DOCUMENT SCANNER MARKET ROUNDUP

Scanning was once the domain of specialized value-added resellers, imaging hardware distributors and geeky "systems integrators." These three sales channels catered to an equally obscure group of imaging-focused employees in the back office operations at large financial services operations, insurance companies, government agencies and wherever else paper showed up in huge quantities. In the past five years, however, things have changed dramatically.

Today these sales channels remain while the customer base has grown exponentially, as small and medium-size enterprises and new vertical markets have embraced document scanners, including retail sales and health care, not to mention city and county governments. In the post-Enron/WorldCom era, many business and IT executives are aware of how imaging processes fit in with the larger content management picture and growing demands for regulatory compliance.

InfoTrends Market Segments

The market research firm InfoTrends has divided the document scanner market into five categories, defined by speed and price. These categories are as follows: workgroup, departmental, low-volume production, mid-volume production and high-volume production.

New models released over the last several years, however, are blurring the boundaries between these segments as technology becomes more sophisticated and less expensive. InfoTrends emphasized that classification within these market segments is a question of both speed and price, and that while a given device's speed may put it in a higher category, its price may place it in a lower category. In discussions with manufacturers, BLI learned that price can sometimes be a more important determinant for classification than speed.

"One of the big issues in the scanner market is that devices are really starting to transcend the boundaries of the traditional five segments we've used in the past to divide up the market," said Jonathan Franke, a market analyst at InfoTrends.

Workgroup devices cost between $500 and $2,000 and feature scanning speeds of 10 ppm to 25 ppm. Workgroup machines are generally attached to a PC at individual office workers' desks or a common desk in an office, but aren't used for any kind of heavy-duty scanning.

Departmental devices are priced between $2,000 and $5,000 and have speeds of 25 ppm to 40 ppm. Departmental machines are evolving into network-connected devices designed to scan directly into enterprise content management systems. But like workgroup units, they're still relatively small, low-volume machines. Departmental scanners are seldom found on individual workers' desks, but are generally situated next to the office copier or shared printer.

Production-level machines are generally found in a dedicated scanning center, though branch offices that handle a lot of documents will use a low-volume device in a distributed capture role. Low-volume production machines cost between $5,000 and $12,000 and feature speeds of 40 ppm to 60 ppm. Mid-volume production devices are priced at $12,000 to $30,000 and scan at 60 ppm to 90 ppm. High-volume production units cost $25,000 and above and run at speeds of 90 ppm and higher.

Centralized Capture, Distributed Capture

In the past, the most common method of handling document scanning was to ship paper documents to a dedicated scanning facility equipped with many fast production scanners and a specially trained staff. This

INFOTRENDS DOCUMENT SCANNER MARKET SEGMENTS

Segment	Speed (simplex PPM)	Cost
Workgroup	10-25	$500-$2,000
Departmental	25-40	$2,000-$5,000
Low-volume production	40-60	$5,000-$12,000
Mid-volume production	60-90	$12,000-$30,000
High-volume production	90 and above	$30,000 and above

centralized scanning model remains very common today and provides the main market for mid-volume and high-volume production scanners. Growth in outsourcing is just one trend driving centralized capture.

"Traditionally, when people think of document scanning, they think of the 'big iron' machines that are scanning 24 hours a day in a centralized office in a basement somewhere," said InfoTrends's Franke.

Insurance companies and banks commonly rely on large centralized scanning operations. "Böwe Bell + Howell has several multinational insurance companies as customers, and all of their claims applications and documents, with photographs attached, and any correspondence related to a customer's file, are scanned, indexed and keyed to a specific claim or a customer's account at large, centralized scanning bureaus," said Jackie Horn, director of worldwide marketing for Böwe Bell + Howell Scanners. "Some of our customers are imaging millions of documents a year."

However, shipping costs make this an expensive option for smaller batches of documents or small businesses. Plus, the centralized scanning process is slow. According to one Kofax market research report, companies have found it typically takes three to

six days to make a document available online when shipped to a centralized location for scanning.

Distributed scanning has become very popular over the last five years, thanks to new technology that makes scanners lighter, smaller and less expensive than ever before, along with the widespread adoption of computer networks and enterprise content management (ECM) software. Distributed scanning takes the opposite approach to centralized scanning. With distributed scanning, many smaller, slower, less expensive devices are distributed among many offices and workgroups.

"As the name suggests, distributed refers to a model where instead of having a centralized scanning department, the organization distributes scanning operations so that scanning takes place where the paper is produced and used in the first place," said Kevin Keener, director of marketing at Kodak Document Imaging.

The choice of a distributed or centralized capture model depends on many factors, including the business process utilizing the scanned images. The Kofax report, for example, noted that manufacturers usually choose centralized scanning for handling warranty registration applications—since all of the warranty cards come into one place, it makes sense to central-

ize the scanning in the mailroom where the registration cards are received.

Mortgage loan processing, on the other hand, is an example of an application that is better suited to distributed processing, according to the Kofax report. Loan documents are typically created at bank branches and it makes sense to scan the documents locally at each branch and send digital files to the bank's central content management system.

Another good use of distributed scanning is at the check-in desk in a doctor's office, when patients fill out registration forms and a nurse scans the documents into a document management system as people check in for appointments. With doctor's offices, there is seldom any central office to report back to, and it makes sense to scan documents one by one as patients arrive at the office.

Market Dynamics

The widespread adoption of the distributed capture model represents the strongest dynamic in the scanner market today. The manufacturers spoken to for this article were unanimously enthusiastic about growth in the workgroup and departmental market segments, and emphasized that it was the scanner manufacturers who had planted the seeds of this evolution because they were the ones who sparked the move from paper-based processes to digital documents in the corporate world more than a decade ago.

According to InfoTrends, shipments of workgroup and departmental scanners are growing at a rate of 40 to 50 percent a year. "With compliance issues and more ECM software being used than ever before, we're seeing a shift in the market towards a distributed scanning model and this much larger market is really what's driving sales," said Franke.

"People today are constantly looking for more feature functionality in a smaller, more compact, lower-cost device," said Kodak's Keener. "Large corporations and businesses have been the main market for document scanners over the last 15 years, whereas today we're seeing a huge amount of adoption among SMBs [small and medium-size businesses]. They are undergoing a dramatic shift from paper-based to electronic workflows, taking advantage of lower-priced advanced technology to do so."

The growing adoption of document scanning by small and medium-size businesses and explosive growth in the departmental and workgroup segments are continuing to push down prices and drive innovation, including the migration of features and functionality traditionally available only on production-level hardware to lower-end devices.

Scanner Lingo

There are two main form factors among the scanners offered by the major manufacturers: sheetfed and flatbed. A sheetfed scanner resembles a fax machine more than a copier, since it moves the page being scanned past the scanning head instead of leaving the material stationary. These scanners are designed to handle large volumes of paper very quickly, and are generally equipped with automatic sheet feeders. A flatbed scanner is what most people first think of when they consider scanners, as it's the most common type of scanner on the market. A flatbed scanner, which resembles a copying machine, can effectively scan any two-dimensional flat object, such as a photograph or drawing, as well as books. Flatbed scanners are most often used for ad-hoc scanning, when only the occasional document needs to be scanned, or for scanning bound matter or delicate documents that would be damaged by a document feeder.

Manufacturers generally offer three types of interfaces to connect scanners to the computer. There are both performance and support issues related to the connection type.

USB is rapidly becoming the most common interface because of its ease of installation, low cost and reasonably fast transfer rate. In addition, every personal computer sold on the market today comes equipped with a USB port. SCSI (Small Computer Serial Interface) has been the interface of choice for most scanners mainly because of fast transfer rates. The cross-platform capabilities of SCSI also make it easier to connect the scanner. It is usually standard on Macintosh computers; PCs will have to be upgraded to SCSI using a corresponding adapter card. High-end scanners may feature a FireWire interface capable of very fast data transfer speeds. Developed by Apple Computer, FireWire technology has been adopted as an industry standard for moving large amounts of data between computers and peripherals.

"For the foreseeable future, we'll continue to see prices fall and innovation will continue, as more devices are hooked up to the network," said John Capurso, vice president of marketing at Visioneer. "There will be shorter product development cycles if manufacturers want to stay competitive."

While growth in the centralized, production-level scanning market has slowed considerably over the last five years, this segment remains healthy. InfoTrends says sales of medium- and high-volume production scanners are growing at 5 to 10 percent a year.

Fujitsu is upbeat about the market outlook for pro-

Drivers: ISIS Vs. TWAIN

ISIS and TWAIN are competing technologies for connecting scanners to computers and computer networks. While the two standards offer similar image processing features and performance, there are important differences between them and the choice of one driver over the other is usually determined by the needs of different customers.

While scan drivers play an analogous role to that of print drivers (they must be installed on end-users' computers, they allow users to change the parameters of a job), in the end they serve a very different purpose. A print driver sends information to a device, whereas a scan driver takes data from the device. Scan drivers facilitate the smooth transfer of data into a software program located on a remote computer or server.

TWAIN was originally developed by the TWAIN Working Group in 1992 for general scanning applications. TWAIN is a free, open-source product that is frequently customized by individual hardware manufacturers. ISIS was created by Pixel Translations in 1990 for production scanning and has since been widely adapted for different scanning applications. ISIS is a proprietary format that is now owned by EMC Captiva and licensed for use by many hardware manufacturers.

ISIS drivers are standardized: the same feature set and software compatibility is available for every different scanner that comes with the driver, since the product is maintained and licensed by a commercial entity. With TWAIN drivers, functionality differs from device to device. Because the TWAIN driver is an open-source product, each manufacturer is free to modify it as they see fit. With ISIS, EMC Captiva guarantees that data handled by the driver can be moved into a third-party software application without any hang-ups because ISIS's integration with such software has been verified by the company. Each manufacturer is responsible for ensuring that its version of TWAIN is compatible with third-party applications. However, the open-source nature of TWAIN allows manufacturers a wide latitude in customizing the driver, whereas they cannot change ISIS drivers, and must pay a licensing fee for their use.

The origin of the name "TWAIN" has given rise to some controversy. According to the TWAIN Working Group's Web site, the word TWAIN comes from Rudyard Kipling's story The Ballad of East and West, specifically the passage that reads "...and never the twain shall meet..." The choice reflected the difficulty of connecting scanners and personal computers in the early 1990s, when the TWAIN driver was initially developed. The group chose to use uppercase letters in order to make the name more distinctive, which in turn led IT professionals and other users to believe it was an acronym. Several "definitions" of the "acronym" are in circulation, including "Technology Without An Interesting Name" and "Toolkit Without An Important Name."

For more information on ISIS and TWAIN drivers, visit the Web sites of the TWAIN Working Group (www.twain.org) and EMC Captiva (www.captivasoftware.com/products/isis.asp).

duction-level scanning. "Growth in this area continues and represents an interesting phenomenon. People don't just go out and buy a $25,000 scanner without having familiarized themselves with scanners in general, which often happens by buying a slower workgroup or departmental device first," said Kevin Neal, product manager for production scanners at Fujitsu Computer Products of America.

Neal said that Fujitsu is finding that customers buy slower devices to get familiar with supporting a scanner and integrating it into their business workflows, and as they become more experienced, they want faster and bigger scanners, eventually migrating to production-level scanning.

Document Scanner or MFP?

There are a number of different factors to think about when choosing between an MFP or a dedicated document scanner in order to meet office scanning needs. Many attributes of MFPs make them an attractive option, since many companies may already own an MFP and most office workers are already comfortable with using them. The use of dedicated production scanners often requires specialized training, whereas scanning with an MFP is just like making a copy.

"In instances where your scanning needs exceed 5,000 pages per month, a dedicated production scanner will likely be a better capture device than an MFP," said Keener.

MFPs are designed to perform multiple tasks and some units don't have the robust paper handling capabilities and scanning speed that make dedicated document scanners efficient when handling large batches of documents. In addition, monopolizing an MFP with a large scanning job would disrupt the productivity of workers who need to use the MFP for copying, printing and faxing. MFPs are best suited for scanning small batches of documents or for ad hoc scanning purposes.

MFPs also don't come with advanced image enhancement software, which is standard on almost all dedicated document scanners. With paper originals that are worn, creased or faded, document scanners can automatically adjust contrast, despeckle and deskew the scans to provide the best possible image.

MFPs have strengths and weakness as document scanning onramps, but some of the manufacturers BLI spoke to don't see them as competition for their products. In fact, some industry representatives welcome them and say they help them sell more scanners.

"MFPs are part of an enterprise's document imaging solution and help advance the paper-to-digital workflow," said Capurso. "Once a company buys an MFP and starts scanning, the device creates a path

and plunges the company into the paper-to-digital process. This helps companies like Visioneer gain entry to the office workspace."

Capurso emphasized that MFPs are not a substitute for true document scanners, since they are built on an entirely different economic model. He points out that they are essentially copy-centric or print-centric devices that fill many roles, whereas document scanners do only one thing, and tend to do that very well.

Kofax VirtualReScan

Kofax's VirtualReScan (VRS) is the most widely used image processing software for document scanners. Nearly all manufacturers, with the notable exceptions of Canon and Kodak, offer VRS at least as an option. Many manufacturers include it as a standard feature on mid- and high-volume production scanners, as well as some lower-end devices. The software, which can be installed on a PC connected to a scanner or integrated in the scanner's firmware, contributes to productivity by improving image quality, making it much easier for OCRing software to read the document image files and reducing OCR reading errors.

One study by Doculabs, a research and consulting firm specializing in business technologies and the imaging industry, found that the quality of images produced by VRS improved OCR accuracy by nearly 35 percent, greatly reducing costly manual data entry and correction. The technology means that multi-part forms like hard-to-read air waybills and receipts are now scanned, read, and indexed with greater accuracy.

"Kofax VRS greatly enhances the image quality of scanner output," said Visioneer's Capurso. "The Pro version of VRS handles automatic page rotation, so that users don't have to orient all the pages in a stack of documents to front side up, deletes blank pages and handles document clean-up."

Kodak

Kodak has been in document imaging for 80 years: before entering the document scanner market, the company was the leading manufacturer of microfilm technology. Offering products in all five InfoTrends market segments, the company has a strong position in the mid- and high-volume area, whereas it is more of a newcomer in the distributed capture segments.

"Kodak got into digital scanning 16 years ago, when demand was following the centralized scanning model," said Keener. "The company played much more in the high- and mid-volume range for a number of years, but over the last three or four years we've really broadened our offering in the distributed capture area."

In the low-volume production area Kodak offers

the 200 series, comprising the i250, i260 and i280 models. The i250 (simplex-only) and i260 (duplex) model run at 50 ppm, whereas the i280 (duplex) runs at 62 ppm. The i280 can handle unusual scan jobs, including extremely long documents such as x-ray sheets or paper monitor strips from heart monitors.

"We worked with a gas company that had a device that recorded environmental conditions on a circular piece of paper with a hole in the middle," said Keener. "The hole caused various problems, as a traditional scanner would come to the hole and think it was scanning a new document, cutting the single circular document into two documents. The i280 is adapted to handling special jobs like this."

In the mid-volume production segment, Kodak has the 600 series, including the i610, i620 and i640 models. The i610 is a bi-tonal, black-and-white only scanner, developed due to heavy demand for a slightly cheaper, monochrome 600 model. The i610 and i620 run at 80 ppm, and the i640 runs at 100 ppm.

The 600 series scanners are upgradeable—if a buyer starts out with the i620, but decides that she needs extra speed, a service technician can install an upgrade kit that will turn the i620 into the faster i640.

The 600 series includes one high-volume production unit, the i660, running at 120 ppm. Kodak also offers the 800 series in the high-volume production area, including the i810, i820, i830 and i840. The i810 and i820 run at 110 ppm, while the i830 and i840 run at 160 ppm, making them among the fastest scanners on the market. The i810 and i830 are bi-tonal only, providing buyers with a less-expensive, high-volume option, whereas the i820 and i840 are color units. All of these devices feature unlimited daily volumes. Kodak says it has many customers who are putting between 70,000 and 100,000 documents a day through these scanners.
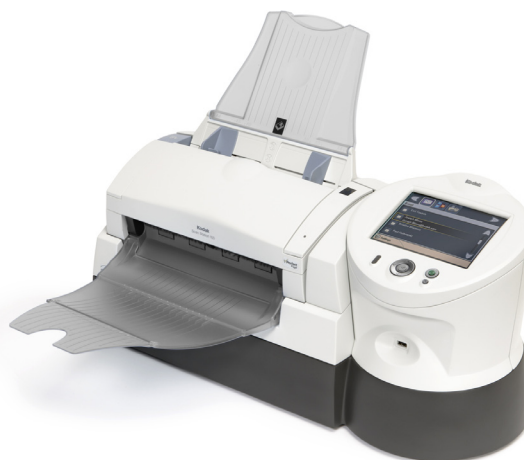
Kodak Scan Station 100

The workgroup Scan Station 100 is one of Kodak's most recent introductions. The 25-ppm Scan Station 100 comes with standard duplexing and features a 4" x 5" color touch screen that lets users preview documents after scanning. The Scan Station 100 connects to the network; this feature, plus the unit's large touch screen, means that it does not need to be hooked up to a PC to be used.

The i30 (simplex) and i40 (duplex) are workgroup models, both running at 25 ppm. Kodak also offers the 30-ppm i1200 in the workgroup segment. In the departmental space, Kodak features the i1300 (60 ppm). Both the i1200 and i1300 offer an optional tethered flatbed scanner for book scanning or delicate documents that shouldn't go through an automatic feeder. The company also offers the 100 series in the workgroup space, comprising the i150 (50 ppm) and i160 (60 ppm) models.

Kodak incorporates PerfectPage image processing technology into every scanner it makes. The software, which Kodak developed in-house, is comparable to Kofax VRS. PerfectPage ensures that documents are deskewed and borders are removed. In addition, contrast is properly adjusted for every document as it goes through the scanner, ensuring that when a dark document with dark handwriting is scanned, the text remains readable.

"This technology is included with every device throughout our line," said Keener. "Of course, the sensors aren't the same in every single scanner, but the idea is that you should be able to take any given document, drop it into any one of our scanners and get very similar image quality from our least expensive model to our top-of-the-line model."

Fujitsu

Fujitsu is the leading manufacturer of document scanners; according to the company, one out of every two document scanners in use today is a Fujitsu. The company offers a variety of scanners in the workgroup space, the departmental space and in the low- and mid-volume production space.

"The Fujitsu corporation has a group called Fujitsu Computer Products of America [FCPA], within which is a unit called the Imaging Products Group [IPG]. This group focuses on nothing except document scanning technology. It doesn't make MFPs, it doesn't make printers, just scanners. Everything we do revolves around scanning," said Neal.

Neal emphasized that since Fujitsu develops and manufactures scanning hardware in a variety of market segments, the technologies the company develops for use in higher-volume production environ-

ments are also available for lower-volume distributed capture devices.

One example of this is Fujitsu's ultrasonic multi-feed detection technology, which is designed to detect when two or more documents are being drawn into the scanner at one time. When that happens, only the top document is scanned and the other one or two documents are ignored. Traditionally multifeeds have been detected using a laser, which is beamed through the documents as they enter the scanner. Fujitsu has taken a different approach, using a technology based on sound waves, which are bounced off the documents as they are being scanned.

"These technologies, such as ultrasonic sensors, can take quite some time to work out and can be very costly to develop," said Neal. "Making these heavy investments for production-level hardware allows us to migrate the feature down to our other products."

In the workgroup area, Fujitsu offers two ScanSnap models: the 15-ppm ScanSnap fi-5110 and the 18-ppm ScanSnap S500. These models were developed to handle standalone scanning applications in small offices that need to scan the occasional document to a single location. They come equipped with a proprietary Fujitsu driver and do not offer TWAIN or ISIS drivers.

The 25 ppm fi-5120C and fi-5220C are also workgroup models, both of which are very popular in healthcare, according to Neal. The fi-5120C is sheet-fed only, whereas the fi-5220C has a tethered flatbed scanner (8-1/2" x 14") for scanning books or other delicate documents. Also noteworthy is that these are two of the only workgroup-level models on the market to come standard with full versions of Kofax VRS.

Fujitsu sells two models in the departmental segment: the fi-5530C and the fi-4340C. The fi-5530C, which is a faster version of the fi-5120C, runs at 35 ppm and features an 11.7" document feeder. The fi-4340C is a flatbed version of the fi-5530C, scanning at 40 ppm.

In the production segment, Fujitsu offers both low-volume and mid-volume models. The low-volume production fi-5650C and fi-5750C, sheetfed and sheetfed/flatbed respectively, run at 57 ppm whether the user is scanning in color, grayscale or black and white at 200 or 300 dpi. Interestingly, these two machines feature dual control panels that allow operation from either side for greater convenience. Fujitsu's mid-volume production lineup includes the fi-4860C, which runs at 63 ppm. In the mid-volume segment, the company sells the 90-ppm, monochrome-only M4099D scanner.

The company's newest model, the fi-5900C, has a scanning speed that would technically qualify it for

Fujitsu fi-5900C

the high-volume production area, since it runs at 100 ppm, well over the 90-ppm threshold for high-volume production devices. However, the price point, at $25,000 retail, technically classifies it as a mid-volume scanner. Neal said that Fujitsu chose to classify the fi-5900C as a mid-volume production scanner because it replaces two of its obsolete models that were also mid-volume production machines.

The fi-5900 offers several other stand-out features. Kofax VRS is integrated on the firmware of the device, speeding up image processing. It also features three ultrasonic sensors instead of one. If a customer has an insurance form with a section on the left to which a photograph of a damaged vehicle is typically attached, the ultrasonic sensor over that area can be disabled, while leaving the sensors in the middle and right-hand zones on. This enables the device to detect legitimate multifeeds without erroneously detecting every photo stapled to a form as a multifeed.

Visioneer/Xerox

Visioneer was an early pioneer in the distributed capture market, entering the scanner business in 1994 with a sheetfed model called the PaperPort, which home and office users tended to put between their keyboard and monitor.

"This model was a unique combination of hardware which hadn't previously been available on the desktop and a software product called PaperPort," said Capurso. "The company managed to grow this into a very large business through the 90s as we grew to be shipping 50,000 units a week at one point."

As the digital camera market took off in the late 1990s, Visioneer's market shrank dramatically. The company adapted itself wholly to the business scanning market, developing a sheetfed model called the Strobe, which is used extensively in distributed scanning.

In 2003 Visioneer signed a licensing agreement with Xerox to sell its scanners under the Xerox brand name. The relationship is a sort of reverse OEM arrangement: Visioneer develops, sells and supports scanners up to 50 ppm, all of which carry the Xerox brand.

"This accomplishes a couple of objectives for both companies," said Capurso. "It provides Xerox with a quick and low-cost market entry into the fast-growing document imaging scanner market and, at the same time, it provides a complete Xerox-branded document imaging solution for Xerox' customers. For Visioneer, not only do we acquire a great brand in document imaging, but we have become a better company by putting in place development and customer service processes that meet Xerox' stringent requirements for customer satisfaction."

"We've worked with many companies to expand the Xerox brand and have found that it very often benefits both sides of the relationship, both the licensee and Xerox," said Jan Daley-Austin, director of Analyst & Consultant Relations at Xerox. "We evaluate all of Visioneer's products that carry the Xerox name and are very comfortable with this relationship. It's a good fit with our core business."

In the workgroup segment of the market, Visioneer offers the Strobe XP 450, Visioneer 9750 and Visioneer 9650. The Strobe XP 450 is a simplex-only, 20-ppm, sheetfed device. The 9750 has the same feature set as the Strobe XP 450, but includes a flatbed scanner as well. Both of these models feature Visioneer's one-touch technology—they have a single button on the front of the device that allows a user to scan into a document or electronic content management system with one click, speeding up the workflow and greatly enhancing ease of use. The 9650 is a simplex-only, 12-ppm sheetfed/flatbed model.

Visioneer sells one scanner in the departmental segment: the Strobe XP 470, a 33-ppm duplex unit. The Strobe XP 470 also features the company's one-touch technology. Visioneer also offers a selection of inexpensive, but slow sub-workgroup models, ranging in price from $200 to $400.

As mentioned above, Visioneer sells and supports all of the Xerox scanners available on the market today. Like the Visioneer line, the Xerox DocuMate line includes a range of workgroup and departmental models.

The Xerox DocuMate models in the workgroup area include the simplex DocuMate 152 (15 ppm), simplex DocuMate 520 (20 ppm, with flatbed), sim-

Scanner Technology

Scanners utilize three different sensor technologies (CIS, CCD and CMOS) to convert physical documents into digital files. While all three types of sensor accomplish this task in more or less the same way, there are important differences between them.

■ **CIS** (contact image sensor) cameras represent a relatively new technology that is mostly used in workgroup or departmental scanners. As the name implies, contact image sensors must be placed very close to the document being scanned, as the CIS has a narrow depth of field. The technology utilizes red, green and blue LEDs to produce white light and has one or two rows of sensor pixels. CIS maintains a moderate level of image quality while being less expensive than CCD sensors and more energy efficient and simpler to manufacture than CMOS sensors. In addition, using CIS eliminates the need for the mirrors and lenses used by CCD or CMOS sensors, so no lens alignment or adjustment is necessary and the scanners can be physically smaller.

■ **CCD** (charge-coupled device) is mature image sensor technology that is mostly used in production-level scanners. CCDs comprise an array of linked, or coupled, capacitors that are sensitive to light. The sensor captures color by filtering light though red, green and blue filters. CCD sensors contain larger, multi-line grids of sensor pixels. The technology requires specialized, dedicated manufacturing processes. This process leads to very high-quality sensors in terms of fidelity and light sensitivity, but very expensive hardware. In operation, CCDs consume lots of power, as much as 100 times more power than an equivalent CMOS sensor. CCD (and CMOS) sensors feature a much deeper depth of field than CIS technology, utilizing mirrors and lenses to capture images, which contributes to better image quality.

■ **CMOS** (complementary-symmetry/metal-oxide semiconductor) cameras rely on tried-and-true semiconductor technology that has been used in a variety of computer and imaging products for decades. They are used in both low- and high-speed scanners. CMOS sensors can be made at the same manufacturing facilities using similar techniques as those used to produce 90 percent of all semiconductor chips, from microprocessors to RAM memory, making them less expensive than CCD sensors. This aspect of the technology also enables the sensor to be placed on the same microchip as the processor, permitting a very compact camera system that is more reliable and easier to assemble, further reducing cost.

Overall comparison:

CCD – high cost, best image quality, low power efficiency.
CMOS – costs less than CCD, better image quality than CIS.
CIS – low cost, lower resolution, but good image quality.

plex DocuMate 250L (22 ppm) and duplex DocuMate 252 (25 ppm).

In the departmental segment, the company offers the Xerox DocuMate 262, DocuMate 272 and DocuMate 632. The 262 and 272 are sheetfed units that feature duplexing and speeds of 33 ppm, but the 272 can scan ID cards through the document feeder. The 35-ppm DocuMate 632 offers duplexing and a flatbed scanner.

Bundled software applications include PaperPort and OmniPage for OCRing. PaperPort is a desktop document management application for single users or small groups. Visioneer developed this application in the early 1990s and later sold the software to ScanSoft, which subsequently became Nuance. The company now licenses PaperPort from Nuance. The application allows users to scan to local or network folders, or ECM and document management systems. It can also create text-searchable PDFs.

Böwe Bell + Howell

Böwe Bell + Howell (Bell & Howell before the 2002 acquisition by German company Böwe Systec AG) is one of the most well-established hardware vendors in the imaging industry, with a pedigree that goes back nearly a century and a presence in the document scanner industry since 1986.

"Since that time, Böwe Bell + Howell has enjoyed most of its success in the high-volume production scanner market, although like most manufacturers, it has recognized the potential in the distributed capture market sectors," said Horn.

Sidekick is the company's workgroup and departmental scanner line. Böwe Bell + Howell introduced Sidekick with several vertical markets in mind, including medical practices, small insurance and legal offices, and departments of educational institutions. The workgroup-level Sidekick 1200 scans at 23 ppm, while the Sidekick 1400 scans at 43 ppm. Both come equipped with Kofax VRS Basic edition.

"With Sidekick, Böwe Bell + Howell sought to create a scanner bundle that appeals in part to businesses that do not have much experience with document imaging," said Horn. "With that in mind, Sidekick has been designed to be easy to install, operate and maintain, and to minimize service calls, since end users can clean and change the scanner rollers themselves."

Trūper is Böwe Bell + Howell 's low-volume production scanner. The sheetfed Trūper 3600 and the sheetfed/flatbed Trūper 3200 both scan at speeds of 62 ppm and come bundled with Kofax VRS as a standard feature. The scanner was designed to help businesses meet a broad range of small to mid-volume

imaging needs, such as accounting/finance, payroll, human resources, forms processing and customer correspondence.

In the high-volume production space Böwe Bell + Howell offers its flagship Spectrum XF line. The company sells three models: the Spectrum XF 8090D, 8120D and 8140D. All three are duplex models. The 8090D scans at 90 ppm, while the 8120D scans at 120 ppm. The 8140D features a speed of 140 ppm, making it among the fastest scanners on the market.

The company says that Spectrum XF scanners are very durable and can exceed a lifetime volume of 50,000,000 scans. They feature ultrasonic multifeed detection technology, which uses sound to detect multifeeds of two or more pages. Multifeed ignore by size allows users to set the scanner to ignore certain documents, such as taped photographs, sticky notes and labels, to prevent the detector from seeing these sorts of papers stuck to a document. In addition, Kofax VRS is integrated in the device firmware of all three models, further increasing speed and enhancing productivity.

Canon

Canon entered the digital scanning market in 1996, as a bit of a latecomer to the market. Today the company is focusing its efforts on the workgroup, departmental and low-volume production segments.

Canon prides itself on the demonstrated compatibility of its scanner line with a wide range of enterprise content management and document management software. Many of the industry's leading software companies have tested Canon's DR-Series scanners for compatibility with their products. Thanks to this process, customers are ensured the reliability and benefits of seamless integration with their document management solution.

The company bundles CapturePerfect document processing and image management software with every device. CapturePerfect is a fairly advanced software application suitable for entry-level and sophisticated users. It handles document clean-up tasks, creates encrypted PDFs and offers OCR.

Canon offers the DR-1210C and DR-2050C in the workgroup segment. The DR-1210C is a 12-ppm flatbed unit that offers standard duplexing. In addition, it features three built-in scan-to-job buttons for copy, file and e-mail functions. Additionally, up to 50 different functions can be assigned to five customizable buttons for common tasks, including

Böwe Bell + Howell Sidekick

scanning to multiple network locations.

A 20-ppm sheetfed model, the DR-2050C features a special folio mode that enables users to scan 11" x 17" documents in the letter-size paper pass by folding them in half and scanning it through in duplex mode. The software automatically reassembles the document.

In the departmental segment Canon offers the DR-3080CII, a 43-ppm unit featuring standard duplexing, and the 25-ppm DR-2580C. The latter unit offers dual paper passes: one u-turn pass for scanning flexible, paper documents and a straight pass for ID cards. It also features the folio mode detailed above.

Canon's production-level scanners include the DR-5010C, DR-7080C, DR-7580 and DR-9080C. The 50-ppm DR-5010 offers a wide 11" x 17" paper pass and provides image enhancement technology that assures accurate color reproduction in the firmware. The 70-ppm DR-7080C also features this color image enhancement technology. The 75-ppm DR-7580 provides only black-and-white and grayscale scanning, offering small and medium-size businesses high-speed performance for a lower price. Canon is marketing the 90-ppm DR-9080C as a distributed production machine, able to handle production-level jobs, with ease of use suited for distributed capture applications in the office. **BC ∎**

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