesn't heavily highlight, such as Blox-Lite FR (Flame Retardant for strict public fire codes) and Blox-Lite Chrome (a metalized blockout version).
- DISPA® from 3A Composites is a 100% recyclable, FSC-certified paperboard featuring a unique embossed paper core. While a bit more rigid

than Ultrahide's traditional poster format, it is a primary competitor for structural hanging retail signs because its core keeps the sign perfectly flat without warping.

- 3A also offers KROMA®, a multi-ply, sustainable wood-pulp board widely used in European and global retail markets for double-sided indoor signage with zero light show-through.
- KATZ Americas makes a display board from a dense, sustainable wood-pulp core lined with premium paper on both sides, KATZ boards are entirely biodegradable and recyclable. They are designed for high-end, heavy-weight indoor retail graphics where brands want to avoid plastic alternatives.

MATURING INKS—ESPECIALLY UV-CURABLE AND LATEX—ALSO PLAY A ROLE

In addition to newer, more sustainable substrates, vinyl is also challenged by maturing inks. Historically, wide-format printing relied on solvent inks that needed plastic/solvent-receptive PVC vinyl to properly adhere and survive outdoor installations.

UV-curable inks are now available on a wide range of printing devices, ranging from rollfed and flatbed (or hybrid) wide-format printers to more conventional printing options such as offset and flexography.

The benefit of UV-curable inks is the fact that they do not need to absorb into the substrate; rather, they are instantly cured using UV light (these days, low energy UV-LED lamps are common) sitting on top of the substrate rather than sinking into it. This delivers ultra-durable, outdoor-grade, scratch-resistant graphics that can be printed directly on to a wide range of display graphics substrates—wood, glass, fabrics, corrugated board, etc. And unlike vinyl, there is no need to laminate it, which takes time and labor out of the manufacturing process, although some print engine suppliers offer various types of coating to provide different finishes to the final piece, typically applied in-line.

Latex inks are also eco-friendly, low-VOC options that come out of the printer dry



and ready to use. Latex inks use a thermal evaporation process for drying, rather than UV light, to dry the ink and lock it onto the substrate. While UV inks can literally print on just about anything, Latex inks are traditionally used in roll-to-roll applications meant for flexible media. It should be noted that latex typically refers to a natural, rubber-based material; in the case of these inks, however, there is no rubber involved. These are aqueous resin inks.

HP pioneered the “Latex” name is has by far the largest market share in this category. However, they are not alone. Ricoh, Mimaki, Epson, Brother, and others have introduced “latex” inks as well. Mimaki was the first to bring white Latex ink to the market. Now, HP and Ricoh both offer white Latex/resin inks. As of this writing, neither Epson nor Brother offer white. There are also aftermarket Latex inks designed to work with HP printers from Sun Chemical, Nazdar, and Bordeaux Digital Printink.

A VINYL BRIGHT SPOT

One bright spot for traditional PVC vinyl is its use in vehicle/fleet wraps and longer-term outdoor billboards, especially those facing harsh weather conditions. I always found the FESPA vehicle wrap competitions to be fascinating. Paper and fabric would not serve here, of course. This has actually turned into a global event, the World Wrap Masters Series. These events typically match competitors against each other wrapping vehicles, but sometimes they are handed “mystery” objects, like bowling pins, helmets, toilet seats, or even furniture, adding a bit of fun to the event. Avery Dennison also offers a “Wrap like a King” Challenge, also a global affair. The International Sign Association also conducts a Wrap Institute during the ISA Sign Expo. At these events, show attendees tend to gather to watch the action, guided by minute-to-minute commentary by judges explaining exactly what mistakes—or advances—are being made by contestants.

And the winners of these events earn themselves important recognition of their competence as vehicles, especially fleet vehicles, or other business vehicles, want to display their brand and messaging—kind of mobile direct marketing. Who has a plain white van anymore?



SO WHAT’S THE UPSHOT?

PVC vinyl will continue to decline, being preplaced by material made from PVC-free resins, fabric, paper, etc. As more unique substrates are brought to market, traditional PVC will market share will continue to decline, except for specialty applications—perhaps vehicle wraps and the construction industry will hold out the longest.

Both manufacturers of vinyl substrates and producers still using these materials should be considering alternatives now. While the regulatory environment in the United States is generally weaker, this could change with a new Administration, and can vary from state to state. An article from Signs Atelier (see References below) is worth perusing if you are planning on working in that state or selling product there. The focus is largely on the difference between regulations in San Francisco and Los Angeles, but penalties can apply As an example, both New York and Los Angeles could impose penalties of up to \$48,000 per day for illegal signage—and as more substances are banned, signs created with traditional PVC could become one of those “illegal signage” risks.

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FLEXIBLE PACKAGING STEALS THE SPOTLIGHT

BY MARY SCHILLING

Hey there, print geeks and packaging pros! Grab your favorite coffee or whatever keeps you sharp during marathon press runs because we're diving deep into some exciting developments making inkjet a true powerhouse in flexible packaging. I've spent years at Schilling Inkjet Consulting elbow-deep in droplets, color workflows, and tricky substrates, and I can tell you this: inkjet has leveled up big time. It's no longer just an alternative, it's becoming the go-to choice for shorter runs, personalized orders, and those tough sustainability targets that brand owners are chasing.

The secret sauce? Five key areas driving real progress:

- Sustainability through water-based inks and bio-based inks paired with recyclable outputs
- Improved drying technology,
- Jetting reliability with smart nozzle monitoring and recirculation,
- Speed and scalability powered by GPU based RIPs and high-speed single pass designs,
- Workflow intelligence from AI tools handling color and quality.

Together, these advancements are letting inkjet go head-to-head with traditional flexo and offset, especially when agility, reduced waste, process advancements, and customization matter most.

Let's unpack each piece with the kind of real-world insights I love exploring in my Cool Tools series.

GREEN PERFORMANCE THAT ACTUALLY DELIVERS

Sustainability isn't a buzzword anymore it's a requirement. Flexible packaging converters and brand owners want solutions that lower environmental impact while maintaining vibrant shelf appeal and functional performance. Water based pigment inks have emerged

as a leading option here, with major improvements in formulation that address earlier limitations.

These inks rely primarily on water as the carrier, dramatically cutting VOC emissions compared to solvent or UV based systems.

Formulators are incorporating higher levels of bio renewable materials, including plant-derived components that help reduce reliance on fossil fuels. The result is inks that can not only print beautifully on films like polyethylene and polypropylene but also support better end-of-life outcomes.

Recyclability gets a big boost too, as these prints integrate more cleanly into mono material recycling streams. Less ink contamination means higher quality recycling and smoother processing.

I've evaluated many of these inks on real production jobs for food contact applications. Low migration versions help meet strict compliance needs across markets, while delivering the color pop and durability that packaging demands. For shorter runs and personalized flexible packaging think limited edition snack pouches, custom health product labels, or seasonal promo bags; inkjet shines by eliminating plates and reducing makeready waste. You print only what you need when you need it, which cuts excess inventory and overproduction.

Bio-based overprint varnishes and coatings are



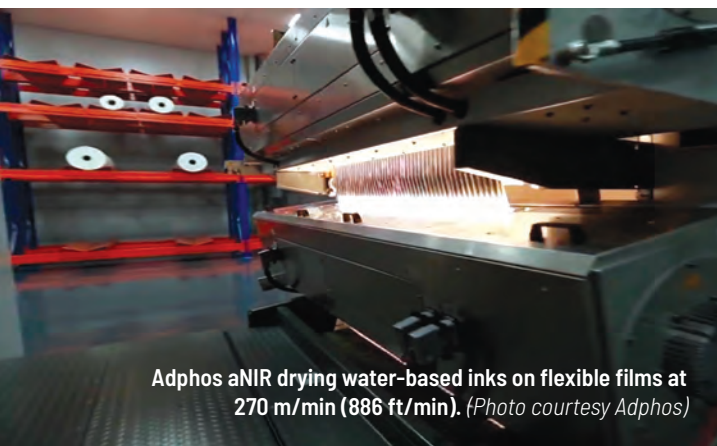
(Image Created by Adobe Firefly)

complementing these inks nicely, enabling more fully recyclable or compostable structures. Challenges like drying speed on non-absorbent films remain, but the pace of improvement is impressive. Inkjet is giving converters practical ways to hit sustainability goals without sacrificing productivity on runs that don't justify traditional long setups.

On flexible substrates, today's water-based pigment inks achieve strong adhesion, excellent rub resistance, and solid chemical performance with custom pre-printed primers and once properly dried. And drying is the key!

THERMAL TUG OF WAR

Flexible films live in a narrow thermal window, and aqueous pigment inks don't make that window any wider. BOPP, PET, PE, and their cousins hold their shape only when the web temperature stays low, yet the ink layer sitting on top needs enough energy to drive off water, activate binders, and anchor pigment at higher ink tac levels. That's the core issue: the film wants "cool and steady" while the ink needs "hot and decisive." The only way to satisfy both is to target the heat precisely at the ink layer, not the substrate. When you control where the energy goes, you can remove moisture quickly, keep the film dimensionally stable, and maintain the process window without chasing curl, stretch, or surface distortion down the line.



Adphos aNIR drying water-based inks on flexible films at 270 m/min (886 ft/min). (Photo courtesy Adphos)

This is where drying systems such as Adphos Advanced Thermal Processing with aNIR and aLITE are a benefit. Adphos aNIR dryer systems work by driving near infrared energy directly into the ink layer, activating moisture and solvents so they flash off quickly without stressing the substrate. The energy couples with the ink, not the paper or film. Results are fast, "zone-based" adjusted drying with far

less heat load on the web. Zone-based drying applies more or less energy based on down web image coverage and/or ink thickness zones, reducing overall intensity across the web. The benefit shows up immediately producing cleaner printed colors, wider reproducible gamut, less media distortion, and tighter registration.

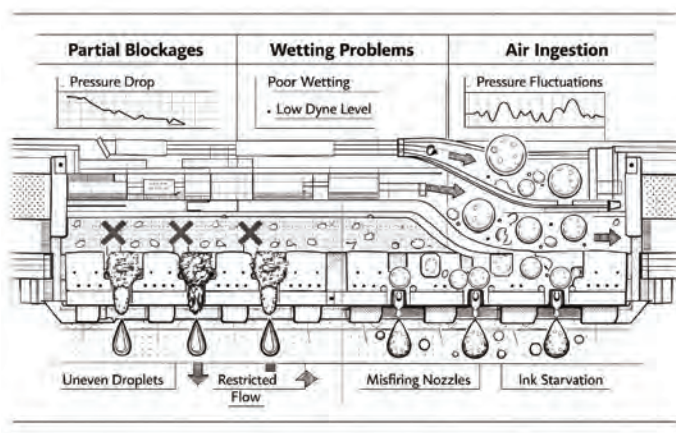
NOZZLE INTELLIGENCE THAT KEEPS PRODUCTION ROLLING

Reliability has historically been one of the bigger hurdles for inkjet in demanding flexible packaging applications. Streaks, missing nozzles, or inconsistent performance can quickly turn a promising run into an expensive headache. Fortunately, hardware and monitoring advancements are changing that story.

Modern printheads now incorporate improved ink recirculation right at the nozzle level. This continuous flow prevents pigment settling, reduces drying in the nozzles, and supports a broader range of ink viscosities and particle loads. It's particularly helpful when switching between different finishes or adding opaque whites for flexible packaging designs.

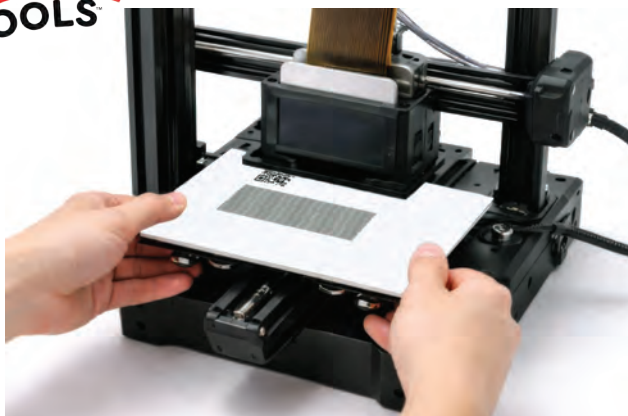
One of the coolest tools hitting the market is Meteor Inkjet's Nozzle Health Technology. This system, introduced in early 2026, brings real time monitoring to an entirely new level. Using electrical impulse response testing through the printhead driver cards, it checks every single nozzle in milliseconds while the press keeps running. It can detect issues like partial blockages, wetting problems, or air ingestion almost instantly.

The beauty is in the response. The system provides immediate data for automatic compensation or targeted maintenance alerts. No more frequent test prints eating up expensive flexible film, and far less unplanned downtime. For high mix flexible packaging jobs with





Benchmark printhead accuracy testing.
(Photo courtesy Meteor)



frequent job changes, this kind of reliability is a game changer. It shifts inkjet from “needs constant watching” to a more set and go production tool.

When paired with robust printhead platforms that offer better temperature control and durability, operators gain confidence to run longer shifts across varied substrates. This consistency helps inkjet close the gap with flexo’s reputation for steady output, especially in shorter and medium run lengths.

GPU POWER DRIVING HIGH SPEED SINGLE PASS

Speed remains a critical factor for competing with analog processes, and inkjet has made impressive strides here. High-speed single-pass configurations where full-width printbars allow the web to move through in one smooth pass are becoming more common and capable. We’re seeing reliable production speeds in the 50 to 100+

meters per minute range on flexible materials, all while maintaining 1200–1600 dpi resolution for sharp text, smooth images, and detailed graphics.

Making all that data flow smoothly is where backend software becomes crucial. That’s why Hybrid Software Helix’s SmartRIP stands out as a major innovation. As the first fully GPU native industrial inkjet RIP (launched in late 2025), it moves heavy computational work to the graphics processing unit, delivering significant gains in speed, scalability, and handling of complex files with no compromise in output quality; as the RIP engine conforms with the Ghent Workgroup PDF Output Suite 5.

Variable-data printing, multi-bit screening for enhanced quality, and intricate packaging designs with multiple brand colors no longer create bottlenecks. The RIP integrates advanced color management capabilities and supports modern factory protocols for seamless workflow integration. Setup is streamlined, allowing OEMs and converters to get new systems running production much faster.

For flexible packaging producers, this combination of single-pass hardware and GPU-powered RIPs means dramatically shorter turnaround times. No waiting for plates or lengthy makeready. You can move from design approval to printed rolls in a fraction of the time traditional methods require. This agility is winning jobs for personalized and short-run flexible packaging that used to default to flexo purely for speed reasons. The overall economics including lower waste and faster delivery often favor inkjet in the hundreds to low thousands meter range.

AI BRINGING SMARTS TO COLOR AND QUALITY

The final piece that ties everything together is the growing intelligence layer in inkjet systems. Color control and print quality analysis have evolved from manual, time consuming processes into automated, predictive workflows.

AI tools now optimize color profiles dynamically, accounting for substrate variations, environmental conditions, and ink characteristics. Inline sensors scan output in real time, monitoring for issues like mottle, dot gain, banding, or edge definition. When problems arise, the system can flag them immediately or make automatic adjustments.

This intelligence extends to brand color consistency across different substrates and production sites. Cloud connected libraries and automated matching reduce the back and forth that used to eat up time and materials. In personalized packaging, AI helps manage variable-data



(Image Created by Adobe Firefly)

elements without slowing down the RIP or press.

Combined with nozzle health monitoring and sophisticated RIP screening algorithms, these tools help inkjet deliver near offset quality on flexible films. Stochastic screening techniques minimize visible patterns, while quality analysis systems provide detailed reports for process improvement. In practical terms, converters can begin to see notable reductions in waste and faster job approvals.

INKJET'S COMPETITIVE EDGE IN FLEXIBLE PACKAGING

When you combine sustainable water-based inks, reliable nozzle management, high-speed single-pass production, and intelligent AI driven workflows, inkjet becomes a compelling choice for modern flexible packaging needs. It won't replace flexo or offset for every long-run job, but for shorter runs, frequent changeovers, and customized work, it often delivers better total value.

Converters adopting these technologies report stronger customer satisfaction through faster delivery and unique design capabilities. Reduced inventory requirements and improved compliance with environmental standards are added bonuses. Yes, there are still areas to optimize like ink consumption rates, substrate preparation, and energy use in drying, but the direction is clearly positive.

From my consulting work, I've seen these advancements grow with the development of inkjet flexible packaging, looking to solve real production challenges and open new opportunities. Water-based single-pass systems produce impressive results on flexible packaging with the durability needed for retail and food applications. Tools like Meteor's nozzle monitoring and Helix's SmartRIP represent the kind of practical innovation that moves the industry forward.

If you're exploring inkjet for your flexible packaging operations, my advice is to start with a focused pilot project. Pay close attention to color management early in the design phase while testing drying and adhesion on your actual substrates. Each step of the process has its own list of variables which must be managed and addressed early. The technology has reached a point where thoughtful implementation can deliver strong returns.

Inkjet isn't just participating in flexible packaging anymore it's helping redefine the possibilities for



(Image Created by Adobe Firefly)

sustainable, agile, and high-quality production. Watch for future inkjet flexible packaging technology as it is the current inkjet nut to crack. The future looks bright, efficient, and full of colorful potential.

So, there you have it, my inkjet geeks, inkjet is having a serious glow-up moment in flexible packaging, blending sustainability swagger, reliability, blazing speed, and brainy AI smarts into one seriously competitive package. Whether you're tired of long makereadies, wrestling with sustainability targets, or just craving more creative freedom on shorter runs, these advancements are making digital feel downright fun again. From my ink-stained lab at Schilling Inkjet Consulting, I'm genuinely energized by where this technology is heading, and I'm pleased to continue helping the packaging industry navigate the inkjet for flexible packaging variables. There's real opportunity in tightening chem stack control, dialing in color behavior, and elevating image quality across the full workflow. That's the space I love working in; translating the science into practical, production ready decisions that expand the process window instead of fighting it. It's not about replacing everything overnight, but about giving converters and brands smarter, greener, and faster options that actually deliver on the pressroom floor. So go ahead and experiment, test, and push those boundaries!

Drop me a line if you want to geek out over droplets, color, substrates and challenges or assistance with your next packaging or industrial inkjet project. The future of flexible packaging is looking colorful, efficient, and full of possibility.

Let's keep the ink flowing!

NEW PRODUCTS

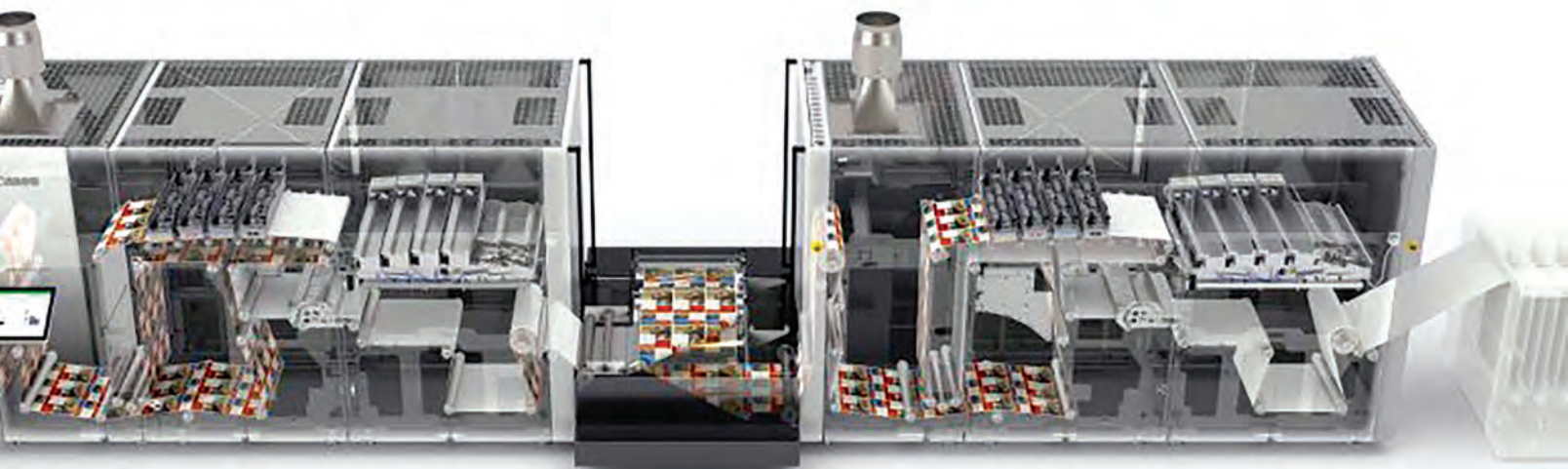
This section outlines the new product announcements that have been made in 2026 as of presstime. Stay tuned to WhatTheyThink's Newsfeed for more-up-date announcements, as well as what to look for at PRINTING United.



Canon varioPRESS iV7



Canon ColorStream 7000



PRODUCTION PRINT—OFFSET, DIGITAL, AND INKJET

Boston Industrial Solutions Natron 717S Series UV LED Ink for Ricoh GH2220 printheads

Canon varioPRESS iV7 B2+ inkjet press

Canon ColorStream 7000 series rollfed inkjet press for mid-range production

Durst P5 350 HSI high-speed industrial inkjet press

Fujifilm Metallic Gold specialty toner for REVORIA PRESS EC2100S and SC285S

Fujifilm REVORIA PRESS PC2120

HEIDELBERG Jetfire 75 in B2 Format

Inkcups Cobalt Pro+ CO₂ laser plate-maker



HEIDELBERG Jetfire 75



Komori-Chambon TwinFlex

Konica Minolta/TROY Group TROY AccurioPrint 2100 MICR high-speed monochrome production printer
Kyocera Inkjet Printhead with over 1,500 nozzles

LABELS & PACKAGING

ACTEGA/Living Ink Technologies ACTExact® UV Black Algae UV flexographic ink

BOBST EXPERTFOLD 145/165 corrugated board folder-gluer

BOBST New MASTERFOLD folder-gluer range for corrugated board converting

BW Converting PCMC Meridian Elite+ laser anilox cleaning platform

Canon LG-P800 label printer

Domino Cx150i Direct to Box Printer

Dupont Cyrel ReNew LSH flexo plates

UNITED CAPS
 26/22 S-SPRING
 closure





Miraclon FLEXCEL



Avery Dennison Supreme Wrapping films



Epson SureColor V4000



Roland DGA VersaOBJECT LO-640-F3



Summa F Series Vantage

EFI Nozomi 17000 LED platform 1.7m single-pass printer for corrugated

Esko XPS Spark 4835

Fedrigoni Self-Adhesives DS2 water-soluble adhesive

hubergroup NewV tin LED MGA ink series for metal food packaging

Inkcups Helix® High Throw

INX INXJet MDLM low-migration digital inks for metal packaging

IST America LEDcure NX for narrow web label and packaging applications

Klößner Pentaplast (kp) kp Evolve Fish Boards packaging for processed fish

Komori-Chambon TwinFlex inline flexo press for paperboard packaging

Michelman DigiPrime Vision 9200 primer for shrink sleeves and high-performance labels

Vanguard Digital Printing Systems Natchez

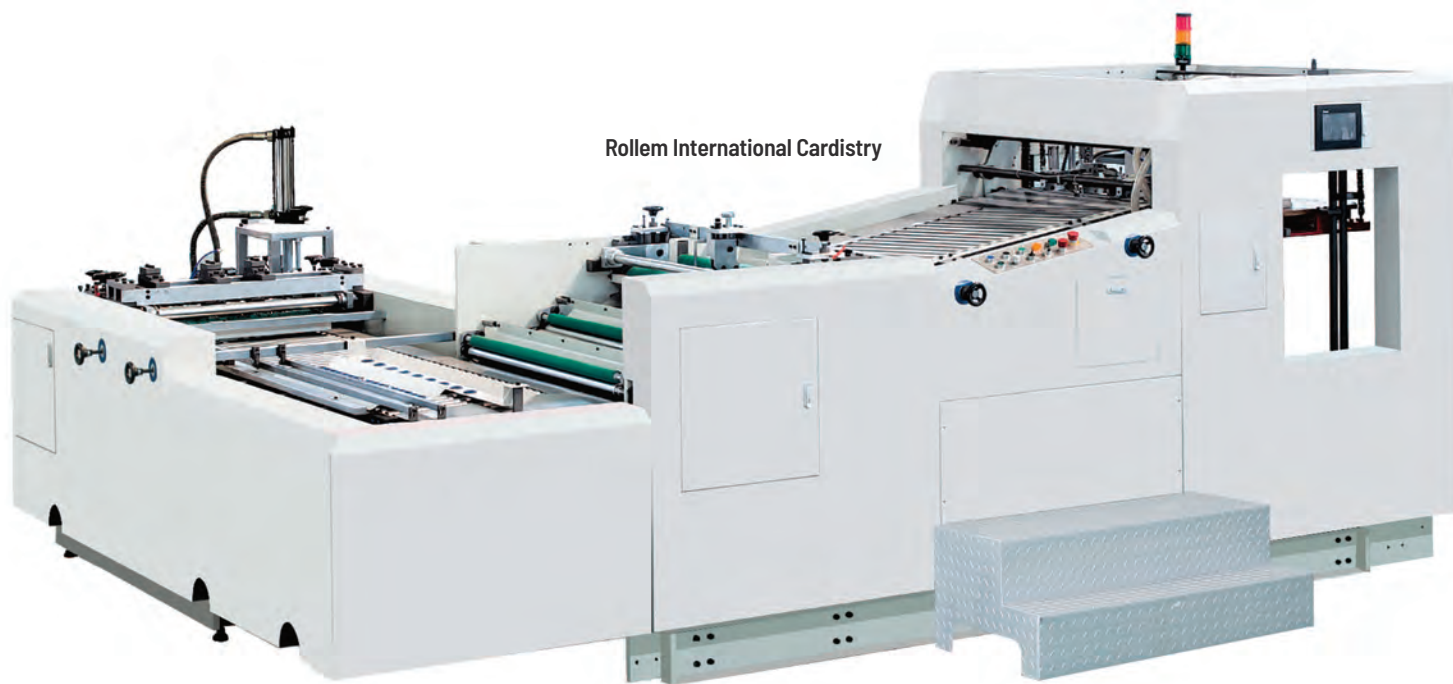




Kornit Digital Atlas MATRIX



Roland DGA UV Direct-to-Film (DTF) system



Rollem International Cardistry

Michelman Nuvita Life 4002/Nuvita Life 4605 bio-based barrier coatings for paper packaging applications

Miraclon FLEXCEL Prime Plate

UNITED CAPS 26/22 S-SPRING closure for the sports cap segment

SOFTWARE & WORKFLOW

Agfa Asanti 8 workflow software

Aleyant Pressero 360

Caldera PrimeCenter 5 prepress job preparation and workflow software for wide-format and industrial print workflows

callas software pdfNest OEM Module

Color-Logic EVE free embellishment value estimator

Durst Kyveris Sandbox and Open Software Initiative (OSI)

EC03 Apogee v15 prepress workflow software

eProductivity Software (ePS) CommandCore platform for packaging manufacturers

Fiery FreeForm Create 2.0 print personalization software

Fiery XF 9 software RIP, color management, and workflow solution for wide-format print production

Fiery Scribe AI solution for job submission

Fiery FS700 Pro platform

Loftware Loftware Connect for connected supply chains

OneVision Wide Format Automation Suite

Printcore AI-native management platform for wide-format and digital print

PrintVis PrintVis 28

Ultimate Tech Ultimate Imposstrip 2026.1

Xitron K2 with enhancements to imposition, automation, and job management

X-Rite Pantone Offset360 color management solution

WIDE FORMAT & SIGNAGE

Avery Dennison Graphics Solutions MPI 1903 Cast Wrapping Film

Avery Dennison Graphics Solutions Five new colors for its Supreme Wrapping Film color change vehicle wrapping film product line (Gloss Ivory, Gloss Sand Dune, Satin Metallic Cyber Green, Matte Metallic Oasis Blue, and Gloss Metallic Gothic Rose)

Canon imagePROGRAF GP-2600S large-format inkjet printer

Drytac PaperTac White Matte coated self-adhesive paper for indoor sign and display applications

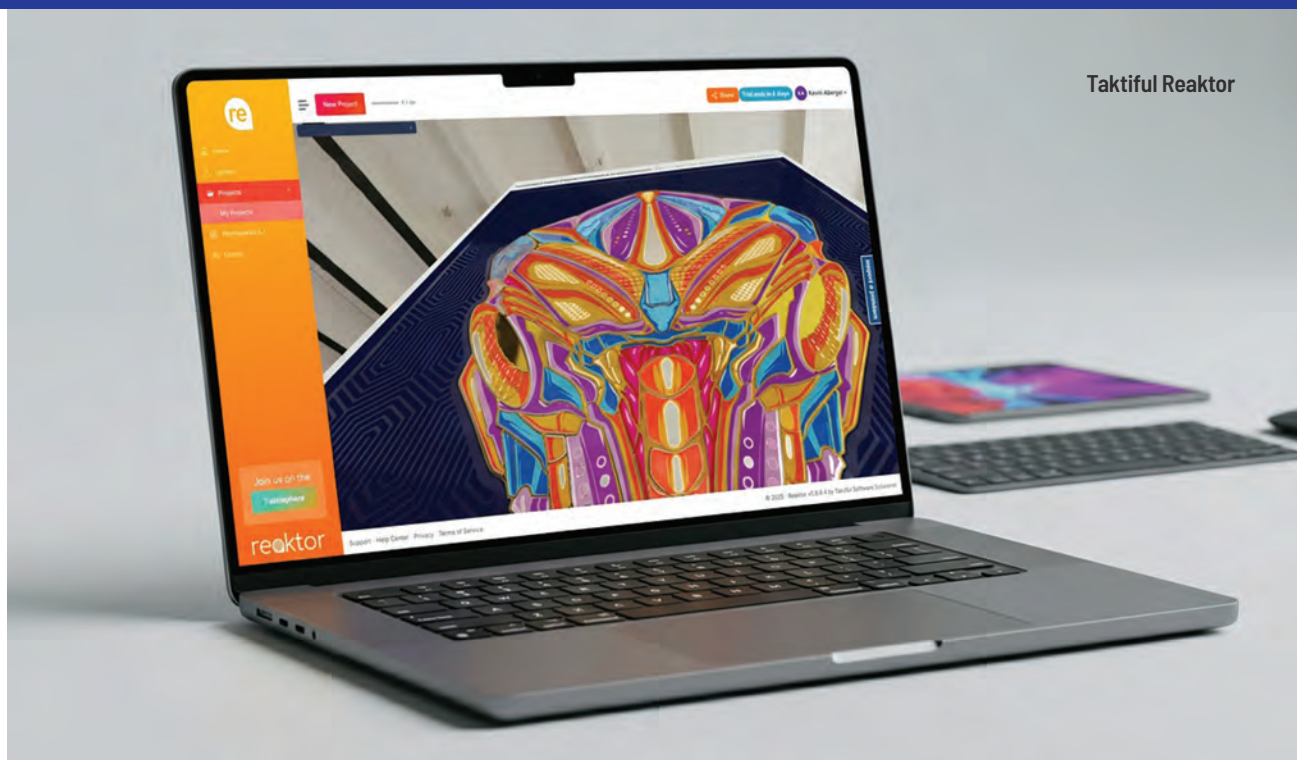
Durst P5 350 CORE for a broader mid-market segment

Easy Cut Studio 6.016 design-and-cut software for wide-format printers/cutters

EFI VUTEk M3H X hybrid LED printer

EFI Pro 33r roll-to-roll LED printer

EFI Nozomi 17000 SD platform 1.7m single-pass printer for sign and display



Taktiful Reaktor

Epson SureColor V4000 UV flatbed printer

Konica Minolta AccurioWide 320HS

Mimaki UJ330H-160 hybrid UV inkjet printer

Roland DGA VersaOBJECT LO-640-F3 UV Flatbed

Printer

Roland DGA TrueVis VG4 Series

Roland DGA EUV-H (EUV-HP7) UV hard ink for industrial and commercial applications

Summa F Series Vantage cutting tables

Vanguard Digital Printing Systems Natchez flatbed printer

TEXTILES & APPAREL

Brother GTX300 hybrid direct-to-garment and direct-to-film printer

Durst P5 500 Tex iSub + 5 m Hasler cutter for soft-signage production

EFI VUTEk FabriVU 340 i8 dye-sublimation printer

Epson SureColor G9070 direct-to-film printer

Fisher Textiles DD4421 Nirvana Puritya 5-meter-wide fabric for direct sublimation printing and large-scale soft signage

Kornit Digital Atlas MATRIX unified digital production system

LINKO K-607 direct-to-film printer for high-volume garment decoration

Mimaki TS330 dye-sublimation printer

Mimaki TxF300-75Plus direct-to-film printer

Nutec Digital Ink Ruby R10-DTF UV-curable direct-to-film ink

Roland DGA UV direct-to-film system

Roland DGA VersaStudio BY2 20 direct to film system for compact apparel workflows

FINISHING & EMBELLISHMENTS

Bar Graphic Machinery (BGM) Compact finishing lines for digitally printing labels

Color-Logic Visualis3R PDF viewer for print embellishments

Plockmatic ColorCut SC7800 Pro-RS XL

Rollem International Cardistry automated platform for high-volume playing card, trading card, and collectible card production

Rollem International Insignia Series Die-Cutters PLUS

Rollem International Strata folding and gluing machine for folding carton and pocket folder production

Skandacor Bagel Falcon B1 Industrial Single-Side Auto Laminator

Skandacor FINISHpro 3D 1623 sub-B3 digital embellishment press

Taktiful Reaktor 3D virtual soft-proofing platform for embellishments

Zeno 360° CASEMAKER IND420-XXX automated hardcover casemaking machine

FRANK ROMANO:

A LEGACY IN PRINT—CELEBRATING HIS 85TH BIRTHDAY AND PUBLICATION OF HIS 85TH BOOK!

BY CARY SHERBURNE AND RICHARD ROMANO

As most of our readers will know, Frank Romano has a long and storied history in the printing industry. What you might not know is that it was sheer serendipity that he began this journey after graduating from high school in 1959. He said, “I went to my guidance counselor at Madison High School in Brooklyn and told

him I needed a job. He said, ‘This company, Mergenthaler, is looking for people.’ I asked what they did, and he said something to do with books. That sounded interesting, and now here I am!” Interestingly, the other job option that the counselor had offered was with Squibb Pharmaceutical, which would have led to a completely different life path for some of us.



Fun Fact: Frank was on his high school track team with Bernie Sanders!

Although the Mergenthaler job was the one that started him down the printing path, his first job was actually delivering furniture. He met his wife-to-be delivering furniture to her mother. He went to Brooklyn College, and he also served in the Navy for a time.

When Frank joined the company, he delivered the mail to the President; by the time he left, he was writing his speeches. He added, “I learned about type and print and everything else, and that became my career.”

And what a career it has been. After starting a regular newsletter for users of the Mergenthaler Variable Input Phototypesetter (V-I-P)—called VIPPY—he went on to found eight publications, serving as publisher or editor (and early on, his 10-year-old son did the typesetting and manual paste-up) for TypeWorld/Electronic Publishing (which ended in its 30th year of publication), Computer Artist, Color Publishing, The Typographer, EP&P, and the NCPA and PrintRIT Journals. He founded the Digital Printing Report and was the editor of the EDSF Report. He also owned and operated a quick print shop in Salem,

N.H., called AllPrint, for a brief period in the 1980s.

As if that's not enough, he has published 85 books including the 10,000-term GATF Encyclopedia of Graphic Communications (with Richard Romano), published in 1998, the standard reference in the field (according to the American Library Association). His books on QuarkXPress, Adobe InDesign, and PDF workflow were the first in their fields. He has authored most of the books on digital printing. One of his books is the 800-page graphic arts textbook for Moscow State University. Perhaps his best-known publication was the International Paper Pocket Pal, which he edited for 35 years.

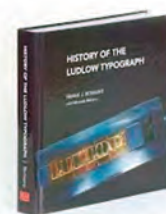
His 500-page History of Desktop Publishing (Oak Knoll) joins History of the Phototypesetting Era (Cal Poly), History of the Linotype Company (RIT Press), and History of the Ludlow Typograph (MoP). Coming this fall is his 85th book, a 500-page tome entitled History of the Typesetting Service.

His articles, numbering in the thousands, have appeared in a variety of publications around the globe, including here at WhatTheyThink. You may also be familiar with his informative videos we publish every Friday, always including an interesting historical gem.

Frank joined the Rochester Institute of Technology in 1990 and was appointed to the Melbert Cary Professorship, and advanced to Director of the School of Print Media. He was tenured in 1998 and was awarded Emeritus status in 2010. He also taught courses at Cal Poly, where students would produce a unique printed book as part of the course.

He's also proud of the fact that he has provided thousands of scholarships over the years to students pursuing a degree printing, always anonymously.

Perhaps one of his biggest achievements, a true legacy, was co-founding The Museum of Printing, where his 11,000-book library resides, along with a world-class collection of presses, type, ephemera, prints, and thousands of books and other exhibits, many of which Frank has acquired and then donated to the Museum.





Some of these collections are quite unique. For example, the Museum has the only collection in the world of Type Specimen Books. Back in the day, both manufacturers of fonts and the printers that used them would create specimen books to use with their customers and to define type specifications. Frank states that as typesetting firms became a thing of the past, no one seemed to want to save these specimen books, but he felt they were valuable and should be protected.

A major donation from Frank was the current building housing the Museum. He states, "We were located in North Andover, and the North Andover Historical Society, which owned the building, was charging a very low rent. Years went by, and a new Board of Directors took over and wanted to double our rent. So we had to make a decision: do we stay in business? What do we do? And I said, no, if we find the right building, I'll buy it and donate it. And so John Rogers, God bless him, was on our board for many years. He was a contractor who did very high-end developments. He found our current building and determined it met all of our needs. It could take the floor weight of heavy equipment, it had a loading dock, et cetera. So I bought it and donated it to the museum."

Frank has also been an expert witness in some interesting cases relative to typography. Two of note involved Presidents of the United States! In one case, there was a dispute over a letter involving President George W. Bush's military history. By analyzing the type, Frank was able to determine that the letter was not original, but rather, created after the fact. The other Presidential engagement had to do with President Jimmy Carter and the President's Daily Briefing (PDB). President Carter didn't like the typeface that was being used, so the National Security Agency hired Frank to choose a different font. He got them into a new phototypesetting

machine and recommended a Times Roman font, which the President found acceptable. He was also an expert witness in a plagiarism case brought against J.K. Rowling, which he disproved by demonstrating that the typeface used was newer than the first Harry Potter book.

Another interesting engagement came about in March of 1984. Steve Jobs was working on what would become the LaserWriter, sold by Apple from 1985 to 1988. The printer would include PostScript, but the memory would only hold 13 fonts. Frank received a call from Steve Jobs to help determine which 13 fonts to use. Working with people from Adobe, Linotype, and others, they determined the initial set would include four Times Roman fonts, four Helveticas, and the symbol font. According to Frank, that became the set of fonts that everyone used back in the day. The museum has one of the original LaserWriters in its collection.

Speaking of Linotype, the museum has one of the only remaining operational Linotype hot metal typesetters in the world. Volunteer Chris Bradford demonstrates this machine every Saturday (the Museum is open Saturdays, 10 AM to 4 PM). Visitors love having their names set in hot metal, a nice takeaway for them. And other demonstrators at the museum can use these "slugs" to print custom pieces.

Frank has also lectured extensively, having addressed virtually every U.S. club, association, group, and professional organization in the printing industry at one time or another. He has presented to groups in North America, South America, Europe, India, Vietnam, Thailand, Australia, New Zealand, Dubai, Singapore, and Sri Lanka.

To help Frank celebrate his 85th birthday, he and the Museum would be delighted if our members would consider joining the Museum as a member, visiting on a Saturday or by appointment, taking advantage of one of its many workshops, and, of course, donating to the Museum's Future Fund, which has been set up to preserve the Museum—Frank's legacy—and help it transition into an exciting new future.



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