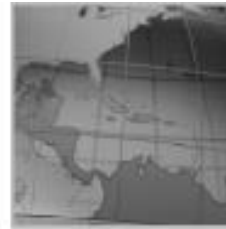


White Paper



Production Printing & Media



April 2016

The Value of Cut-sheet Inkjet

The Xerox Brenva HD Production Inkjet Press

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Executive Summary

Xerox has announced a new product called the Brenva HD Production Inkjet Press, a cut-sheet color inkjet device capable of speeds up to 182 letter/197 A4 images per minute. The device will compete in an area that InfoTrends describes as ‘the Zone of Disruption,’ in which products like the Brenva HD Production Inkjet Press bring the high speed and low running cost of inkjet at an acquisition price that is much less than roll-fed color inkjet systems.

Key Findings

- The Xerox Brenva HD Production Inkjet Press is one of the few cut-sheet inkjet color devices on the market today. It represents the first beginning-to-end collaboration of the Xerox Corporation and Xerox Impika teams, in terms of product development.
 - Building Brenva on an iGen frame has the advantage of making the integration of market-tested feeding and finishing options possible
- The Xerox Brenva HD Production Inkjet Press is differentiated from other devices in the Zone of Disruption by its large sheet size, in-line spectrophotometer, a black-only mode, and relatively small footprint.
 - There is a new drying system, and an architecture that is designed to allow upgrades, will make future feature expansions possible
- Xerox has expanded its inkjet portfolio significantly over the past year with the addition of the roll-to-cut-sheet Xerox Rialto and the new Xerox Trivor roll-fed inkjet printer. These products join Xerox’s Impika (Compact, Reference, and Evolution) and CiPress offerings.

Recommendations

- Print service providers, particularly those printing applications like transaction, direct mail, and books, should consider whether the speed, running cost, and productivity of inkjet are a good fit in their environments.
- Carefully consider how the device will fit in to a full workflow that includes document preparation, prepress, substrates, feeding, finishing, and fulfillment.
- In assessing print quality, be sure that the system has the tools to assure color quality and accuracy, as well as consistency over time.
- Print service providers should evaluate the use of color in customers’ documents, particularly related to the coverage levels. See if inkjet will bring color to these customers at a compelling price point.

Introduction

Inkjet printing technology has the potential to bring some important advantages to production environments through new cut-sheet designs, like Xerox's Brenva HD Production Inkjet Press. To date, the major successes of high-speed production inkjet have been with roll-fed systems that have acquisition prices of more than a million dollars. Getting under this price point, while still maintaining attractive running costs, has the potential to open up new markets. In this sponsored white paper, InfoTrends will look closely at the Brenva HD Production Inkjet Press and the opportunity it presents.

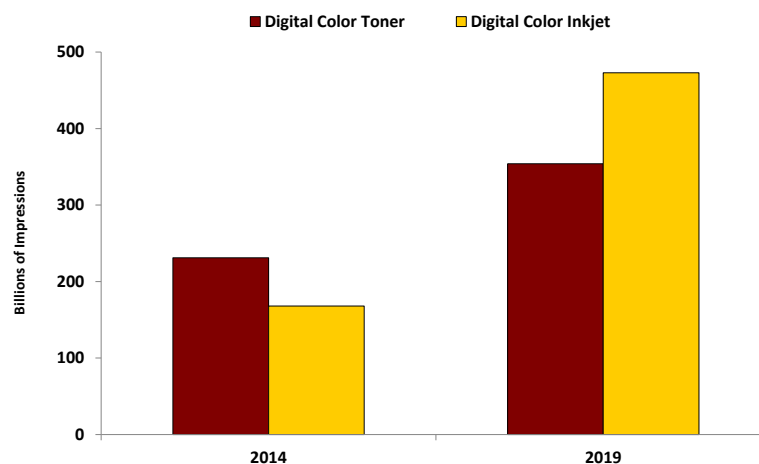
Inkjet and the Production Color Digital Print Market

Production color digital print has been on a growth path since the first toner-based color products entered the market in the 1990s. Much of this growth was driven by cut-sheet designs, including offerings from Xerox's DocuColor and iGen product lines. InfoTrends forecasts that production color digital print volume will continue to grow for toner-based products, but this growth will be outpaced by inkjet.

Market growth

Around 2008, the arrival of high-speed, roll-fed color inkjet devices brought huge amounts of print volume to applications like transactional documents, direct mail, and books. These systems are designed for many millions of page impressions per month and, as a result, a relatively small installed base has generated significant volumes, which in turn has accelerated the growth of production color digital.

Figure 1: Global Digital Production Color Print Volume by Technology



Global digital production color volumes totaled about 400 billion impressions in 2014. InfoTrends expects them to exceed 825 billion by 2019. Production color inkjet accounted for 42% of the total production digital color volume in 2014, and will account for 57% in 2019. This remarkable turnaround will occur, despite the fact that digital color toner is also growing at a 9% rate. These numbers speak to the tremendous growth potential in production color inkjet systems.

Key applications

What is driving the growth in inkjet volume? Initially, it has been in applications like transactional documents, direct mail, and books. A few key categories predominate:

- **Offset preprint replacement:** Sites that are using offset-printed shells (e.g., pre-printed forms) for transactional print and direct marketing have the opportunity to eliminate the shells and institute a “white paper in, full color out” workflow. Rather than using pre-printed shells for the color component of the document, and then adding the monochrome variable data with an electrophotographic device, they can do this in one step using color inkjet systems. This eliminates the logistical nightmare of keeping preprinted stock up-to-date and in sufficient quantities.
- **Cost-effective production of mixed black & white and color content:** End-users are reluctant to pay a premium for documents printed on color devices, particularly when the document may include significant subsections of monochrome content. The ability to cost-effectively produce monochrome, light coverage color, and full color pages using a single device is very desirable in the production market.
- **On-demand/Just-in-time production:** Digital print is very well-suited to the on demand or just-in-time production of promotional and publication applications. Nevertheless, the run lengths, volume levels, and range of required substrates can make it difficult to address these workflows with roll-fed devices. A cut-sheet inkjet device brings a strong level of application flexibility to on-demand and just-in-time production workflows, at cost levels that can be very competitive with color electrophotography.
- **Filling the cost/productivity gap:** Products with a relatively low cost of acquisition, but which have a high level of productivity, present a disruptive opportunity between the high end of cut-sheet color electrophotographic products and the low end of roll-fed color inkjet systems. The key is that the system’s cost, productivity, and quality levels must be appropriate for the target application.

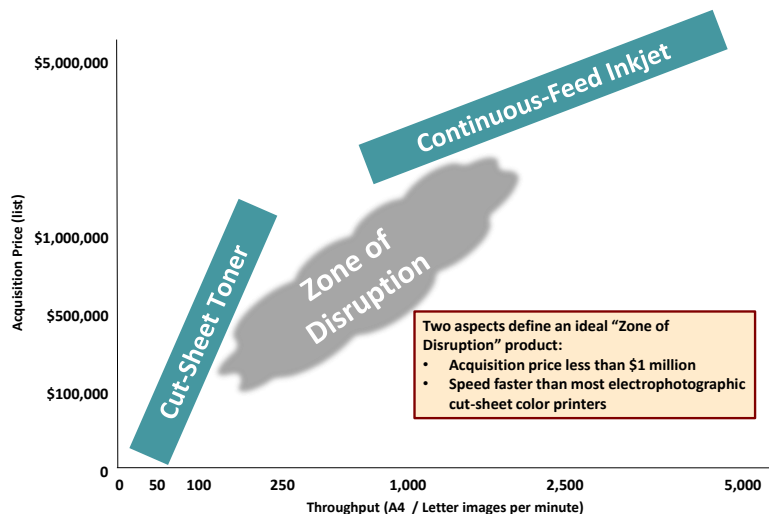
What is particularly fascinating about the growth in inkjet is that the volume has been almost exclusively in roll-fed designs that have succeeded within these categories. In part, this is because any high-speed print technology must meet the quality, speed, cost, and substrate needs of its customers. Water-based inkjet inks require sophisticated dryers when running at high-speed, particularly as the color coverage increases and more ink is applied to the paper. Water-based inks also tend to be more successful in adhering to more absorbent sheets (like uncoated stocks). It is no surprise then that the application successes for inkjet so far have been in lower-coverage applications on uncoated papers.

Bringing the Advantages of Inkjet to a Cut-sheet Design

Starting around 2015, system vendors began to offer inkjet products that came in at a price point below the multi-million dollar roll-fed systems. When typical color digital printing systems are graphed, with acquisition cost on one axis and throughput on the other, two main categories are clearly delineated: cut-sheet toner and continuous-feed inkjet. Devices in the cut-sheet toner category typically have speeds of less than 200

images per minute (ipm) and are used for low to mid-volume short-run, quick turnaround, and print-on-demand work. Devices in the continuous-feed inkjet category today can produce up to 600 dpi resolution (and sometimes higher) at high speed and very high volume. There is a gap of unmet need between these two areas, and underneath that gap is an area that InfoTrends calls the ‘Zone of Disruption.’

Figure 2: The Zone of Disruption



In defining the Zone of Disruption, InfoTrends has in mind inkjet products with a capital acquisition cost of less than \$1 million, very competitive running costs, and high levels of productivity. This puts them at speeds faster than current cut-sheet color toner devices, while at a capital acquisition cost lower than most 20” roll-fed color devices. To be truly disruptive, there are some other important aspects. These devices must compete in quality and ease of use against the mainstream cut-sheet toner devices. This requires sound design, effective feeding and finishing, as well as workflow software that automates production. Success within niche markets is certainly good, but being disruptive in the marketplace means that these products must address the needs of mainstream cut-sheet and roll-fed color users.

As this market progresses, InfoTrends is closely watching for broad levels of success by products in the Zone of Disruption. As of today, only a relatively small number of products fit there, and relatively few placements have been made. One example of a product in the Zone of Disruption is the Xerox Rialto 900 Inkjet Press. This roll-fed device offers color speeds of up to 157 feet per minute (48 meters per minute) and page throughput of about 342 letter ipm (320 A4 ipm) in a single-pass duplex on a web of paper up to nine inches wide. A cutter at the end turns the roll into page-sized cut sheets. Some users, however, are more accustomed to a workflow that starts with cut-sheets. This is where Xerox’s Brenva HD Production Inkjet Press comes in.

Flexibility and Running Cost

Cut-sheet workflows are inherently more flexible than roll-fed ones, since more than one stock is easily available from the multiple drawers that are typical of cut-sheet designs. One job can have a different stock from the previous one. Cover sheets or dividers can be inserted. A finished job can be pulled immediately from the output unit.

The nature of inkjet technology is that there are relatively few moving parts, and much of the operational cost is built into the ink. This is one of the reasons why applications like transactional documents, direct mail, and books, which tend to be relatively low in coverage, have been popular (and particularly cost effective) for roll-fed color systems. Bringing the running cost advantage of inkjet to a cut-sheet design, with an acquisition cost less than \$1 million, opens up applications and volume levels that cannot be met by roll-fed systems.

Assuring Consistent Quality Output

Inkjet printing is quite a consistent process. That being said, a few items are important in maintaining high quality output. Among the most important of these are systems that detect a jet-out (i.e., when an inkjet nozzle has clogged) and make adjustments to correct for this artifact. Another relates to color measurement, both to assure that color remains consistent, but also as an aid in creating profiles for specific paper stocks. Some inkjet systems have the ability to lay down droplets of varying sizes, and therefore the device's front-end system and controller must be able take advantage of this to achieve the highest possible quality, while consuming as little ink as possible.

Trends and Opportunities

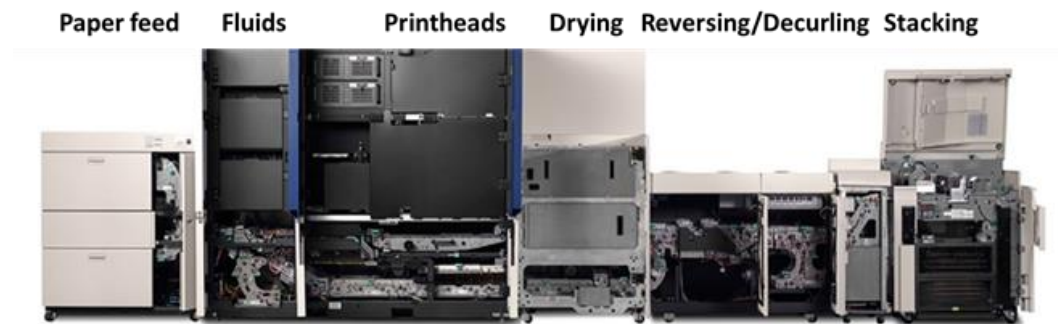
New cut-sheet color designs, like the Xerox Brenva HD Production Inkjet Press, are a timely addition to the market because of trends toward greater (and more effective) use of color, as well as the desire to more fully automate multi-step processes (such as the use of pre-printed color offset shells and monochrome digital printing). Factored with the ability to run more cost effectively, this presents an opportunity for print service providers to rethink how they are using their monochrome and color toner-based devices.

About Brenva

The Brenva HD Production Inkjet Press is a cut-sheet color inkjet printer capable of speeds of up to 182 letter/197 A4 ipm. At first glance, it has the outward appearance of an iGen but, though it is built on an iGen frame, it will become clear that, under the covers, the differences are extensive. It is the first Xerox product to be jointly developed from start to finish, drawing on the combined resources from the Xerox and Xerox-Impika development teams.

Figure 3: The Xerox Brenva HD Production Inkjet Press

The initial application target is likely to be black & white to color conversion, as well as applications like transaction, direct mail, and books, since the device will support uncoated stocks (regular and inkjet treated) at launch. The supported media range is uncoated stocks from 60 to 220 gsm. Supported finishing at launch will be the BDFNX signature booklet maker and the Xerox Production Stacker (which can handle 5,700 sheets and is designed to be unloaded while running, for uninterrupted operation).

Figure 4: Xerox Brenva Internal View

Additional important aspects of the Brenva HD Production Inkjet Press are:

- Inks and drying: The system uses water-based (aqueous) pigment inks and a new drying technology.
- An in-line spectrophotometer that allows the user to create custom paper profiles (about a dozen Xerox-provided profiles will be available at launch).
- Integrated jet-out detector and correction systems automatically adjust for clogged inkjet nozzles.
- Four variable drop sizes provide flexibility with quality settings and ink consumption.
- Duty cycle and target volume: The product's duty cycle is around six million, but Xerox anticipates that target average monthly print volume will be between one and two million.

- Black only mode: When monochrome printing is required, the device has a black-only mode.
- The Windows-based FreeFlow front-end offers object oriented rendering for text and graphics, so that both types can be reproduced most effectively.
- Ink estimation and tracking tools allow the user to accurately predict ink consumption and cost.
- Brenva is designed to operate within a typical environmentally controlled print facility and does not require additional kits for venting or humidification
- Footprint and format: A relatively small footprint (22'6" (W) by 6'8" (H) by 4'0" (D)), as well as a sizable maximum supported sheet (14.3" by 20.5"), help position the product versus competitive units.

Xerox designed Brenva with field upgradeability in mind. Looking inside the machine, it is evident that there is room for an additional set of printheads (possibly two). Xerox stated that Brenva will have a fifth housing, with the goal of making that feature (which is still TBD) backwards compatible when it becomes available. Xerox mentioned magnetic ink character recognition (MICR) as one potential example. There was some discussion around when 1,200 dpi heads emerge in the future. Xerox was not making any guarantees or indicating a timeline.

Figure 5: Xerox Brenva Printheads and Drying Unit



The device has a compact drying unit that includes seven infrared lamps as primary heat sources. Xerox designed the unit so that the heat generated while drying is not immediately exhausted, but instead recirculated to help in the drying process, while reducing energy consumption and ventilation requirements. The drying unit is quite small and helps keep the overall footprint of Brenva to only a few inches longer than an iGen5 with comparable feeding and finishing units.

Brenva has a very straight paper path and can run on stocks between 60 and 220 gsm. Heavier weights will likely be available in the future, but are not a requirement for the applications and environments that Xerox has targeted for the Brenva launch.

Developing Brenva on the iGen platform clearly helped Xerox get to market faster and reduce development costs. The design also likely will help with product reliability and field service operations. Xerox plans to use its army of technicians that provide break/fix maintenance for the iGen to service Brenva in most of its markets.

The Brenva HD Production Inkjet Press will be available later this year at a list price of \$649,000. Order taking and fulfillment will start in Europe at drupa (May 31st to June 10th, Dusseldorf, Germany), where Xerox will show two systems.

Table 1: Xerox Brenva HD Production Inkjet Press Specifications

Metric	Description
System Type	Cut-sheet color inkjet
Speed	187 letter / 197 A4 ipm
Volume	Approx. 6 million (duty cycle) 1-2 million (anticipated average monthly print volume)
Media Weight Range	60 to 220 gsm
Maximum Sheet Size	14.3" by 20.5"
Size	22'6" (W) by 6'8" (H) by 4'0" (D)
Digital Front End	Windows-based FreeFlow
System List Price	\$649,000
Configuration Includes:	One sheet-feed module, a FreeFlow Print Server, the printer module, and one Xerox Production Stacker

Figure 6: Another View of the Xerox Brenva HD Production Inkjet Press



Strengths, Weaknesses, Opportunities, and Threats

When looking at any production digital print device, InfoTrends discerns the product’s strengths, weaknesses, opportunities, and threats (SWOT).

Table 2: SWOT Analysis of the Xerox Brenva HD Production Inkjet Press

Strength	Weakness
<ul style="list-style-type: none"> • A3-format cut-sheet color inkjet in the Zone of Disruption • Speed up to 197 A4 / 182 letter ipm • Built-in spectrophotometer • Black-only print mode • Maximum supported sheet size (14.3” by 20.5” / 363 mm x 520 mm) • Smaller footprint than currently available cut-sheet inkjet A3-format competition • Does not require a heating, ventilation, and air conditioning (HVAC) kit • Built on a market-tested feeding and finishing architecture 	<ul style="list-style-type: none"> • Lack of support for coated papers or stocks heavier than 220 gsm
Opportunity	Threat
<ul style="list-style-type: none"> • Bringing inkjet’s advantages to a cut-sheet device • Automating multi-step processes that use pre-printed offset shells • Moving black & white pages to color • Facilitating print-on-demand, just-in-time manufacturing, and fully personalized print 	<ul style="list-style-type: none"> • Increasing competition in the Zone of Disruption

InfoTrends' Opinion

With Xerox's Brenva, another product joins the Zone of Disruption, and this time it is a cut-sheet offering. This definitely heats up the competition, since prior to this announcement there was only one other true cut-sheet A3-format product in this space. Leveraging iGen for some components certainly helped Xerox get this product to market more quickly, which also means that it can benefit from feeding and finishing components that already exist and can be integrated into the platform. The focus on uncoated stocks at the start makes sense, since there is a lot of opportunity for moving black & white volume from cut-sheet monochrome toner devices, particularly in applications that leverage a pre-printed form. Potential buyers and early users will certainly push hard for coated stocks, but, as with other potential features, there is a lot more that can (and will) be added to the Brenva platform in the future. This announcement is an important move for Xerox because it reinforces its inkjet presence in the Zone of Disruption (where it already has a product with Rialto), and increases the already significant market activity around inkjet.

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