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Analysis

Xerox ColorQube: New Solid Ink-Based MFPs Bring Affordable Color to the Office

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Abstract

In a bold move that could have a major impact on the office imaging landscape, Xerox introduced its first A3-size solid ink-based multifunctional products. The new series promises to change the game for office customers by delivering per-page pricing schemes that allow customers to pay for the color they use, as opposed to a flat rate for all color pages regardless of how much color is on each page. This document provides a detailed analysis on the important technological breakthroughs of the ColorQube 9200 series, and delivers insight on the potential impact of Xerox's latest salvo on the office imaging market.

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Introduction

After a great deal of speculation and anticipation, Xerox has finally introduced its first A3-size solid ink-based multifunctional peripherals (MFPs). There are many important aspects to Xerox's latest announcement that could have a dramatic impact on the office imaging landscape. To begin with, the ColorQube 9200 series represents the first solid ink-based product to penetrate the core of Xerox's product line: segments 3 and 4 of the A3-size MFP market.

In addition, these products represent something that could usher in a change to the traditional copier business model by offering customers a multi-tiered, per-page pricing scheme that allows customers to pay for the color they use, as opposed to a flat rate for color pages regardless of coverage. The ColorQube 9200 series not only provides customers with a greater flexibility for color, but it offers break-through pricing for color pages.

InfoTrends believes that Xerox's ColorQube 9200 series delivers all the important attributes of an ink-based product that are necessary to truly disrupt the office MFP market.

Xerox's latest MFPs could be considered among the industry's first truly universal imaging devices. The ColorQube 9200 series should not be viewed simply as color MFPs, but as universal machines designed to perform equally well for monochrome and color imaging applications. With the ColorQube 9200 series, there is no sacrifice to monochrome printing speeds or operating costs, and the machines offer all the productivity features needed in a workgroup MFP. Device consolidation is clearly an important benefit of a universal platform, and there is little doubt that Xerox will look to capitalize on this capability in its marketing and positioning of the ColorQube 9200 series.

At the heart of the ColorQube 9200 series is Xerox's solid ink imaging technology. For quite some time, InfoTrends has forecasted a broader deployment of ink-based technologies into the mid-level office market to address certain unmet needs—primarily affordable color printing. Our theories are based on some fundamental assumptions: (1) ink costs less than toner, (2) the writing system is typically less complicated compared to xerography, and (3) the print quality that can be produced with inkjet-based technologies is very good. InfoTrends believes that Xerox's ColorQube 9200 series delivers all the important attributes of an ink-based product that are necessary to truly disrupt the office MFP market.

Key Highlights

- There are three new ColorQube models with default print speeds of 38/50 ppm, 45/50 ppm, and 50/50 ppm (color and monochrome).
- An entirely new solid ink-based imaging platform that consists of staggered printheads to create an A3-size, page-wide array.
- A "Hybrid Color Plan" provides customers with multi-tiered billing and metering options based on color coverage per page—resulting in new standards for color per-page pricing.
- High-yield ink sticks (based on Xerox's latest ink formulation and ink forming process) allows for lower operating costs and improved productivity at reduced power consumption levels, when compared to previous generations of solid ink technology.
- New user interface offers videos to help with step-by-step procedures for device maintenance.

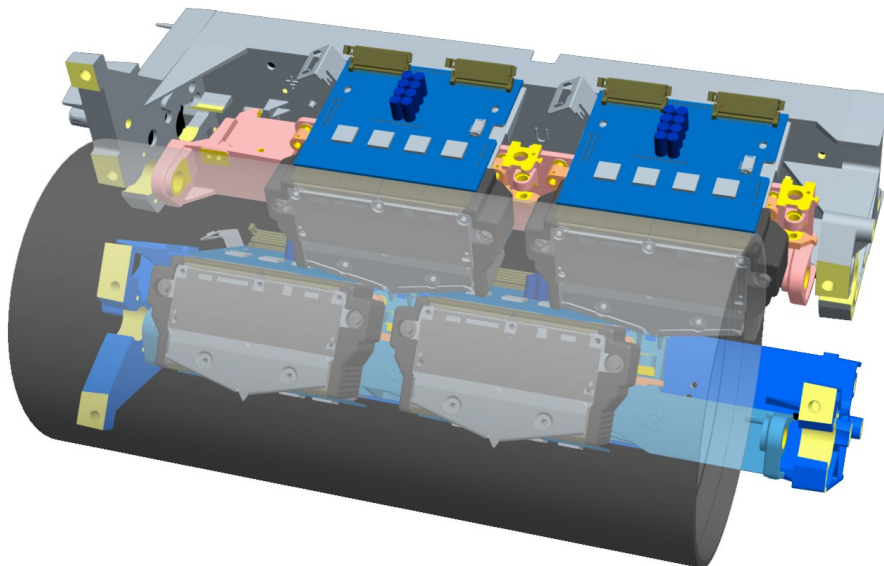
A3-Size Page-Wide Array

The ColorQube 9200 series is based on Xerox's solid ink imaging technology, which the firm gained with its acquisition of Tektronix almost ten years ago. Since the acquisition, Xerox has continually advanced the technology with performance enhancements and improvements in ink formulation, image quality, and durability.

The imaging process used by the ColorQube 9200 series is similar to that of other Xerox solid ink-based products. Incorporating Xerox's "offset" solid ink process, ink sticks are melted into a liquid state and then individual droplets are jetted onto an intermediate drum before the image is then transferred to the paper. Once the image is transferred to the media, it solidifies. Unlike serial inkjet imaging methods, Xerox solid ink technology utilizes a page-wide printhead to achieve fast print speeds and ensure that the entire page is imaged at a constant rate. With serial inkjet technologies, the printhead must transverse back-and-forth across a carriage to image the full width of the paper.

In 2005, Xerox introduced its first A4-size MFP based on solid ink technology, the WorkCentre C2424. Up to this point, Xerox's entire solid ink product line has been based on an A4-size printhead. Perhaps the most important technical achievement Xerox accomplished with its latest products is the development of an A3-size, solid ink page-wide array. To achieve this, Xerox actually stitched multiple modular printheads together in a staggered array that spans the full width of an A3-size page. Specifically, there are four printheads assembled in a staggered, overlapping formation to achieve an imaging width of 11.7 inches (see Figure 1).

Figure 1: Xerox Modular Solid Ink Print Heads Positioned Around an A3-size Drum



The 3-inch printheads used in the ColorQube products are new from the ground up, although Xerox points out that it has leveraged much of the manufacturing expertise acquired with its A4-size products in the development of its new modular array. The etched stainless steel plates that make up the jetting modules, for example, are similar to those used in the A4-size head, except that they are smaller to create a scalable architecture with higher nozzle counts, greater firing frequency, and the ability to support a wider print width. Xerox actually showed the new 3-inch printheads at last year's drupa event to demonstrate how they could be stacked to support very fast speeds and to jet on a wide range of material.

Each modular printhead used in the ColorQube products consists of 880 nozzles, with 220 nozzles per color (CMYK). As a result, the full array delivers 3,520 total nozzles with 880 nozzles per color. With a firing rate of 43 KHz, the printheads used in the Xerox ColorQube series can generate just over 150 million drops per second. It is an impressive technical achievement, and one that requires a great deal of engineering expertise to ensure optimum and consistent image quality. Because the ColorQube products are based on a full-width array, Xerox needed to develop a scanning/sensing unit to automatically calibrate and align the printheads. In addition, the ColorQube MFPs offer built-in fault tolerance to detect and compensate for defective nozzles.

The importance of creating a full A3-size array should not be understated. Xerox is not the first vendor to introduce a mid-level office MFP based on inkjet technology. No doubt many will race to draw comparisons between Xerox's new ColorQube products and HP's Edgeline-based CM8050 and CM8060 products, which were introduced in April 2007.

There are many elements to consider when comparing Xerox's ColorQube products to HP's Edgeline-based MFPs. Perhaps the most important of these, however, is the actual printhead architecture. HP's Edgeline technology utilizes an A4-size inkjet array, which allows it to achieve color print speeds of up to 50 ppm for A4-size pages. Yet, for A3-size pages, HP's Edgeline print speeds drop significantly because the printhead must shuttle back-and-forth across the page to accommodate the wider print width. With Xerox's ColorQube products, there is no productivity loss when printing on A3-size media. In fact, the A3-size array allows Xerox to image A4-size pages two-up on the drum, providing a further performance boost for A4-size printing with the ColorQube products.

Features and Specifications

Xerox's ColorQube Series consists of three new models: the ColorQube 9201, ColorQube 9202, and ColorQube 9203. Aimed at the mid-level office market, the ColorQube series represents a bold step for Xerox in its attempt to transition more office customers to color and, in particular, more office pages to color. Although these machines are based on solid ink technology, the ColorQube series does not take a back seat to any other toner-based MFP in Xerox's lineup in terms of overall features and design. Indeed, the ColorQube products are fully capable MFPs based on a wealth of proven Xerox technology.

The three models in the ColorQube family are essentially identical except for the color print speeds supported and the duty cycle ratings. The ColorQube 9201 has a default print speed of 50 ppm for monochrome and 38 ppm for color with a duty cycle rating of 150,000 pages per month. The ColorQube 9202 has a default print speed of 50 ppm for monochrome and 45 ppm for color, and offers a duty cycling rating of 225,000 pages per month. Finally, the top-of-the line ColorQube 9203 has a default print speed of 50 ppm for monochrome *and* color with a duty cycle rating of 300,000 pages per month.

Figure 2: Xerox ColorQube 9200 Series



Flexible Print Speeds

Like most inkjet-based devices, each model in the ColorQube series offers different print speeds depending upon the print mode selected. There are four different print modes available: Photo Mode (highest quality), Enhanced Mode (default), Standard Mode, and Fast Color Mode. Naturally, print and copy speeds decline as image quality increases. Each mode relates directly to the number of passes required to generate the desired print quality. In Fast Color mode, the machine requires three passes, while in the highest quality (Photo Mode) the machine requires eight passes. In Standard and Enhanced mode, the number of passes required is four and six, respectively.

Based on the print samples that we have seen, the print quality produced in the default “Enhanced Mode” is quite good and certainly comparable to that produced on toner-based devices. In Photo Mode, customers could expect to see the best possible image quality with full color saturation. Nevertheless, it is expected that “Enhanced Mode” would be good enough for most general office applications. One of the benefits of an ink-based platform is the ability to offer improved performance in reduced quality print modes. This can be very beneficial for certain applications where color is required, but the documents are primarily intended for internal use. Xerox’s ColorQube series provides this capability in all models.

Table 1: Xerox ColorQube 9200 Series Product Specifications

	ColorQube 9201	ColorQube 9202	ColorQube 9203
Print/Copy Speed	Color/Monochrome 38/50 ppm (default)	Color/Monochrome 45/50 ppm (default)	Color/Monochrome 50/50 ppm (default)
Flexible Print Speeds	Color/Monochrome	Color/Monochrome	Color/Monochrome
Photo Mode	30/38 ppm	35/38 ppm	38/38 ppm
Enhanced Mode (default)	38/50 ppm	45/50 ppm	50/50 ppm
Standard Mode	50/70 ppm	60/70 ppm	70/70 ppm
Fast Color Mode	60/85 ppm	70/85 ppm	85/85 ppm
Duty Cycle	150,000 pages/month	225,000 pages/month	300,000 pages/month
Memory and Processor	2 GB RAM, 80GB Hard Drive, 1 GHz Processor		
Standard Paper Input			
Trays 1 & 2	550-sheets each, custom sizes: 5.5" x 8.3" to 11" x 17" (A5-A3)		
Tray 3	2,100 sheets (A4)		
Bypass Tray	100 sheets, custom sizes: 4.1" x 8.3" to 12.6" x 18"		
Optional Paper Input			
High-Capacity Feeder	4,000 sheets (A4)		
HCF Kits (HCF required)	2,000-sheet, 11" x 17" (A3) short-edge kit or 2,000-sheet, letter/legal/A4 short-edge kit		
Media Weights	All input trays: 16 lb. bond to 80 lb. cover (60-220 gsm)		
Duplex Support	Yes, 100-sheet Duplex Automatic Document Feeder		

Finishing Options	Offset Catch Tray (OCT) Offset Finisher : 250-sheet top tray, 2,000-sheet stacker tray, 50-sheet multi-position stapling, 2-, 3-, or 4-hole punching (optional) High Volume Finisher : 250-sheet top tray, 3,000-sheet stacker tray, 100-sheet multi-position stapling, 2-, 3-, or 4-hole punching (optional) High Volume Finisher w / Booklet Maker : 250-sheet top tray, 3,000-sheet stacker tray, 100-sheet multi-position stapling, saddle stitch booklet maker, V-folding, 2-, 3-, or 4-hole punching (optional) Z-Fold / C-Fold Unit with HVF w / Booklet Maker : adds letter/A4-size Z- and C-Folding Post Process Inserter : available for HVF and HVF with booklet maker Convenience Stapler		
Print First page out time Resolution (max.) PDLs Connectivity Print Features	As fast as 7.2 seconds 2400 Finepoint PCL 5c, PCL 6 emulation, Adobe PostScript 3 10/100/1000 Base-TX Ethernet Delay, Sample and Secure Print, Simultaneous rip/receive, Program Ahead, Queue process and transmit, Bi-directional print drivers, page-level programming, Embedded Web Server for remote control/monitor/setup, Job Monitoring at device and desktop		
	ColorQube 9201	ColorQube 9202	ColorQube 9203
Copy First page out time Resolution (max.) Copy Features	As fast as 8.1 seconds 600 x 600 dpi Automatic two-sided, Auto reduction and enlargement (25%-400%), auto paper select, auto tray switching, auto color selection, mixed size originals, booklet creation, image quality enhancement, Build Job, book copying, transparencies with dividers and sets, multi-up, invert image, covers, annotation and Bates stamping, inserts, proof set		
Scan Scan speed (with DADF) Scan features Scan options	75/51 ppm (Monochrome/Color) Network scanning, scan-to-home, scan-to-mailbox, scan-to-e-mail, scan-to-PDF Scan-to-PC desktop, SMARTsend, EIP-based scan solutions		
Fax Standard Optional	Internet fax, server fax Walk-up PSTN fax (one-line and two-line options) with LAN fax		
Security Features	Secure fax, secure print, audit log, secure workflows, 802.1x, SNMP V3, network authentication, device access password protection, IP filtering, disk image overwrite		
Accounting Features	Xerox standard accounting (copy, print, scan, fax, e-mail), network accounting (through third-party), foreign device interface (optional)		
U.S. Base List Price	\$23,500	\$26,500	\$29,500

Next Generation Xerox Smart Controller

The ColorQube Series MFPs are the first products from Xerox to use the firm's next generation Smart controller architecture. According to Xerox, the next generation Smart controller is a fully-integrated controller design that will serve as the platform for all of its next generation office MFPs. The intent with this controller platform is to provide a common software platform and user interface experience for all future products. Essentially, the controller is designed such that future code can easily be ported to the platform using a common interface, and it supports Xerox's Extensible Interface Platform (EIP) to support third-party software solutions.

The ColorQube products support PCL 5c and PCL 6 emulations along with Adobe PostScript 3. Nevertheless, PCL is not supported in Standard or Fast Color mode. According to Xerox, the ColorQube products achieve faster performance in Standard and Fast Color mode by reducing the resolution—300 x 500 dpi for Standard mode and 225 x 450 dpi for Fast Color mode. These modes are optimized to achieve the best possible image quality resulting in non-square resolutions, which is not supported in the PCL page description language. On the other hand, High Resolution/Photo mode (or 2400 Finepoint Resolution) rasterizes at 2,400 x 600 dpi and then intelligently down-samples to the maximum native resolution of 600 x 600 dpi, which is supported by PCL language. Xerox also took extra image processing steps to ensure that PCL could be used in Enhanced mode, which has a resolution of 450 x 567 dpi.

Xerox is quick to point out that the resolutions supported in the ColorQube products should not be directly compared to a similar resolution used by xerographic marking engines because the marking characteristics of an ink-based system are different from those of a toner-based device. Indeed, Xerox claims that the effective print quality produced by a solid ink marking engine can be superior to a similar resolution using a xerographic print engine.

As expected, the ColorQube MFPs support all the standard device management, productivity, and security features enabled in previous Xerox office MFPs, including delay printing, Sample and Secure Print, simultaneous rip/receive, Program Ahead, Print Around, Queue process and transmit, bi-directional print drivers, Global Print Drivers, page-level programming, and an embedded Web server for remote control/monitor/setup. One important feature is the ability to manage all meter reads remotely, which will simplify the collection and billing process for Xerox's customers and channel partners.

Paper Handling

Apart from the differences in monthly duty cycle ratings, the three ColorQube models are identical in terms of paper handling capabilities and options. Fully configured with all the various input and finishing options, the ColorQube MFP provides all the capabilities needed in workgroup device. Xerox leveraged much of its previous paper handling technology in the design of its ColorQube products. The finishing devices, for example, are the same as those used in Xerox's 5600 series monochrome MFPs. This is an important point, as some customers and competitors alike may question the reliability of a new engine platform. While the ColorQube products are based on a new writing system, many of the major components for paper movement are based on proven technology with longstanding success in the field.

Table 2: Xerox ColorQube 9200 Optional Accessories

Supply Item	Pricing
Offset Catch Tray	\$400
Office Finisher	\$2,500
High Volume Finisher	\$4,750
High Volume Finisher w/Booklet Maker	\$6,250
High Capacity Feeder (4K)	\$2,200
A3/11"x17" Short Edge Feed Kit for HCF	\$1,000
A4/8.5"x11"/8.5"x14" Short Edge Feed Kit for HCF	\$1,000
High Volume Finisher Post Process Inserter	\$1,500
C/Z Trifold for High Volume Finisher	\$6,500
3 Hole Punch Kit for Office Finisher	\$795
3 Hole Punch Kit for High Volume Finisher	\$795
Legal 2 Hole Punch Kit	\$795
Convenience Stapler	\$299

Physically, the ColorQube MFPs are roughly similar in size to that of other color multifunctional products in comparable speed classes. Again, this is significant because there was concern about the physical size of HP's Edgeline MFPs. The physical size of HP's Edgeline products, however, was related to the printhead configuration and the drum size required to provide the necessary drying time for A3-size pages. This is not a concern for Xerox because solid ink does not require the number of spin cycles and drying time needed in a liquid ink implementation. Essentially, the ColorQube products are sized so that an SR3 image can be laid down on the drum, which means that the drum is a little larger than 18 inches in circumference, providing 4 mm margins for A3-size media.

Another strong feature related to ink-based technologies is the ability to image on a broad range of substrates. One important benefit of solid ink technology is the fact that the printheads are positioned over the intermediate drum so that the media never comes in contact with the printheads. Paper contains a lot of loose fibers that can clog aqueous inkjet nozzles, but that issue is greatly reduced with solid ink technology. Because the intermediate drum architecture ensures that media stays inches away from the nozzles, the Xerox ColorQube products can more effectively image on special media such as lightweight

papers, recycled papers, textured media, or simply on everyday business commodity papers. This is one of the main reasons that the printheads used in the ColorQube products, or any other Xerox solid ink product for that matter, are considered lifetime components that do not have to be replaced.

User Interface

Xerox's ColorQube products have been designed specifically with ease-of-use in mind. The front panel contains 26 hard keys to perform the standard range of functions available on most office MFPs. The most prominent feature of the front panel is an 8-inch color LCD touchscreen display that provides one-touch access to many of the more popular functions. In addition, the ColorQube products support on-screen videos so that users can see step-by-step procedures for device maintenance and error recovery, including videos for replacing ink sticks and clearing paper jams.

Ease-of-use remains an important issue for office customers, and InfoTrends believes that ink-based technologies bring much to the table in this area simply because the writing system requires fewer moving parts and, therefore, fewer components that need constant service. With its ColorQube products, Xerox is making it simpler for customers to maintain their own devices and even to resolve certain issues that require a service technician for some toner-based devices.

By empowering its users to solve these issues on their own, Xerox will help its customers to become more productive and reduce the need to utilize other personnel. This is important not only for customers but for Xerox's channel partners, especially considering that most of these machines will be installed under a click-based service contract.

Figure 3: Xerox ColorQube 9200 Series Front Panel



Supplies Details

Usually, any discussion of the consumable supplies for an office MFP leads to a detailed list of components ranging from toner cartridges to drum units, cleaning units, and waste cartridges (just to name a few). With Xerox's ColorQube MFPs, however, that is not the case. In fact, apart from the ink sticks used in the machine, there is only one other consumable supply item: a cleaning unit that has an average life of 200,000 pages. Obviously, it is this design characteristic of solid ink technology that has helped Xerox deliver breakthrough pricing for color pages.

Xerox points out that there was some significant engineering work that went into the development of the cleaning unit used in the ColorQube products. Xerox's current A4-size solid ink products use a cleaning unit that lasts about 30,000 prints. Producing a cleaning element that lasts 200,000 prints was important for Xerox to deliver the ease-of-use and the low running costs of the ColorQube products. Customers would replace approximately four cleaning units throughout a product life of one million prints. The cost of the cleaning unit is included in all service contracts.

The ink sticks used in the ColorQube Series MFPs are based on the same ink chemistry as that was introduced with Xerox's Phaser 8860 products. This ink formulation provides a number of benefits, but most importantly it is designed for lower energy consumption. At the same time, the ink forming process that Xerox uses to develop the ink sticks is similar in concept to injection molding, which has allowed Xerox to create economies of scale and lower the manufacturing costs of its solid inks. In addition, Xerox has simplified the packaging of its inks, which again helps to lower overall costs and create a more environmentally-friendly solution.

Figure 4: Xerox ColorQube 9200 Series Ink Loader



As has always been the case with Xerox's solid ink products, the process for replacing the ink sticks in the ColorQube MFPs is very simple. Users simply lift a cover located on the upper left of the machine and drop in a new stick (see Figure 4). Each ink stick is color coded and keyed so that it is virtually impossible to load a color stick into the wrong ink bin. Unlike toner-based machines, users do not have to wait until ink is depleted before adding supplies. Instead, customers can "top off" the ink levels at any time, even while the machine is running, which results in greater productivity and reduced down time for the customer.

Xerox has developed new high-yield ink sticks specifically for the ColorQube 9200 Series. Each black ink stick has a yield of 10,000 pages based on ISO yield standards, while each color ink stick (CMY) has a yield of 9,250 pages. The ink sticks are sold in packages and pricing can be found below.

Table 3: Xerox ColorQube 9200 Series Supplies Pricing and Yields

Supply Item	Yield*	List Price
Black Ink (box of four sticks)	40,000 pages	\$570
Color Ink (box of four sticks per CMY)	37,000 pages	\$176

** ISO yield information: quoted yields are based on ISO standards calculated in default "Enhanced Mode."*

Service Plans and Operating Costs

The technical specifications and capabilities of the Xerox ColorQube products are important, but there is no doubt that it is the low running costs and the multi-tiered pricing scheme for color pages that sets these products apart from anything else on the market today. Xerox had a single design goal in mind with its ColorQube products, and that was to bring a platform to market that makes everyday color more affordable for its customers.

While Xerox has published list pricing for the supplies used in its new MFPs, exact pricing information with regard to the total cost of operation (TCO) is difficult to determine. In most cases, the ColorQube MFPs will be brought in under click-based service contracts, and Xerox is unable to disclose exact per-page pricing because each contract will vary depending upon volume commitments and other variables. Nevertheless, Xerox has introduced a new “Hybrid Color Plan” that provides multi-tiered pricing for color pages. According to Xerox, this new multi-tiered approach will set new standards for per-page pricing of color pages and will provide customers with the flexibility needed to shift more office documents to color.

InfoTrends has consistently promoted the benefit of and the need for multi-tiered pricing schemes for quite some time. Under most current MFP leasing contracts, customers pay a flat per-page rate for monochrome pages and a flat per-page rate for color pages, regardless of the amount of color on the page. The price differential between monochrome and color click charges varies, but in typical environments today it is not unusual to find contracts with black pages costing about 1¢ per page, while color pages cost about 8¢ per page. This flat rate for color applies to any page that includes any amount of color. Therefore, for customers who are printing pages with only a small amount of color, the per-page costs can be overwhelming and, frankly, out of line with what is actually produced.

Again, Xerox is not the first vendor to bring multi-tiered, click-based pricing to the office MFP market. HP actually introduced a multi-tiered pricing plan with its Edgeline-based MFPs. Nevertheless, there is one key difference in how each program works. HP’s tiered pricing strategy works by assigning separate click charges depending upon the print mode selected. In other words, pages printed in the “Professional Color Mode” are billed at one rate, while pages printed in the lower quality “General Office Mode” are billed at a lower rate. In essence, HP asks its customers to make a print quality sacrifice to receive the benefits of lower per-page pricing.

With Xerox’s Hybrid Color Plan, customers can actually be billed at different rates depending upon the amount of color on the page, completely independent of the print mode selected. This is a very important distinction because Xerox is not asking customers to sacrifice quality for the benefit of lower per-page pricing. Instead, Xerox’s approach allows customers to essentially pay for the amount of color that is used on each page.

Hybrid Color Plan

Xerox's Hybrid Color Plan works by taking advantage of the solid ink imaging process. The ColorQube 9200 Series creates images by printing individual pixels of black and color on the page, and Xerox has built-in the capability to precisely measure and track the exact number of black and color pixels produced on any given page. With this information, Xerox can establish "tiers" for per-page pricing based on the number of pixels produced on each page. In other words, pages that fall below a certain threshold for number of color pixels could be priced at one rate, while pages that contain enough pixels to surpass that threshold could be priced at another rate.

This is an innovative approach to per-page pricing and one that InfoTrends believes the industry has needed for quite some time. In essence, Xerox is providing customers with a pricing model that more closely relates to the amount of color they actually use. Xerox says that it will offer a variety of post-sales plans that are based on three basic metering options. With this three-tiered approach, individual pages are tallied on three separate meters in the machine based on how many color pixels are on the particular page. Pages with fewer than 286,000 color pixels are called "Useful" color pages and are tallied on the "Black + Color Level 1" meter. Pages with more than 286,000, but fewer than 1,900,000 color pixels are called "Everyday" color pages and are tallied on the "Color Level 2 meter." Lastly, pages with more than 1,900,000 color pixels are called "Expressive" color pages and are tallied on the Color Level 3 meter.

Xerox uses pixel count to measure the precise amount of color on each page because an arbitrary percentage of coverage would be too difficult to define and measure. Nevertheless, it is possible to equate pixel count to approximate page coverage. Xerox says that 286,000 pixels (Useful Color) is roughly equivalent to 1.2% of color coverage on a letter/A4-size page, while 1.9 million pixels (Everyday Color) equates to roughly 8% of color coverage on a letter/A4-size page. For examples of the types of pages that could be produced under each meter rate, see Figure 5 below.

Figure 5: Xerox Hybrid Color Plan Description



It is important to point out that the only factor that determines which meter is incremented by a given printed page is the number of color pixels used in printing that page. In other words, the total amount of black coverage (or pixels) on any given page has no bearing on the meter rate that will be applied. As a result, a monochrome only page would be billed at the "Black + Color Level 1" meter rate because it has fewer than 286,000 color pixels. More importantly, Xerox says that the Level 1 meter rate will essentially

be the equivalent to monochrome per-page pricing. Therefore, customers will actually be billed at a monochrome rate for “Useful” color pages, or pages that contain about 1.2% of color coverage on a letter/A4-size page.

This will no doubt be a strong selling point for Xerox’s three-tiered approach because it essentially offers customers the ability to produce low-level color pages at the price of a monochrome click. In today’s market, a page with only one word of color is billed as a color click. As a result, customers have been slow to shift certain types of documents to color because they understand that they are overpaying for the amount of color on the page.

With Xerox’s ColorQube MFPs, customers only pay for the amount of color they use on each page, independent of paper size and print quality mode selected. Again, this is significant because customers do not have to make a print quality sacrifice to take advantage of lower per-page pricing. Indeed, moving to faster print speeds (or lower quality prints) could result in even further cost savings. The faster (lower resolution) print quality modes of the ColorQube series generally use fewer color pixels to print a given image and, therefore, the same image may occasionally be tallied on a lower (less expensive) meter when printed in a faster mode.

Xerox also points out that copied pages could fall into a different meter rate from printed originals. Copying involves scanning the image, processing it, and printing the best possible duplication of the original. The amount and proportion of color inks used in this process are not the same as those used when printing an original file. Therefore, a copy of a print may not necessarily always increment the same meter rate as when directly printing the original file on the device.

Breakthrough Color Pricing

Of course, it is somewhat difficult to understand the importance of Xerox’s multi-tiered metering approach without some baseline as to actual per-page pricing. As previously mentioned, Xerox is unable to disclose the exact page costs for its ColorQube MFPs because the channel basically sets its own pricing, which varies depending upon the individual contract. The firm has, however, provided some guidelines as to the type of cost savings that customers could expect to see with the ColorQube 9200 series MFPs.

Xerox’s intent with the ColorQube 9200 Series is to revolutionize the current color MFP market by providing breakthrough pricing for color pages. According to Xerox, the “Black+Color Level 1” meter rate will be priced equivalent to today’s monochrome click charge. This can vary depending upon the contract, but the industry standard today is somewhere around 1¢ per page. Providing low-level color pages at the price of a monochrome click is a good first start, but Xerox is extending the value proposition further by delivering lower per-page costs for “Everyday” color documents.

Xerox believes that there is a tipping point in the market that would cause customers to move from printing in monochrome to printing in color, and that tipping point is 3¢ per page for “Everyday” color documents. Xerox claims that in certain contracts with fixed volume commitments, customers will be able to achieve that price point through the “Color Level 2” meter. Of course, these figures are only target numbers that will vary depending upon the structure of the contract. Nevertheless, Xerox says that customers with volumes ranging from 14,000 to 15,000 pages per month could see color running costs reduced by as much as 62% with the new ColorQube MFPs. Finally, Xerox says that the “Color Level 3” meter rate will be priced equivalent to today’s market rate for color pages, which it says is about 8¢ per page.

If these figures can be achieved, Xerox will set new industry standards for per-page color pricing that is likely to cause a rippling effect in the industry. For quite some time, InfoTrends has argued that there is little reason that customers should be paying more than four-times the cost of monochrome for a color page. Nevertheless, color printing costs have been slow to migrate downward. With its solid ink-based MFPs, we believe that Xerox could truly disrupt the traditional copier market by providing customers with a real solution to take advantage of the value of color.

Ultimately, Xerox will offer a variety of post-sales plans for the ColorQube MFPs. The firm understands that customers want choice, and no plan will work for all customers in all environments. For example, there are customers who like having a single price for monochrome pages and a single price for color pages. For these customers, there may be little desire to change that business model. Xerox says that it plans to lead with the three-tiered pricing model, but it will remain flexible so that its channel partners can adapt to customer desires. In fact, Xerox says that there are plans to introduce a program that will offer a single flat-billing rate for monochrome and color clicks, which would be ideal for those customers with a very high penetration of color. The ColorQube 9200 Series MFPs will also be available for purchase outright and supplies could be sold on an ink-out basis.

Whatever the plan, Xerox asserts that the ColorQube platform will ultimately reduce total running costs significantly. The Hybrid Color Plan will be offered to ColorQube customers under Xerox's standard Full Service Maintenance Agreement (FSMA), which includes installation and on-site service for the length of the contract. Operator training is an optional charge and final click-based pricing and other variables will be established on a contract basis by Xerox and/or its channel partners.

Environmental Benefits

As if breakthrough technology and color pricing were not enough, the ColorQube 9200 Series MFPs also deliver all the environmental benefits of Xerox's solid ink technology. Of course, the most compelling attribute of solid ink from an environmental standpoint is the limited amount of waste that is generated by the technology. As mentioned, there are very few consumable supplies for the ColorQube 9200 MFPs, and most of those are completely consumed as the device is used. Unlike toner-based technologies, there are no empty toner cartridges to dispose of, not to mention fuser units, imaging units, or any other consumable supply item typically associated with a xerographic imaging machine. The solid ink sticks used in the ColorQube products are completely consumed, which means that the only recycled supply item is the cleaning unit.

To take the analogy further, to generate one million prints on a ColorQube platform, the user would only need to replace four cleaning units. Xerox says that on a typical toner-based device, the user would have about 50-times that amount to dispose of, considering all the consumable supply items that need to be replaced and discarded. This translates not only to less waste but also to real cost savings for the customer over the long run.

Another important attribute relating to solid ink technology is the benefit provided in the system's overall carbon footprint. Xerox has conducted a full life cycle analysis and environmental impact study on its solid ink products and the results are quite compelling. The key findings from that study, which have been peer reviewed by the Rochester Institute of Technology, indicate that solid ink technology provides lower energy consumption throughout the device's life cycle, less greenhouse gas emissions, fewer raw materials, and about 90% less waste than a typical laser system.

According to Xerox, the ColorQube MFPs will meet the new, more stringent Energy Star requirements that are scheduled to come out later this year. A lot has been made over the years about the power consumption requirements of solid ink technology, particularly when the machine is not operating but in sleep mode. The reason for this is that solid ink needs to be heated to print, and the heaters remain operating in sleep mode to keep a small amount of ink heated and ready for printing.

To help address this issue, the ColorQube MFPs support Xerox's Intelligent Ready technology, which keeps track of the customer's typical usage patterns to automatically determine the appropriate times to power down and power up. Nevertheless, Xerox argues that solid ink technology uses less energy when operating compared with laser-based technologies, as well as less energy when in standby mode. The technology does use more energy in sleep mode but, ultimately, power consumption will depend on how the customer uses the products.

Another important benefit of solid ink is the environmentally-friendly packaging for supplies. The solid ink sticks offered for the ColorQube MFPs come incased in a plastic tub that is packaged in a cardboard box. According to Xerox, the plastic tubs are made of 100% recycled material and the cardboard boxes are made of 45% recycled content. The plastic tubs and the cardboard boxes are locally recyclable where options are available.

The environmental benefits of solid ink will ring true with those customers focused on sustainability, which is growing more and more important. Just a few short years ago, people were not even considering sustainability in their decisions to acquire new imaging equipment. Xerox asserts that today, it is not

uncommon to find someone in the room whose sole responsibility is to evaluate the sustainability aspects of any new equipment purchase. Xerox also points out that paper consumption generates a greater carbon footprint than anything else involved in the imaging process. Xerox has developed a high-yield business paper that uses a mechanical pulping process, and the ColorQube platform is tuned to produce high-quality, consistent color on those environmentally-friendly papers.

Of course, other vendors have developed technologies that create more environmentally-friendly toner-based solutions. Kyocera Mita, for example, has promoted the benefits of its ECOSYS technology for quite some time. By focusing on the long-life aspects of the amorphous silicon drum technology used in its products, Kyocera Mita argues that the reduced waste and diminished service intervals result in cost savings and a reduced environmental impact for its customers. Xerox's solid ink technology seems to have a strong and favorable environmental position compared to xerography, but it is not the only vendor focused on this issue.

Marketing and Positioning

The ColorQube 9200 Series MFPs will be positioned by Xerox as a universal color device. The marketing message is not only to help customers reduce their running costs for color, but also to consolidate their equipment and their print jobs to a single device. One of the key value propositions of the ColorQube platform is that it can be used effectively for monochrome printing because there is no price penalty for monochrome-only pages and no productivity loss. This is a strong selling point, especially when you consider today's economic climate and the pursuit of cost reduction in every facet of business operations.

Of course, the ColorQube 9200 Series MFPs are color products, and as such are clearly aimed at those customers who are already producing color documents or intend to do so. A monochrome only MFP would be much more cost effective for those customers producing only monochrome documents, not because of the running costs but because of the equipment pricing. Nevertheless, Xerox says that the ColorQube MFP would be an ideal solution for those customers who are not only producing monochrome today, but would like to shift some volume to color.

Naturally, Xerox's intention with the ColorQube platform is to help customers shift more pages to color. That is the true benefit of the Hybrid Color Plan and the clear desire behind Xerox's introduction of the platform. Today, color printing in the office involves a very complex set of behaviors. In most cases, customers limit color usage to certain individuals or to certain documents because of the expense associated with color. Xerox believes that by reducing color running costs, customers will consider a greater number of documents that could benefit from the perceived value of printing in color. Xerox's marketing efforts will undoubtedly focus on this theme, with messaging such as "reducing the guilt of color," "reducing the cost of color," and "worry-free everyday color printing."

There is no question that the ColorQube MFPs are intended to be a disruptive play in the market. Xerox says that its goal with the platform is to capture new opportunities, which will lead to increased market share. The firm also understands that, in some ways, the ColorQube products will be competing head-to-head with its own laser-based MFPs. Nevertheless, Xerox says that the ColorQube platform is designed to provide a strong value proposition to those customers desiring lower color running costs. Xerox says that it understands the market is dominated by laser today and it will continue to offer both types of products and technologies.

Given the fast print speeds achieved with the ColorQube MFPs, it seems plausible that these products could be attractive for certain light-production applications. Nevertheless, Xerox indicates that the products will be clearly positioned for general office use. Right now, there are no plans to support any third-party RIPs or additional production workflows with the ColorQube products.

Xerox's ColorQube 9200 Series MFPs are being announced worldwide. Order taking will begin immediately in the U.S. and Canada. Order taking in Europe will begin in the later part of 2009 and in Developing Markets (DMO) in 2010. The products will be sold through all of Xerox's distribution channels.

Conclusion

The Xerox ColorQube 9200 Series MFPs offer four key value propositions: a universal platform; flexibility for color pages; breakthrough color pricing; and a cartridge-free, environmentally friendly solution. Individually, any one of these four elements would be enough to create a stir in the market. Combined into one solution, however, the ColorQube 9200 MFP series represents a truly disruptive play in the office segment. There is no doubt that Xerox's solid ink technology serves as the basis behind the firm's ability to make this move. Therefore, much of the opportunity for success rides not only on Xerox's ability to meet the expectations that are promised with the platform, but also on the customer and channel acceptance of the technology and business model.

On the surface, there is little doubt that these products offer many attributes that customers would find quite valuable. InfoTrends has long believed that customers want and need a universal platform that could be brought in not only to handle the production of color documents, but also to serve as a general-purpose office machine. Device consolidation is clearly at the top of mind for many customers today to not only reduce costs and optimize their document output infrastructure, but also to increase productivity. The ColorQube 9200 Series delivers in this area by providing a product that offers customers everything needed in a workgroup color MFP with no penalty in monochrome print speeds or operating costs.

At the same time, the lower running costs and multi-tiered billing structure would seem to be immediate wins from the customer's viewpoint. After all, who would not want lower-priced color pages, especially if there is a strong desire for color and it can be had in a flexible pricing model that even offers some color pages at the price of a monochrome click charge? The ColorQube 9200 Series MFPs would seem to be an obvious choice for any customer with heavy color print volumes, or at least a heavy mix of color documents. With all of that said, it appears that the only challenge to customer acceptance of the ColorQube 9200 Series MFPs would be in acceptance of the solid ink technology.

What Inkjet Bias?

As already mentioned, InfoTrends has long promoted the potential benefits of ink-based technologies for the mid-level office market. The question, of course, is can ink-based technology overcome any favorable bias that exists toward laser technology? Much of InfoTrends' position on this issue was discussed when HP launched its Edgeline-based products. There is little question that toner-based technologies currently dominate the office market (especially the traditional copier business), but the bias against inkjet is limited primarily to consumer-class implementations. In other words, customers primarily have consumer inkjet implementations to compare to when they consider the opportunities for ink in an office environment. To the extent that vendors can implement inkjet technology in a product that is clearly designed to meet the demands of the office user, InfoTrends believes that this bias can be overcome.

Indeed, Xerox is already several steps ahead in this regard because solid ink, while clearly a piezo-based inkjet technology, has never really suffered from this inkjet bias. This is because Xerox's solid ink technology has always been implemented in page printers designed for office customers. Xerox points out that 6 billion pages a year are printed on solid ink technology, and virtually all of these were office pages printed by office users. The fact is that solid ink is a technology that has already proven successful in office applications—perhaps not at the volumes targeted by the ColorQube 9200 Series machines, but the ability to handle a heavier workload would fall on other engine characteristics and not the writing system.

The fact that Xerox's new MFPs *are* based on inkjet technology is the primary driver behind the benefits and value proposition provided. In reality, these machines look and act like any other page printing multifunctional device, and InfoTrends believes that few customers will hone in on the fact that these machines are not laser-based. Instead, the ColorQube 9200 Series MFPs are more likely to be judged on their merits and on the comparisons with other products in a similar class, regardless of the imaging technology. Though solid ink output is different from aqueous inkjet output in that it will not smear and can hold up to moisture, there are some customers out there who simply will not consider these products because they are ink-based. There is always some concern over any new technology implementation, and Xerox will continue to offer its own toner-based products for those customers.

The Inevitable Edgeline Comparison

Naturally, many will look to draw immediate comparisons between Xerox's new ColorQube products and HP's Edgeline-based MFPs. Some will point to HP's lack of market penetration with the Edgeline platform to show the challenges that ink-based technologies face in the office MFP market. Nevertheless, there are a couple of important points to consider when comparing the two platforms and strategies.

First, InfoTrends would argue that any lack of market penetration suffered by HP's Edgeline products has had less to do with imaging technology or product design and more to do with HP's channel structure. In reality, HP does not have a strong enough presence in the office equipment channel to achieve strong penetration in the segment 4 MFP space. This has long been a problem for HP, going all the way back to its original Mopier product and its branded copier products that were sourced from Konica Minolta. For its part, HP understood its channel limitations up front and the firm consistently positioned Edgeline more as a compliment to its distributed MFP strategy rather than as a pure "copier killer."

In fact, InfoTrends would characterize the Edgeline product as successful for HP given its targets and intent for the product. While it is true that unit placements have been low relative to the entire segment 4 MFP market, HP has likely landed certain large corporate accounts that it otherwise would not have secured had it not developed the Edgeline platform. The Edgeline products continue to be an important part of HP's product mix and the firm has, in fact, announced plans to expand it even further into segments 5 and 6 of the MFP market. Whether or not these products will be based on inkjet technology is unclear at this point, but what is certain is that the ability to offer high-speed, departmental A3-size MFPs is crucial to HP's strategy.

In addition, there are a few notable differences between Xerox's ColorQube 9200 Series MFPs and HP's Edgeline products. As mentioned previously, HP's products are based on an A4-size printhead and suffer from very slow A3-size print speeds because of this, which is not an issue with the Xerox ColorQube products. Xerox's Hybrid Color Plan is also much more attractive because per-page color pricing is based on the amount of color on the page and not on the print quality mode selected. HP's method in this regard has some value to the customer, but InfoTrends has always believed that a coverage-based, multi-tiered pricing model would be better received. In short, InfoTrends does not believe it is wise to look at HP's Edgeline platform to determine whether or not ink-based technologies or multi-tiered pricing strategies can be successful in the office MFP market.

Competitive Response

The ColorQube 9200 Series MFPs represent a significant threat to the office MFP market and to the traditional copier business model. Xerox's competitors will likely respond in a variety of ways. No doubt, many competitors will focus in on the fact that these products are based on solid ink marking technology, looking to discredit the imaging technology as well as the products themselves. As already mentioned, this may be an uphill battle given Xerox's proven success with solid ink, but it is expected to occur nonetheless.

Solid ink technology has suffered some negative press in previous years. Early on, the technology demonstrated image quality issues related to pile height that created a rather waxy feel to the resulting print. In addition, solid ink prints have previously suffered from durability issues, such as a tendency to crack when folded. These issues have largely been overcome in recent years as Xerox has continued to advance the technology, but competitors are likely to bring them up again. Xerox argues that solid ink technology now produces prints that are as durable as monochrome laser, and certainly good enough for general office applications. In reality, Xerox has many customers using solid ink-based products to produce marketing brochures and other collateral. It is hard to imagine that image quality would be an issue that holds back any customer acceptance of the technology.

Some are likely to focus on the power consumption issue, as that has long been an area where Xerox's competitors tend to attack the technology. Solid ink technology, however, offers a very compelling environmental position relative to toner-based devices, so it would appear that Xerox has the ammunition needed to respond to that argument.

Most likely, Xerox's competitors will respond in the traditional way when any new product comes to market, and that is through pricing. HP opened the door for multi-tiered pricing and flexibility for color pages with its Edgeline products. Xerox has now responded with a strategy that appears to provide even greater flexibility and per-page savings for color. Indeed, Xerox expects its competitors to initially try and beat the pricing levels established with the ColorQube MFPs. In reality, however, competitors will only be able to go so far with current toner-based platforms, so this is likely to be a short-term reaction. As a result, InfoTrends expects to see other vendors begin to pursue multi-tiered pricing strategies for color, which could lead to a complete change in the makeup of the traditional copier business model.

Market Prospects

There are many things to consider regarding the potential success of Xerox's ColorQube MFPs. One key question is whether or not Xerox can adequately train its channel partners and agents on how to properly sell these products given all the new variables presented with the Hybrid Color Plan. The "traditional copier business model" has been in place for a very long time, and there may be some hesitation related to any changes—from customers and the channel. For its part, Xerox says that it has been working closely with its resellers, agents, and the direct channel in preparation for the launch of the ColorQube products.

Xerox says that its channel partners are quite enthusiastic about the prospects for the ColorQube products. The firm says that the level of channel training and support required will be different depending upon the region. In the U.S., for example, Xerox's direct sales force will perhaps require more training and education because that channel has primarily been selling laser technology. In Europe, however, Xerox's Concessionaires are the number one channel for selling A4-size solid ink. Therefore, there is little uncertainty about the ColorQube products within that channel.

Xerox says that it has shown the ColorQube 9200 Series MFPs to several customers under NDA and the reaction has been quite positive. Xerox believes that customers will welcome the flexibility provided with the multi-tiered pricing model, and it claims that reactions thus far have been quite good. InfoTrends has long believed that customers value choice, not only in how they acquire products but also in how they pay for color pages. The Xerox ColorQube 9200 Series MFPs provide a level of choice that has yet to be delivered to customers in the mid-level office MFP market.

Xerox has long understood the value of ink-based technology for the office environment. With the launch of its ColorQube 9200 Series MFPs, the firm is attempting to push that technology into the core of its product line and customer base. What remains to be seen is how its customers and competitors will react. The ColorQube 9200 Series MFPs represent a lot of firsts for an industry that has remained relatively unchanged for a very long time. The machines are based on new technology (new at least to the traditional A3 MFP space) and provide a value proposition that is currently unmatched. The capabilities needed to truly disrupt the office color market appear to be in place with these products, which means that the greatest barriers to success will be customer acceptance of the products and Xerox's ability to execute.

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