BERTL

EXCEPTIONAL

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Xerox WorkCentre 7345

45-ppm Monochrome ▪ 35-ppm Color

Print ▪ Copy ▪ Scan ▪ Fax

100% INDEPENDENT ANALYSIS

What's Inside

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OFFICE

Introduction

In its continual pursuit of the multi-billion-dollar office MFP market, Xerox strengthened its MFP arsenal in April 2007 with the introduction of its next-generation office-color MFPs, the WorkCentre 7328/7335/7345 family. Xerox, along with most other MFP vendors, continues to add color printing/copying, refinements to network scanning, and enhanced security to its MFPs—all of which are evident with this new WorkCentre family. Each member of the series provides standard color network printing and color digital copying. Color network scanning/scan-to-e-mail may be added for $1,400 (list price) and Group 3 walkup fax may be added for $995 (list price). BERTL tested the WorkCentre 7345, which was equipped with the maximum paper capacity of 3,140 sheets and with Xerox's 1,500-sheet Professional Finisher for producing saddle-stitched booklets.

At Xerox's rated print speed of 45 (black-and-white)/35 (color) ppm, the WorkCentre 7345 is the fastest unit in the series. Its maximum paper capacity of 3,140 sheets and 130,000-page recommended monthly volume make it suitable for higher-volume workgroups. Similarly, its Xerox-rated color print speed of 35 ppm makes it suitable for workgroups with both substantial black-and-white *and* office-color print/copy applications.

When configured with network scanning, the WorkCentre 7345 provides color scanning to e-mail addresses, computer desktops, FTP sites and document-management applications. Several scanning capabilities of note include:

- Encrypted PFD scan-to-e-mail, so that only recipients can open and view e-mailed documents.
- With Xerox's Thumbnail option, users can view thumbnails of scanned documents on the touch screen, making sure they are correct before they send them.
- Administrators may configure templates that automate the scanning process. For instance, an administrator might configure a "Human Resources" template for an FTP site where employee forms are stored. Users simply select the template, and scanned documents are automatically sent to the destination.
- Xerox's optional SMARTSend software provides automated scanning and document routing. Instead of the user having to repeatedly specify scanning settings and destinations, these tasks are automatically performed.

In this test report, BERTL will review the WorkCentre 7345's performance as a mid-volume office-color MFP, including its productivity, image quality, ease of use and remote management and monitoring.

Device Features Summary	
Suggested List Price	$13,799
Monochrome Print Speed	45 ppm
Mono First Page Out Time	4.8 sec.
Color Print Speed	35 ppm
First Copy Out Color	7.2 sec.
Warm Up Time	45 sec.
Maximum Monthly Print Volume	130,000 pages
Internet/Network Fax	Yes/Yes
Network Scan	Yes
Output Options	Office Finisher ($2,000), Advanced Office Finisher ($2,995), Professional Finisher ($4,995)
Input Options	WorkCentre 7328/335: 3x520-sheet drawers; High Capacity Option (520-, 800-, 1,200-sheet drawers)
Other Options	Single line fax (includes IFax) ($995); 3- line fax (includes IFax) ($1,495); Network Scan / E-Mail Kit – ($1,400) Media Card Reader ($595); USB Thumbdrive Media Print Kit ($299); Convenience Stapler ($299); Network Fax Server Kit ($795); Foreign Device Interface Kit ($349); USB/Parallel Direct Print Kit ($495); Secure Watermark ($795); Scan to PC Desktop (SE and Pro) ($1,195 and $4,195); SMartSend; Secure Access

BACKGROUND

Printing passed copying as the primary method of reproducing documents years ago. Today, printing is just as important—if not more important—than copying.
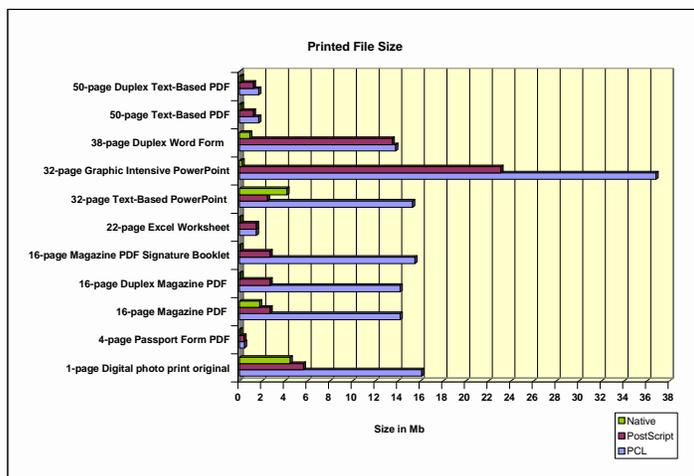
Connectivity

Most devices include Ethernet and USB connectivity out-of-the-box. Some devices also include a parallel interface. In addition, many devices provide a selection of optional connectivity choices such as Wireless 802.11b or g (g is the faster, preferred standard), Bluetooth for cell phone or PDA connectivity, PictBridge photo printing for printing directly from a digital camera, and FireWire for high-speed local connectivity.

Page Description Languages (PDLs)

PCL is the page description language (PDL) provided by most printer and MFP suppliers. Some manufacturers charge for a PostScript upgrade or provide a PostScript Level 3 emulation (clone). Still other manufacturers provide genuine Adobe PostScript Level 3 and bundle in PCL. A few manufacturers also include their own PDL, which are typically loosely based on the Microsoft Windows/GDI printing technology of old. These Windows or GDI drivers often offer significant productivity advantages over traditional PCL and PostScript print drivers, since the bulk of the processing is handled by the more powerful desktop PC, rather than by the less well-equipped printer processor itself.

NETWORK-BANDWIDTH/PRINT FILE SIZE

Print-Features Summary	
CPU	667 MHz
RAM and Hard Drive	1 GB; 40-GB hard drive
Operating Platforms	MS Win 2000, XP (32-/64-bit), Server 2003 (32-/64-bit), Vista (32-/64-bit); Mac OS 10.3 +; AIX 5lv5.3; HP UX 11.0, 11i v2; Solaris 8, 9, 10; Linux FedoraCore 1, 5; RedHat Enterprise Linux 4; SUE 10.x
Standard Print Drivers	PCL 5c, PCL 6, Adobe PS 3, HP-GL2, Microsoft XPS Interpreter
Optional Print Drivers	No
Standard Interfaces	10/100Base-TX Ethernet, 10Base, 10Base5 (via adapter), wireless Ethernet 802.11b (via 3rd-party adapters)
Optional Interfaces	USB, parallel

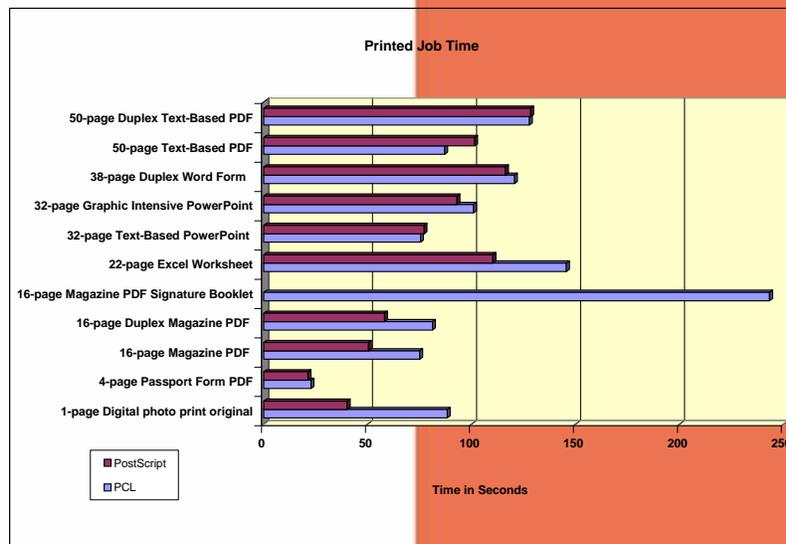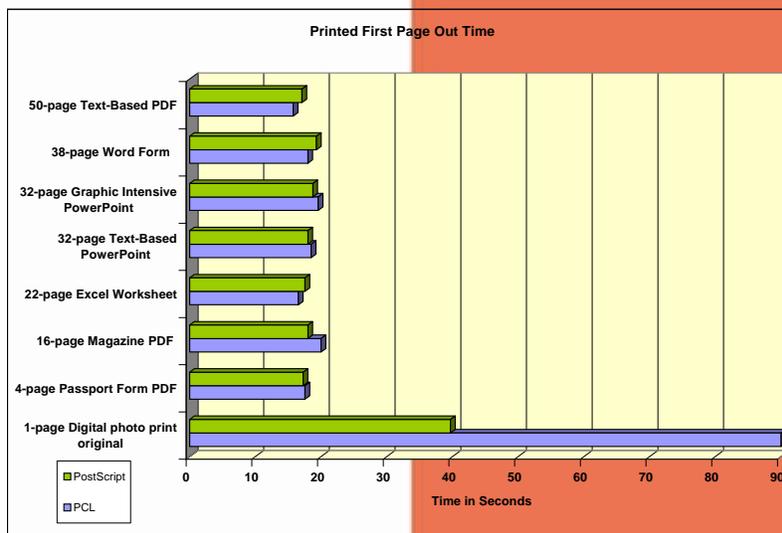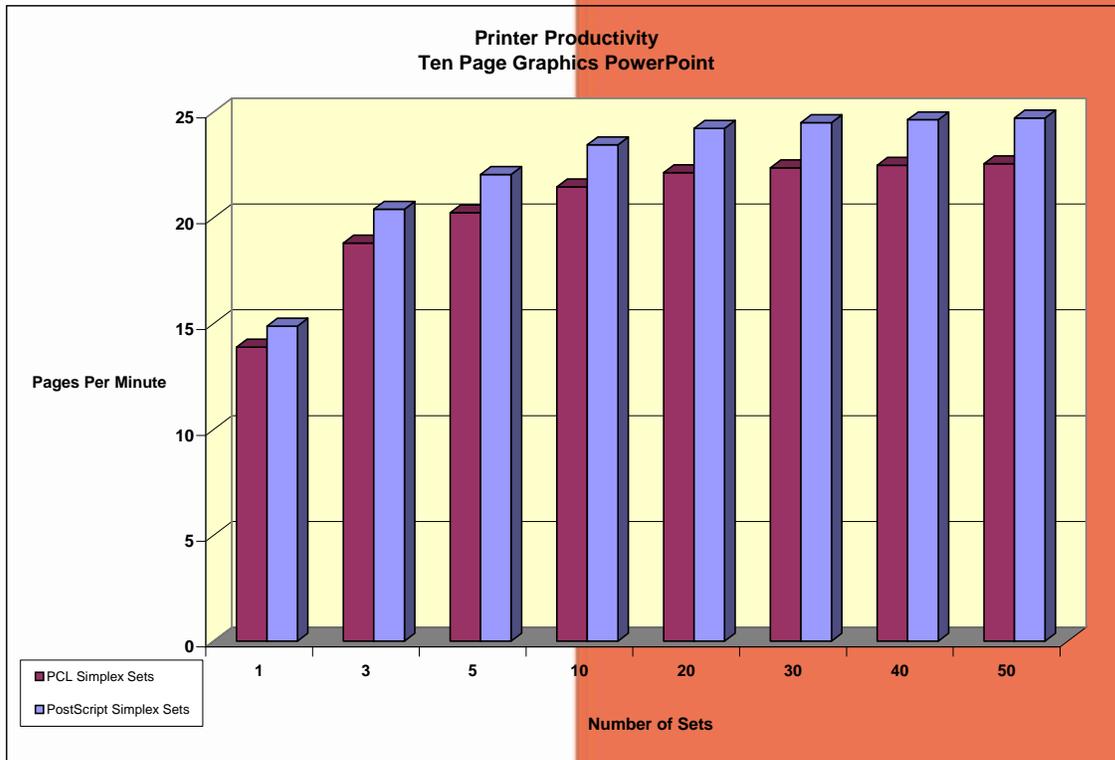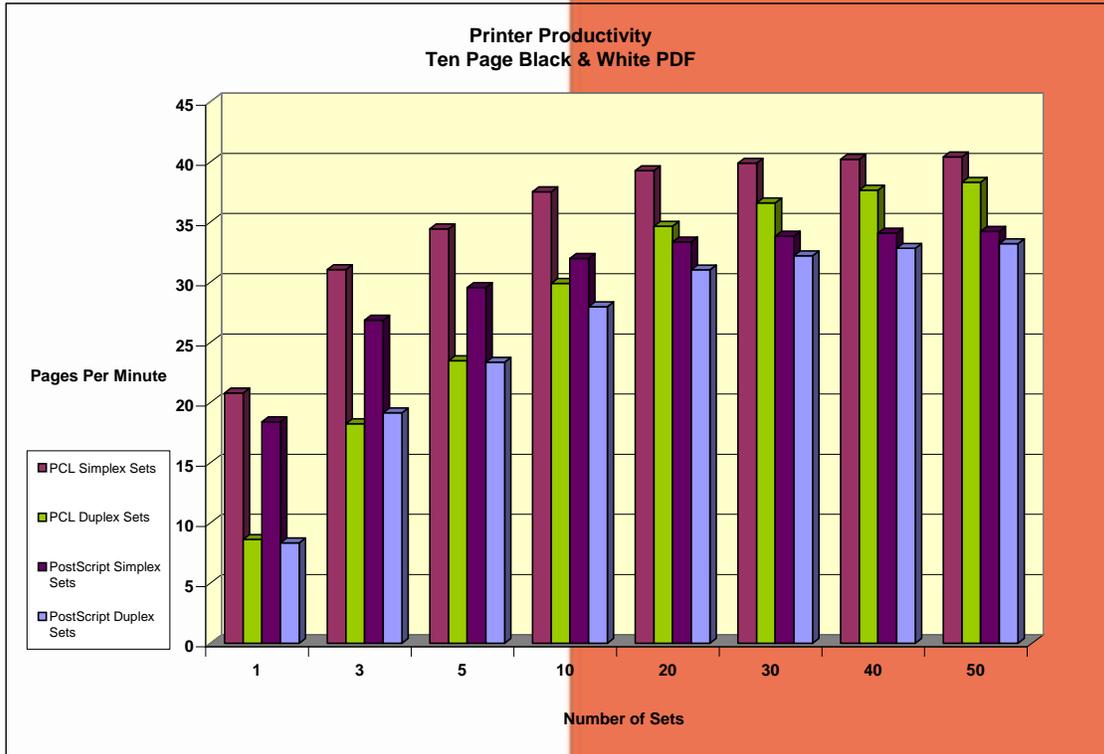| Network-Bandwidth/Print File Size			
	Native file size	PCL	PS
1- page digital photo PDF	4,483 KB	16,100 KB	5,640 KB
4 page Passport Form PDF	79 KB	448 KB	402,000 KB
16-page Magazine in PDF	1,780 KB	15,500 KB	2,710 KB
22-page Excel Worksheet	122 KB	1,550 KB	1,500 KB
32-page Text-Based PowerPoint	232 KB	15,300 KB	2,480 KB
32-page Graphic Intensive PowerPoint	4,200 KB	36,800 KB	23,100 KB
38-page Form Word Document	912 KB	13,800 KB	13,500 KB
50-page Text-Based PDF	170 KB	1,710 KB	1,240 KB

PRODUCTIVITY

Evaluating print productivity is not as simple as timing copy jobs. The printing process involves several steps and can be affected by a variety of factors along the way.

The document must first be spooled by the print driver into a PCL or PostScript file. The PCL or PostScript file is then sent to the printer where it is raster image processed (RIPped) into image data by the device processor. The image data is then sent to the marking engine and output as printed pages.

There are three obvious factors highlighted above (spool time, RIP time, and print engine speed), which can all make or break a device's overall productivity. Other factors include concurrency and contention; for instance, print speed may slow down when the device is being used for other functions, such as scanning.

However, it is possible to time and compare these factors through the use of careful preparation, conditioning and testing. Following are charts that show printing performance when tested under controlled conditions.

Print

**Printer Productivity
Ten Page Black & White PDF**

Pages Per Minute

- PCL Simplex Sets
- PCL Duplex Sets
- PostScript Simplex Sets
- PostScript Duplex Sets

Number of Sets

**Printer Productivity
Ten Page Graphics PowerPoint**

Pages Per Minute

- PCL Simplex Sets
- PostScript Simplex Sets

Number of Sets

Print

WORKFLOW

Concurrency or Contention?

MFPs, by their very nature, are designed to handle multiple tasks, acting as the printer, copier, scanner, and even fax machine. BERTL looks at how these tasks affect each other.

In BERTL's concurrency test, a large print file is submitted for printing. When spooling has completed, the rate at which pages are output is measured. The BERTL analyst then carries out various tasks such as scanning in a copy job, to see if the print output rate is affected.

Batch Printing

Batch Printing: There are situations in which multiple files are combined into a single print job. There are two main reasons for this:

1. Multiple authors contributing to a single document
2. Collated sets comprised of multiple individual documents.

These two workflow scenarios put MFPs and printers to task, as they demand more than just the ability to spool, RIP, and print a file as fast as possible.

Network Workload

Network-printing devices may often face a queue of jobs stacked up for processing during busy periods of the day.

During BERTL's network workload tests, analysts queue a series of jobs at a paused print driver. The jobs are arranged in order of their raw application file size per page. The purpose of the test is to illustrate how well a device handles a stream of jobs and how the queue's make-up can have a major impact on a device's performance. BERTL is not trying to suggest that a series of jobs is an example of a typical office application, as this would be misleading.

Concurrency Test Results	
Print slowdown when scanning in copy job	No
Print slowdown when scanning originals	No
Print slowdown when scan-data transfer underway	No

Batch-Printing Capabilities	
Multiple jobs all combined into a single finished document	Yes
Multiple jobs all combined into a single finished document with page numbering/watermarking added	Yes
Multiple jobs sent in collated sets	Yes
Multiple jobs sent in collated sets with finishing/job attribute changes on a job-by-job basis	No

Printed Job Time

Printed Job Time
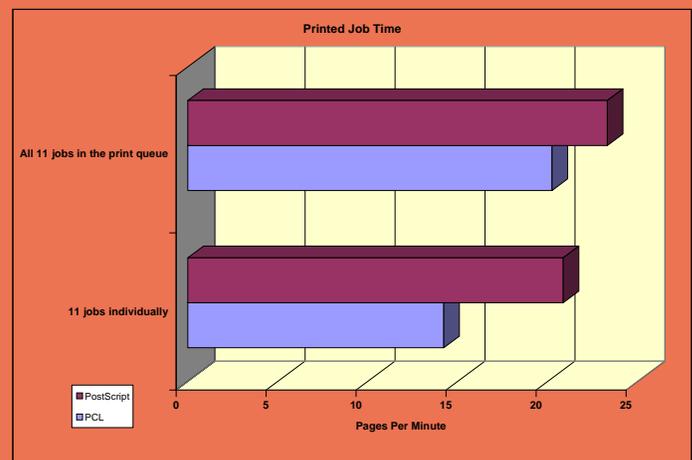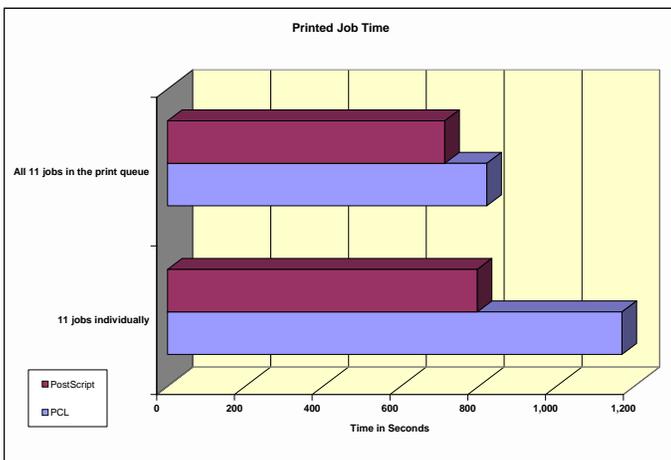
PRINT-ON-DEMAND

Ever since manufacturers began including hard drives with their MFPs and printers, they have looked for ways to offer print-on-demand capabilities. With print-on-demand, users can quickly print a document whenever needed, instead of having to store hardcopy, and then make copies of it.

The most basic print-on-demand is the ability to store a document in device memory for instant reprinting from the walk-up control panel. A growing number of printers and MFPs provide this.

The other major benefit of print-on-demand is the removal of the RIPping process when printing large documents repeatedly. With print-on-demand, the file is stored on the device in a post-RIPed format, eliminating the spooling and RIPping process that usually precedes printing. This saves users time, and reduces the network workload.

With a growing number of devices now supporting direct Adobe PDF printing, many printers and MFPs now also support USB direct interface printing. With this feature, users can simply insert a USB flash memory device containing a PDF (or other supported file format) into the device's USB direct interface (usually located on or near the printer's control panel). The files contained on the USB flash memory device are then displayed on the printer's touch or LCD screen. The user simply scrolls down to the file they would like to print.

Do All Devices Offer the Same Capabilities?
There is a large degree of differentiation between products and manufacturers in this area. Those interested in print-on-demand should look carefully at the functionality offered by each manufacturer.

Areas of differentiation include issues such as the ability to manage stored files, as well as the ability of users to make job settings (such as simplex/duplex, paper size, stapling, etc.). Other systems enable users to combine single files into one job, while still others enable users to view and manage stored jobs from a desktop computer utility.

WHAT WE LIKED

- Users may scan and store documents in password-protected user mailboxes in hard-drive memory for print-on-demand. Documents may be converted into various file formats, including text-searchable PDF, so that their content may be searched for easy retrieval.
- Optional USB Thumb Drive Media Print kid for printing files stored on USB Flash Devices (Thumbdrives). Optional compact-flash to SD card converters are available for printing from SD memory cards.
- Standard Adobe PostScript 3, as well as the Microsoft Corporation's XPS page description language (PDL).

Print-on-Demand Features Summary	
Job Storage From the Device?	Yes
Job Storage From the Desktop?	Yes
Finishing Options Included at Time of Storage?	Yes
Document Images (incl. thumbnails) Provided on the Device Touch Screen?	Yes
Document Images (incl. thumbnails) Provided on the Desktop?	Yes
Multiple Jobs Can Be Combined and Printed as One Finished Job?	Yes
Stored Jobs Can Be Edited After Storage?	Yes
Stored Jobs Can Be Combined With Send Feature	Yes

WHAT WE WOULD LIKE TO SEE

- Overall, BERTL was satisfied with the WorkCentre 7345's network-printing capabilities.

Copy

BACKGROUND

Nearly all MFPs on the market today provide digital copying, while many desktop printers offer it as an option. Despite the fact that many devices provide a wide range of digital-copying capabilities, from image manipulation to page insertion, most typical copy jobs actually consist of a single set of a simplex document that is five pages or less, with no finishing, and no image-quality manipulation.

Small Simple Jobs

Although most MFPs provide a wide range of copying features, most users are not willing to navigate through countless screen menus in order to get to the point where they can actually press the *Start* key. There are two components of copy-job productivity: 1) user productivity, and 2) device productivity. BERTL encourages enterprises to also consider the impact of *user* productivity, along with device productivity. Device productivity only includes the time it takes from the press of the *Start* key until the final copy exits the device, and does not take into account the time that it takes a user to program and start the copy job. However, the easier the job, the easier it is to program; users will also take less time to program jobs as they acclimate to the controls and/or create job programs. And, of course, some users are more astute and capable than others. Consequently, these uncontrolled factors introduce a high degree of variability. However, of course, a device that takes twice as long to produce the first copy affects the job productivity of each and every user and job.

Large, Complex Jobs

Even with large copy jobs—where it seems engine speed plays the largest role—user productivity should be taken into account. For example, the user is less likely to wait at the copier for larger and more complex jobs. Factors that enhance user productivity include such features as easy job programming; a scan-ahead feature so that users can program and scan jobs while other jobs are printing; fast original scanning so that users can more quickly return to their desks with their originals; the ability to build a job using a mix of different-size originals scanned from both the document feeder and platen; and job notification at the computer desktop when the copy job is completed (thus eliminating the guesswork of when to return to the copier to collect the job).

| Copy-Features Summary	
Black Copy Speed	45 ppm
Color Copy Speed	35 ppm
First Copy Out Time (Platen/DF)	4.8/7.2 (color) sec.
Job Build	Yes
Scan Ahead Copy	Yes
No. of Copy Job Programs	Info not available
Customizable Menus	Yes
Max/Min Zoom Ratio	25-400%/1%
Cover Insertion	Yes
Sheet Insertion	Yes
Page Stamp Options	Yes

The Xerox WorkCentre 7345's control panel.

Copy

BACKGROUND

Advertised speeds are always quoted using the simplest route—in-and-out of a device. Of course, users often apply finishing options, incorporate different paper sizes and types into the document, print in duplex, and add other elements that can affect speed. In the chart below, BERTL tests how different modes—mixed-size original mode and duplex mode—affect document-feeder productivity.

PRODUCTIVITY

In order to assess copier productivity, BERTL ran a series of copy jobs in order to determine document-feeder scanning speed, the affect of the first set out on overall engine speed, and whether specific job attributes affect engine throughput capability. Each job was set up by feeding paper from the shortest paper route to the shortest available output destination. A separate test examines how adding finishing/output destinations affects productivity.

Copier Productivity
Ten Page NJ Tax Form

First Copy Out Time

Copier Productivity
Ten Business Color Originals - 1 Set
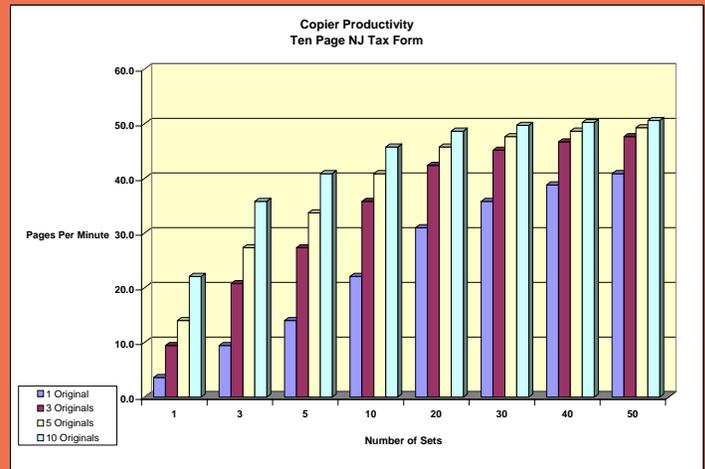
DOCUMENT FEED SPEEDS

BERTL also takes the user into account and looks at how document-feeder productivity affects the amount of time a user has to wait at the device before they can walk away with their originals.

Document Feed Speeds

Copy
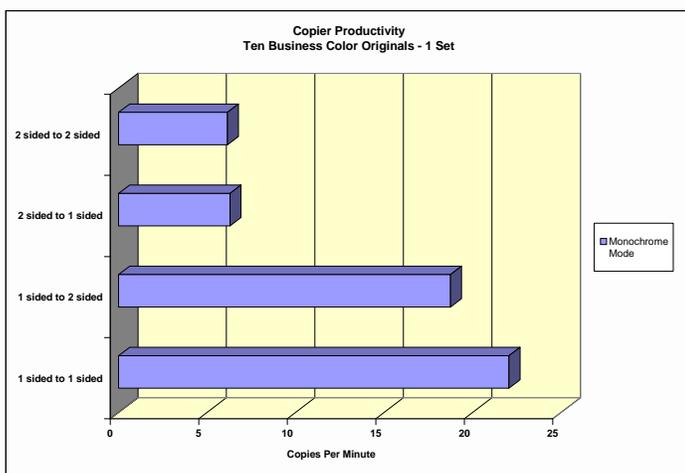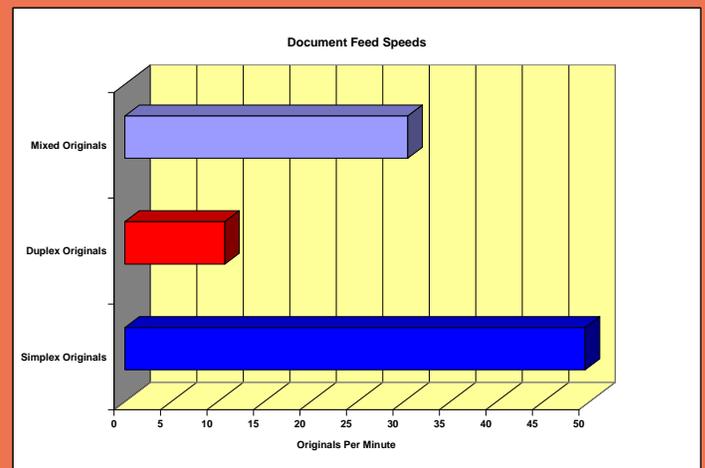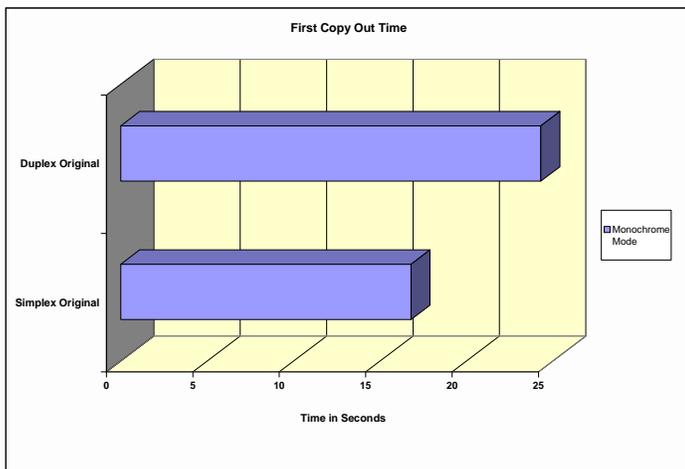
SPECIAL FUNCTIONS

In a perfect world, all original documents are the same size, the same type, and require the same imaging settings. BERTL looks beyond the perfect world to see how devices help those working with difficult workflow situations.

Take the example of a paralegal scanning a case file. The file could well contain both letter- and legal-size documents, requiring a mixed media-size capability. The file's text pages are best copied using the document feeder in Text or Text/Photo mode. However, the accident-scene photographs are best scanned using the platen (to avoid damage) in Photo mode, as Photo mode typically captures the halftone detail much better. There may also be simplex and duplex pages in the same batch. Rather than waste more of the paralegal's time, it would be ideal to be able to switch between single-sided and double-sided scanning.

Job-Build Copy Capabilities	
Combine scans from the document feeder and platen?	Yes
Combine multiple scans from the document feeder and platen?	Yes
Change image quality and other features within a single job-building process?	Yes
Switch between simplex and duplex scanning within a single job-build process?	Yes
Mix different-size originals into a job build?	Yes

WHAT WE LIKED

- As with Xerox's other WorkCentre units, the WorkCentre 7345 features an exceptionally easy-to-use, large color touch screen with large easy-to-read text. Indeed, it is the easiest touch screen to use among the many touch screens BERTL has evaluated. There are no complex and confusing sub-menus or cryptic instructions. Instead, even novice users will be able to navigate the touch screen for copy jobs in just a matter of minutes.

- Extensive job-build capabilities, including combining originals scanned from both the document feeder and platen into a single job, and changing image-quality and other settings within a single job-build process.

- An optional Media Card Reader enables users to download and print files and photos stored on Compact Flash memory cards.

WHAT WE WOULD LIKE TO SEE

- A dual-head document scanner so that duplex originals can be scanned in a single pass, without the inversion steps that significantly affect scanning/copying productivity.

- Automatic wake-up from sleep mode when users insert originals into the document feeder or lift the platen cover. As it stands, the user must press the "Power Save" button to "wake-up" the device.

BACKGROUND

In just a few years, network scanning has changed from being a "luxury" function to one that is virtually essential.

Indeed, today, nearly all MFPs provide standard or optional network scanning, including scan-to-e-mail. This makes document-feeder design even more critical, with users looking for document feeders with higher feeding speeds, low–resolution capabilities, as well as for MFPs with more versatile scanning, and color-scanning capability.

Address Book Integration

MFPs' ability to integrate their scanning addresses book with central corporate address book located on LDAP or Microsoft Windows NT network servers is the current *de facto* standard. The ability to force-populate outgoing e-mail from the MFP with sender information through an enforced login process is also required (i.e., senders must enter their network password before they can use the MFP's scan-to-e-mail).

Destinations

Most MFPs' network-scanning capabilities include the ability to scan-and-send to e-mail addresses, SMB destinations (Windows desktop locations), FTP (File Transfer Protocol) sites, and Internet fax destinations. In some instances, the scanned document goes directly to the MFP's hard drive, and an e-mail is sent to the recipient with a URL link. By navigating to the URL link, the recipient can quickly access the scanned file from the device's hard drive. Also of note is that a growing number of devices are beginning to include external media ports to allow users to scan and send documents to USB flash memory devices and digital-camera SD chips. We expect this to become more common over the next year.

Security

Security is another critical aspect of scanning. Several MFPs now include the ability to send scanned messages using encrypted PFD or other secure-transfer formats. This is an important capability in industries and sectors where data must be kept secure and confidential. Most devices also support network authentication, so that users must log into their device (usually with their network password) before they scan.

Integration with Third-Party Applications

The big buzz in the office digital-imaging industry is the move toward open architecture, with the MFP's firmware backbone based on an industry standard such as Java or .NET rather than on a proprietary system.

| Scan-Features Summary	
Maximum Scan Speed (B/W)	50 ipm
Maximum Scan Speed (Color)	45 ipm
Connectivity Options	USB, Wireless Ethernet 802.11b (via third-party adapter)
Scan to e-mail	Yes
Scan to SMB	Yes
Scan to FTP	Yes
Scan to HDD	Yes
Scan to URL	Yes
Scan to Internet Fax	Yes
TWAIN Scanning	No
Scan to External Memory Source (Optical Drive/USB/SD card)	No
Network Authentication	Yes
LDAP Lookup	Yes
File Formats Supported	Text-searchable PDF, Compressed PDF, XPS, JPEG, TIFF (Multi-Page)
Encrypted PDF Format	Yes
Ad hoc Subject Line Entry	Yes
Ad hoc Message Line Entry	Yes
Ad hoc File Name Entry	No
QWERTY-Style Input Keypad	Yes

BACKGROUND

The simplest scanning workflow is converting a hardcopy printed image into an electronic image. This may be all that is needed when sending a scanned document to an e-mail address or making an archive copy of an order using scan-to-computer desktop. However, the vast majority of scanning workflow involves converting hard copy into an intelligent image that can be further processed by Optical Character Recognition (OCR) engines, forms-processing applications, or other automated information-management processes. In all of these workflows, the conversion of text (captured as an image by the scanner) into editable, searchable text is a critical first step. To investigate this important workflow issue, BERTL ran a series of standard test patterns containing multiple font types, sizes, and colors, capturing the data at various resolutions using both text and text/photo settings.

Scan Data-Capture Accuracy

After scanning each page of its test originals, BERTL analysts ran the scanned files through OCR software—ABBYY FineReader 8.0 in default configuration. The accuracy of the scanning process at the various resolutions and settings is reflected in the number of words that the OCR application converts correctly without human intervention.
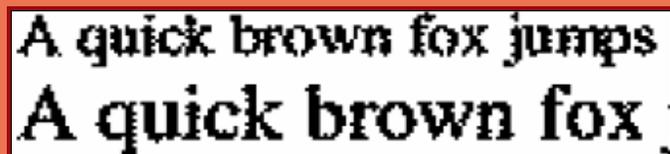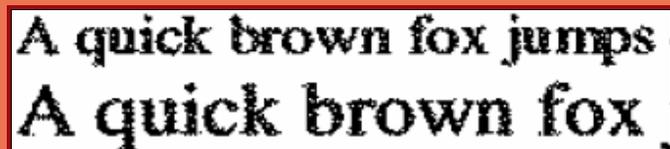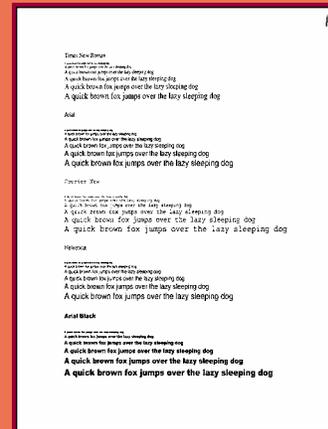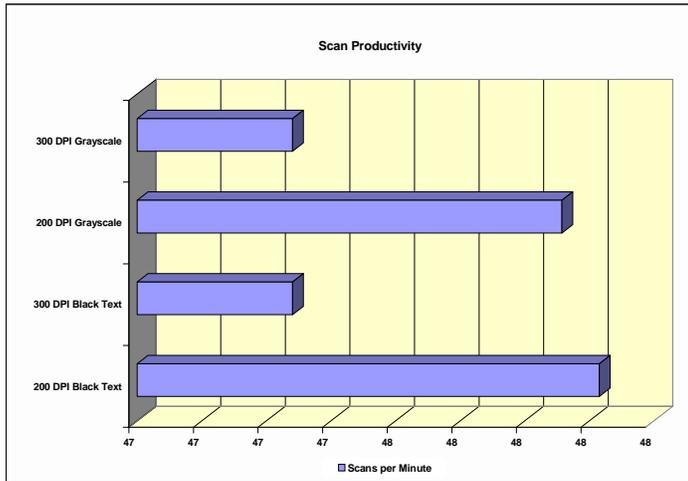

Above are portions of BERTL's OCR test chart scanned at 200 dpi (top), 300 dpi (middle), and 600 dpi (bottom) in text format and saved as a PDF file. The image has been zoomed to 400 percent in Adobe Acrobat and screen-captured for display. The top line is 6 point, and the bottom line is 8 point.
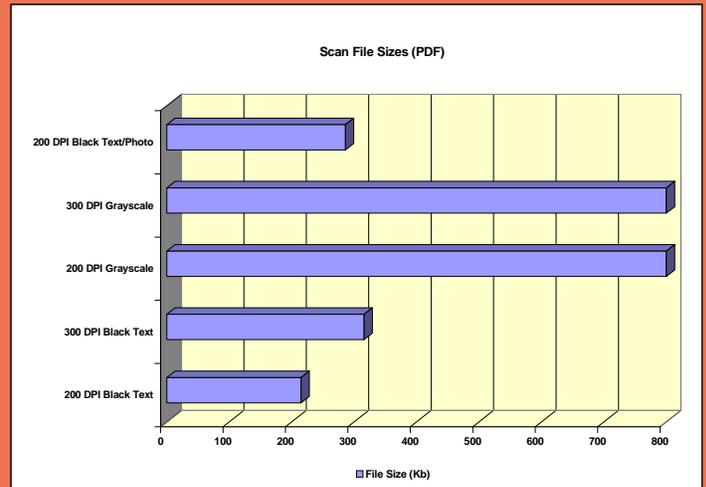
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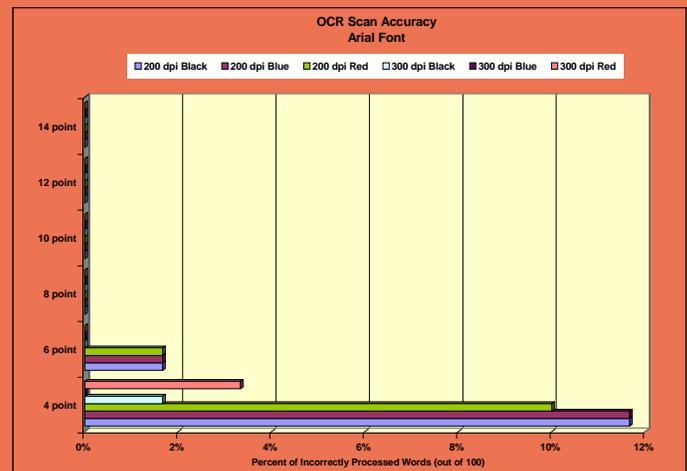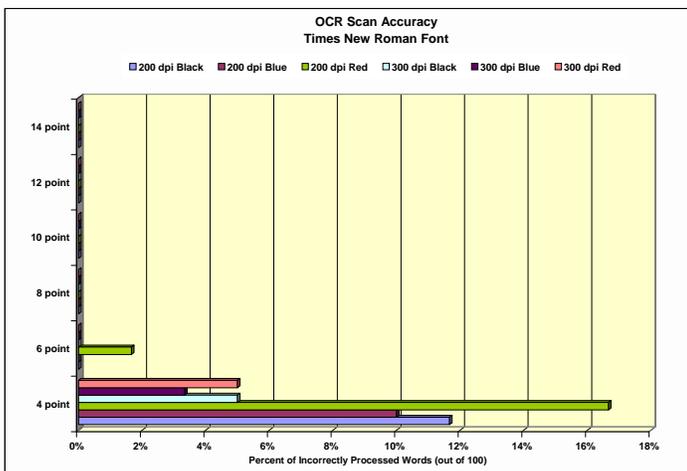
Scan

SCAN PRODUCTIVITY

BERTL technicians scan and time a set of 10 standard test originals using various scan settings in order to determine scan productivity.

Scan Productivity

	Scans per Minute
300 DPI Grayscale	
200 DPI Grayscale	
300 DPI Black Text	
200 DPI Black Text	

47　47　47　47　48　48　48　48　48

SCAN FILE SIZES/BANDWIDTH

The time to get the files back to the desktop, FTP location, or e-mail address is not an exact science. It relies on other network factors that are out of the user's control. The lower the bandwidth, the faster the data transfer, so BERTL provides the file size created by each scanning process.

Scan File Sizes (PDF)

	File Size (Kb)
200 DPI Black Text/Photo	
300 DPI Grayscale	
200 DPI Grayscale	
300 DPI Black Text	
200 DPI Black Text	

0　100　200　300　400　500　600　700　800

WHAT WE LIKED

- Color network scanning and color scan-to-e-mail, as some competitive units only provide scanning in black-and-white.

- Scan-to-e-mail, computer desktop, mailbox (hard-drive memory), FTP sites and document-management applications, as well as scan-to-URL (via Xerox Extensible Interface Platform). Documents can be scanned directly into PDF format, and then searched by their content, forwarded via e-mail, stored on a computer workstation, the Web or in a document-management system.

- Optional Thumbnail Preview enables users to preview thumbnails of scanned documents to make sure they are correct before sending them to their destination.

- Encrypted PDF sending, so that scanned documents can only be opened and read by authorized recipients.

- Administrators may configure templates that automate the scanning process. For instance, an administrator might configure a "Human Resources" template for an FTP site where employee forms are stored. After accessing the network scanning function at the touch screen, the user scrolls through a list of templates, selects "Human Resources" (or enters the template's number) and scanned documents are automatically sent to the FTP site. Template may also be stored on a dedicated template repository (server) where administrators can manage scan templates at an enterprise level.

- Xerox's optional SMARTSend software provides automated document routing and workflow at the computer desktop. For instance, in a single operation, users can configure (and save and recall) a workflow so that a scanned document is sent to multiple destinations, such as list of e-mail destinations, a remote printer, and to a Xerox DocuShare repository where the document is stored, and then save this workflow for other scanning tasks.

- Xerox' Job Flows Sheets tool provides for basic routing of documents to a user mailbox. Jobs can be routed to e-mail, FPT, SMB, Fax, IFax and printer destinations. This is ideal for users who require basic routing capability, but do not wish to purchase or manage additional middleware, or an enterprise customer who requires basic workflow capability.

- Scan files into text-searchable PDFs, Compressed PDFs, JPEG, TIFF (Multi-Page) and Microsoft XPS files formats.

WHAT WE WOULD LIKE TO SEE

- The ability to scan documents and store them on l Media Card Reader, USB or SD flash memory devices.
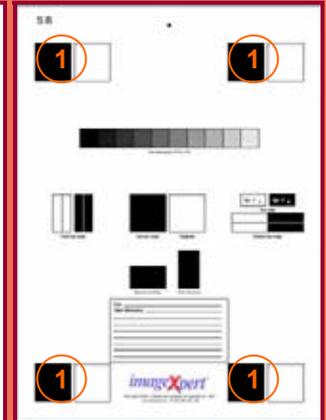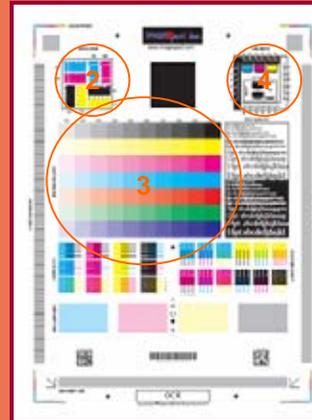
IMAGE QUALITY

BERTL evaluates the output of several "test targets" in order to determine image quality. Following are descriptions of key elements of image quality. Note the numbered examples on each of the test targets shown in the right column.

Office Color Image Quality
1. **Density of Solid Areas -** Better contrast; more vivid overall images
2. **Line Work -** Better production of lines and text
3. **Halftones -** Better production of photographic and screened images
4. **Negative/Positive -** Better production of fine detail

Photographic Color Image Quality
5. **Flesh tones -** Better production of portraits
6. **Banding -** Better solid and dithered fill
7. **Low Contrast -** Better production of dark images
8. **Saturation -** Better production of bright colors
9. **Caste** – Better color fidelity
10. **Fine Detail** – Better reproduction of fine details
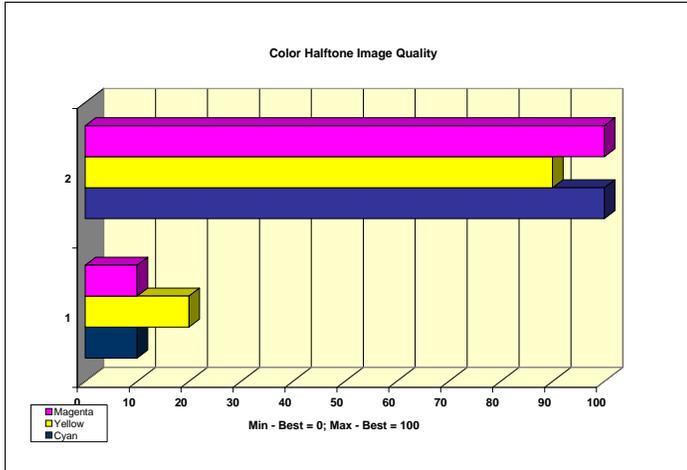

BERTL uses ImageExpert printer test targets for the evaluation of printed image quality. BERTL technicians measure image density and evaluate the device's ability to produce a full range of halftones and various sizes of negative/positive text, dots and lines in each primary printing color (CYMK).

Office Color Image Quality
Resolution and Image Density
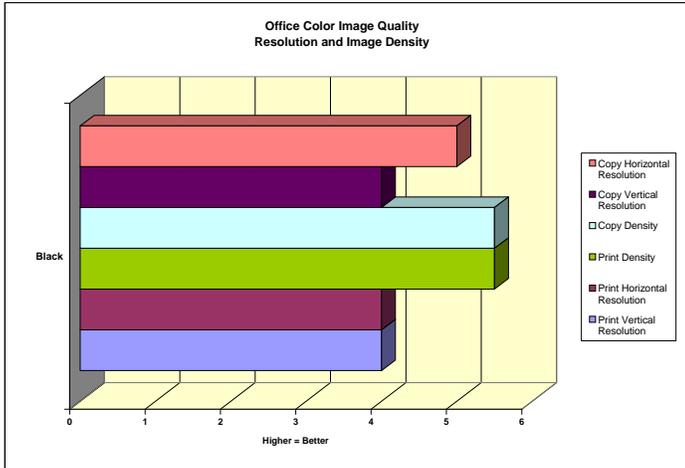
BERTL uses synthetic (photographic) test images obtained from **ISO International Standard 12640--Graphic Technology—Prepress digital data exchange—CYMK Standard Color Image Data (CYMK/SCID)** in order to evaluate the ability to print photographic images.

Black Halftone Image Quality

Image Quality

Color Halftone Image Quality

Magenta
Yellow
Cyan

Min - Best = 0; Max - Best = 100

Printed Photo Image Quality

5 = Best

Photo Quality Attribute

Fleshtones Banding Low Contrast Saturation Caste Fine Detail
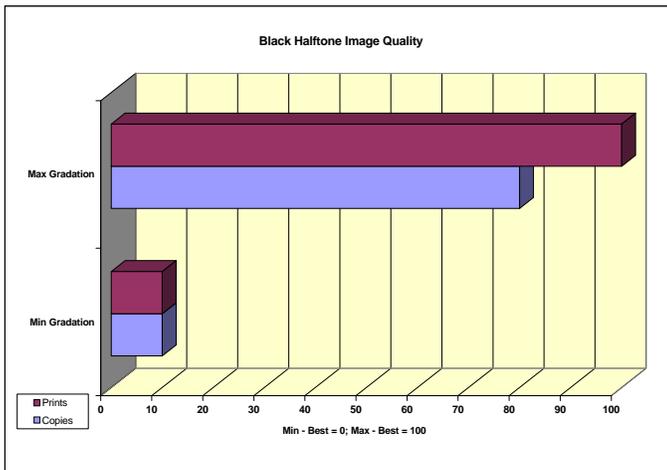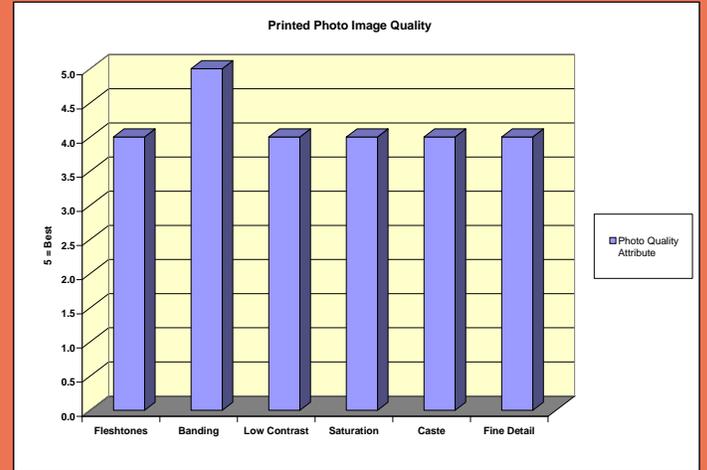
Image Quality

NTH GENERATION COPY

When evaluating MFP image quality, analysts are always working with the best possible scenario by using high-quality paper and first generation masters. However, users often working with second- or third-generation copies. Just consider a law firm. The firm is sent a COPY of the materials (quite possibly copies of originals) by a new client (the master set). They then make multiple copies of the master set (working copies), which get passed around the lawyers and paralegals involved in the case. After redaction and other editing work, the working copies may be scanned to create electronic files that are preferably searchable through Optical Character Recognition (OCR).

To simulate this practice BERTL uses a test pattern of its own design, and, using generic Staples copy paper, makes first-, second-, and third-generation copies of the test sheet in text mode. These copies are then scanned (using the same device) at 600 dpi in text mode and fed through ABBYY FineReader 8.0 at BERTL's workflow lab. The results are displayed in the chart below.
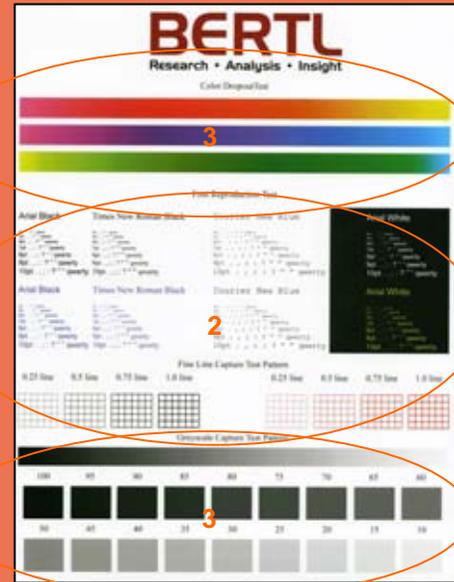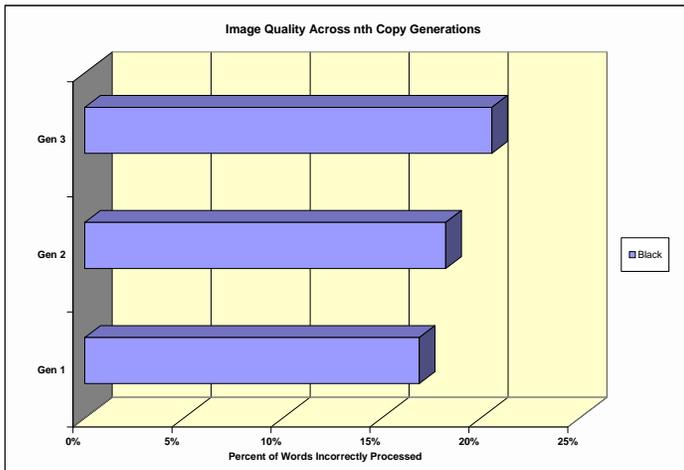
A BERTL Image-quality copy test pattern with multiple fonts in varying sizes, colors and backgrounds from 4 point.

Fine-line grids in black and blue from 0.25 pt upwards.

Grey shades from 0—100 percent in sliding scale and 5 percent block increments.
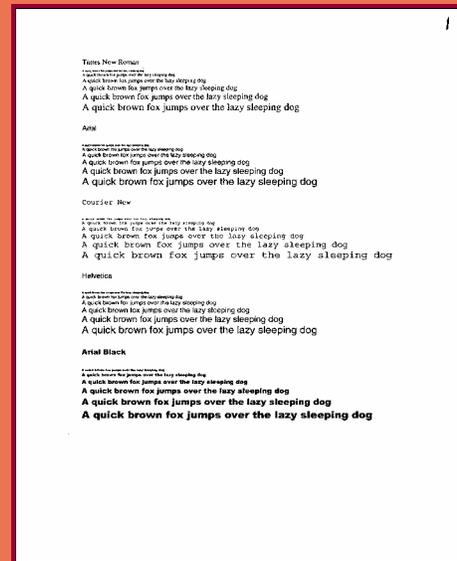
BERTL's nth generation-copy original containing five fonts ranging from 4 point to 14 point.

Originals are printed on high-quality heavyweight paper using a 1,200 dpi laser printer. Each original is checked to ensure 100 percent OCR accuracy is achieved when scanned at 600 dpi binary on an in-house scanner.

ACCESSIBILITY

In the United States, Section 508 legislation prohibits government agencies from purchasing devices that are not accessible to those with physical impairments. For this reason—and the corporate world's increased focus on delivering a better work environment for all—many MFP manufacturers are increasingly providing more user-friendly features for physically-impaired users.

Common design features include tilting control panels, which give wheelchair-bound users a better view of the screen, and larger display options for those with impaired vision. Voice navigation and Braille also are becoming increasingly popular. Easy access to the paper path for misfeed removal and front access to toner supplies also make a device more user-friendly.

Accessibility Features Summary	
Routine maintenance tasks performed at front of device	Yes
Remote control-panel software	No
Audible "beeps" indicating error conditions	Yes
Control panel optimized for visually impaired	No
Voice-recognition software	No
Additional accessibility features	No
Control panel tilts?	No

The Xerox WorkCentre 7345 as tested by BERTL.

PROGRAMMING THE CONTROL PANEL

Visit a few MFP manufacturers' showrooms, and you will see a wide range of control panels and touch screens. The most rudimentary consist of a selection of hard keys and an LCD screen that can often be challenging to navigate. On the other hand, some control panels that utilize hard keys and LCD screens can actually be easier to use than touch screens. However, hard-key/LCD panel systems that require users to scroll through various settings and make a selection can also often be challenging to use.

Among touch screens, some utilize a menu-driven system, while others utilize an icon-based system. Some menu-driven touch screens can involve many complicated sub-menus that can be difficult to navigate.

Most manufacturers try to keep their control panels and touch screens consistent across their MFPs and printers, so that users do not have to spend time learning how to use a new control panel when moving from device to device.

A control panel's ease of use—or lack of—can often have a significant affect on user productivity. The harder it is to select frequently used options such as duplexing, document finishing, etc., the more time the user has to spend programming the device and the less productive they are. In the chart to the right, BERTL assesses how many steps are required to make these commonplace settings.

The WorkCentre 7345's control panel and touch screen. The touch screen is very easy to use and navigate.

Selections Required for Frequently Used Copy Functions	
Corner Staple	4
Hole Punch	1
Reduce to 64%	2
2:2	1
Photo Mode	1
Copied Front and Rear Covers	4

Xerox provides a poster that describes basic copy operations. It may be downloaded, printed and placed near the WorkCentre 7345 for quick reference.

August 2007

Xerox quick-reference poster for network scanning.

Xerox quick reference poster for scan-to-e-mail.

PCL PRINT DRIVER

As with control panels and touch screens, print-driver design can vary enormously from manufacturer-to-manufacturer. And, as with control panels and touch screens, how easy it is—or isn't—to make selections in the print driver and navigate through it can significantly affect user productivity.

Most vendors provide an emulation of PCL (printer control language) developed by the Hewlett-Packard Company. Some may also provide an emulation of PostScript, developed by Adobe Systems Incorporated, or they may license PostScript directly from Adobe. While the Adobe PostScript driver is not the most user-friendly of print drivers, the advantage is that many users are already familiar with it. Alternately, some manufacturers may use an emulation of PostScript and design their own print-driver user interface, or may license PostScript from Adobe and also design their own print-driver interface.

The PCL driver's first tab, Paper Output, provides basic job settings, such as paper size and type, simplex/duplex, document finishing, and color/black-and-white.

Note that the PCL and PostScript print drivers are virtually identical and feature a row of icons on the lower left of the tab that show current toner and paper status at a glance. If a user requires more detailed information, they can select the "More Status" option and a new window opens that provides more detailed information (see upper right).

The "More Status" option's Device tab indicates current device status, while the Supplies tab (below) provides toner and paper status.

August 2007

Ease of Use
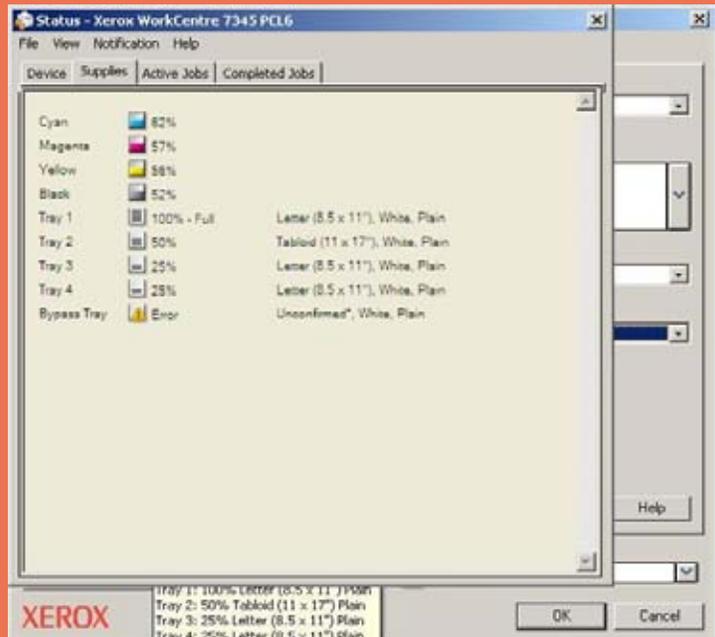
PCL PRINT DRIVER
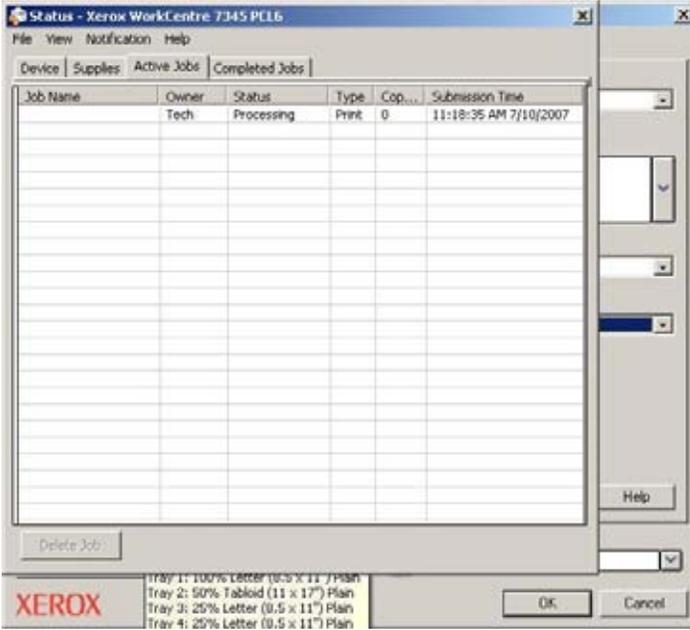
The "More Status" option also indicates current jobs being processed, while the "Completed Jobs" tab (below) indicates completed jobs.
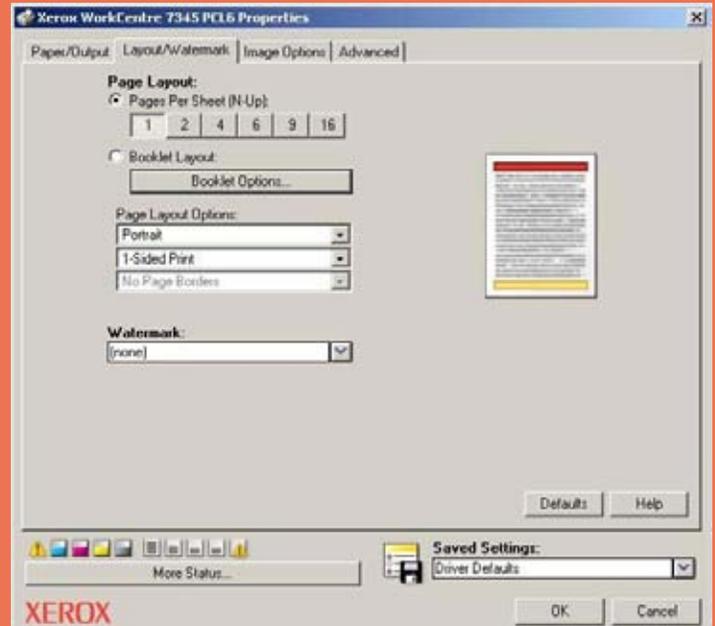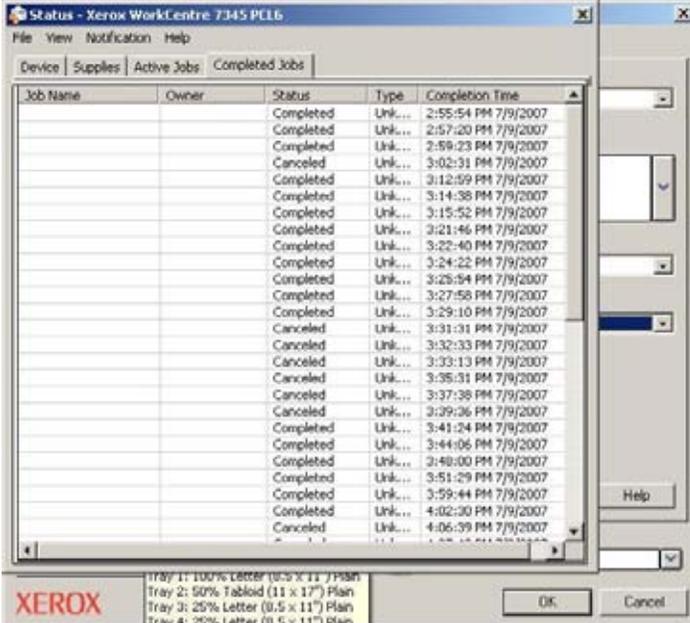
The PCL driver's Layout/Watermark tab provides N-Up printing, booklet, watermark options, etc. Note that the "Saved Settings" option in the lower right enables users to save and recall frequently used print-job settings. The Image Quality tab (below) provides image and color quality options.
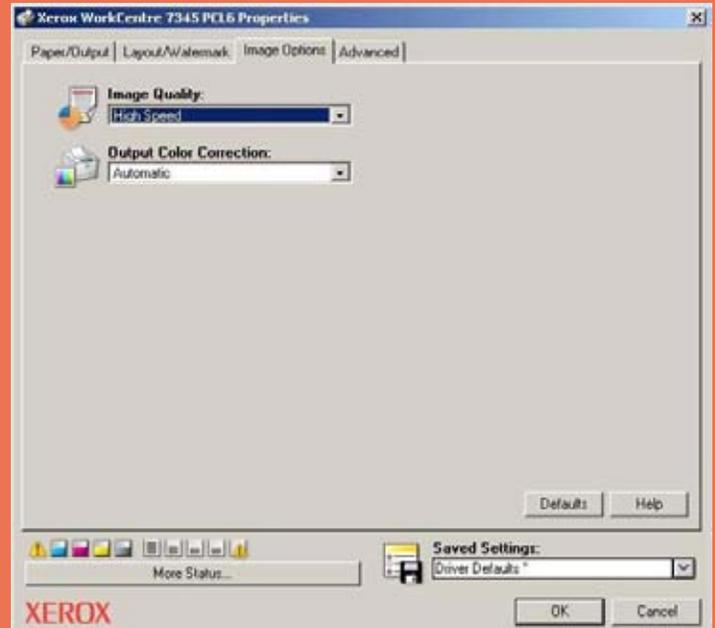
POSTSCRIPT PRINT DRIVER
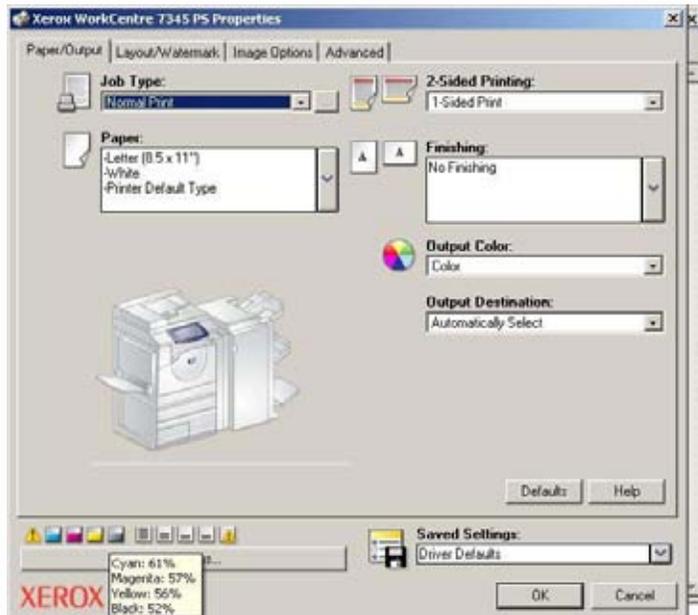
The PostScript is virtually the same as the PCL print driver, except for the Image Options tab (see below). As with the PCL driver, the PostScript driver indicates consumables, paper, and device status, as well as current and completed jobs, and users can save and recall frequently used print-job settings.
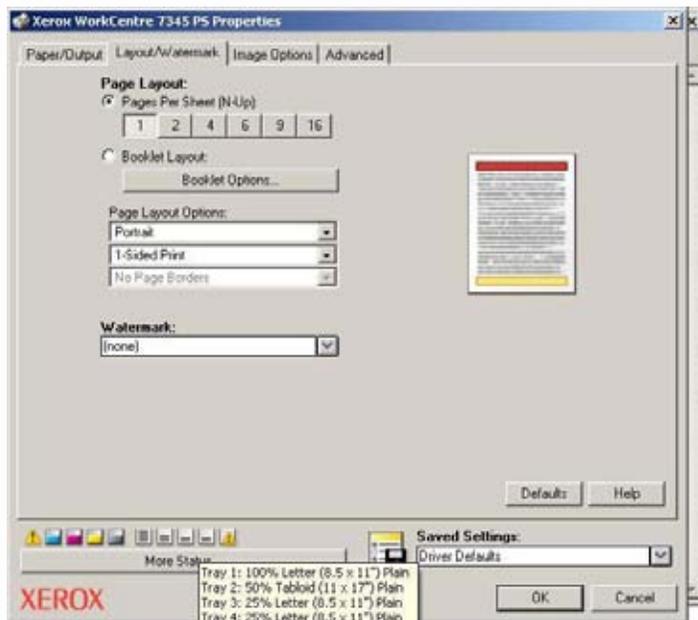
This tab provides document-layout and watermark options. Note again that each tab indicates the percentage of remaining paper in the paper drawers, as well as installed paper size and types.

The PostScript print driver provides several additional image-quality options, including the ability to lighten/darken images, specify margins, as well as print colors matching color image standards such as SWOP, EuroScale, etc.
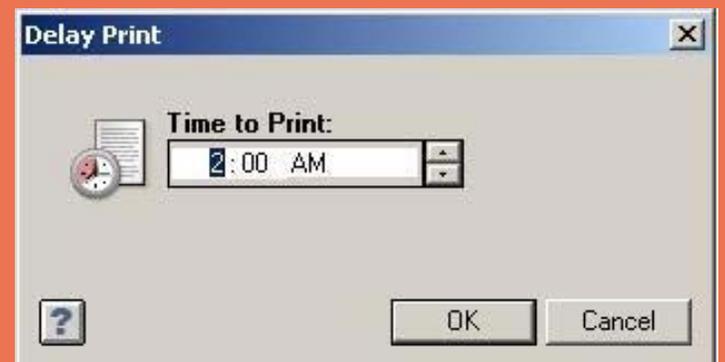
Both PCL and PostScript drivers provide secure, proof and delay options, which are accessed via the drop-down menu on the drivers' first tab. Above, the user can specify what time the printer should begin printing the job. This is useful, for instance, if the job is not a priority and thus can be printed after business hours when other users are not utilizing the device.

CLIENT UTILITIES

In order to take the best and most efficient advantage of a device and its capabilities, as well as ensure maximum uptime, clients need an efficient way to access and monitor the device. This is true whether the device is an MFP, printer, or scanner.

Most general users want to know first if a device is capable of handling a particular job—for instance, if it has duplexing, color capability; supports specific paper sizes, or provides certain document finishing, such as stapling or saddle-stitch booklet making.

Second, users want to know a device's current status—if it is ready to print or is offline, for instance. Third, they may also wish to know whether it is equipped with sufficient supplies, such as toner, paper and staples, to be able to produce their job. Fourth, when the device is shared, they may wish to know how many other jobs may be lined up ahead of them.

Manufactures typically provide the user with this information either via a client software utility that is installed on the client's workstation, or via a printer Web page that is accessed via the Web and a Web browser. Some manufacturers may also provide software that automatically indicates (via a pop-up window) when the user's job is completed or if there is a problem with the device, such as depleted paper.

Xerox bests most of its competition through the integration of real-time device status directly into the print driver (the bidirectional capability can be turned off if needed for bandwidth purposes). This is ideal for several reasons: 1) IT does not have to support any resident utilities for client-printer monitoring, and 2) the user does not have to use a Web browser or launch a utility in order to obtain a variety of real-time device status information (see below).
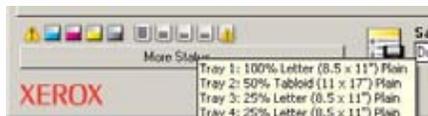
With just a quick glance at Xerox's Web-based CentreWare Internet Services, end users can see device, toner and consumable status. Another tab (below) indicates the progress of current jobs.

CLIENT UTILITIES
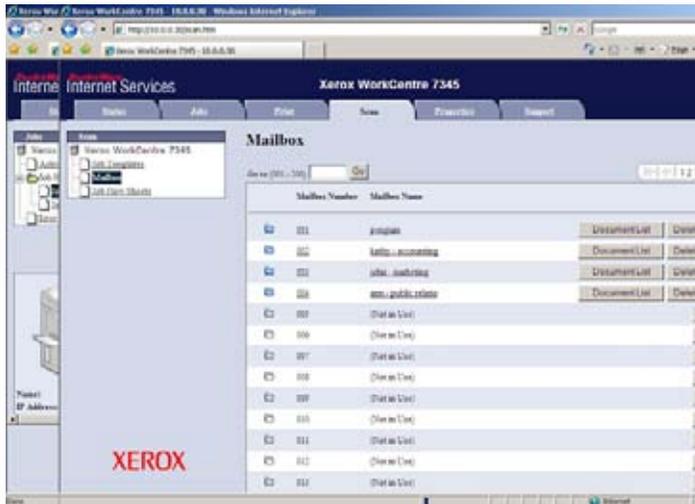
The WorkCentre 7345's CentreWare Internet Services provides print-on-demand capability. From the device's print drivers, users may stored electronic files, while they may store scanned documents from the WorkCentre 7345's touch screen. Above administrators and end users may configure individual password-protected mailboxes.

CentreWare Internet Services also provides a direct-printing feature; users enter the file path and name and print-job settings. It saves time, as users do not have to launch the document application and print drivers.
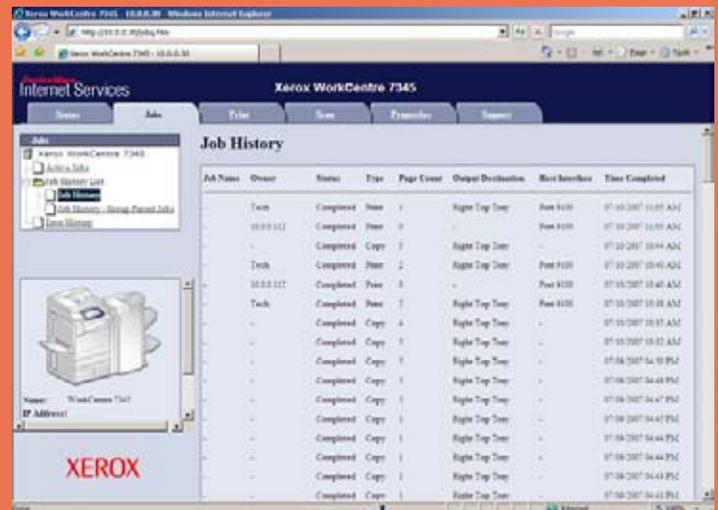
CentreWare Internet Services also provides a detailed job log indicating the file name, user, number of pages within the job, output destination and time completed.

ROUTINE MAINTENANCE

Workgroup devices sold through retail and traditional IT distribution outlets usually are maintained by office workers who change the all-in-one cartridge units that encase the entire imaging system, including the toner cartridge. Units sold through resellers and dealers are usually maintained by office workers and/or trained service engineers. While separate long-life parts are more complex to install (i.e., separate toner cartridges, imaging drums, transfer belts), they tend to cost less than low- yield, all-in-one alternatives.

Toner Replacement

Changing the toner or imaging cartridge is a necessary task that is traditionally is avoided by some for fear of toner dust leaking on clothing or hands, or they fear that it might be too complicated. However, most units today offer clean replacement of toner supplies, and there is very little risk of toner leakage, and toner replacement is usually easy.

Clearing Paper Misfeeds

The main issue that office users attempt to avoid is the removal of an occasional paper misfeed. As a general rule, the faster a device engine, and the more paper handling and finishing options it has, the more complex is the process of removing paper misfeeds.

Common paper-misfeed sources involve the duplex unit and poor loading of paper supplies. The position of the duplex unit may be a major factor in the removal of many paper misfeeds. How easy or difficult it is to load paper supplies can also be a factor in the overall number of misfeeds that may occur

Loading Paper

It goes without saying that loading paper should be as easy as possible, but sometimes that is not the case. Among the factors that affect ease-of-use are:

- The user should be able to load an entire ream (500 sheets) in a single step.
- Mechanisms such as corner separators and ramps in the paper drawer can impede loading paper.
- The most critical factor involved in ease-of-loading paper is automatic paper-size detection. Ultimately, the device should be able to recognize the new paper size and reflect it on its control panel/touch screen and across the network in print drivers and printer-management software. Without automatic paper-size detection, users must remember to program-in the new paper size—something they often neglect to do, or do incorrectly. This can result in jobs printed on the wrong paper size, backed-up job logs, etc.

Maintenance-Features Summary	
Black Toner Yield*	26,000 pages
Color Toner Yield*	16,000 pages each(CYM)
Fuser Life	Info not available
Developer Life	Included in toner cartridges
Toner Refill During Printing?	No
User Replaceable Drum?	Yes (four)
User Replaceable Fuser Unit?	Yes
User Replaceable Waste Container?	Yes
User Replaceable Original/Paper Feed Rollers?	No
Automatically Senses Paper Sizes?	No

*Manufacturer's stated toner yield using originals with 5% area coverage per color.
Includes Xerox's SMart Kit technology. With SMart Kit technology, critical supply components are constantly monitored, and designated users or administrators are automatically notified via e-mail, the print driver or via the Web when supplies are low, so that supplies can be proactively monitored and ordered, and downtime minimized.

ROUTINE MAINTENANCE – REPLACING TONER

In order to access toner cartridges, drum cartridges and the waste-toner container, the user opens the WorkCentre 7345's front door, as seen above.

In order to remove one of the four color-coded toner cartridges, the user first unlocks the toner cartridge as seen above.

Removing the cyan toner cartridge.

REPLACING THE DRUMS

In order to replace the imaging drums and empty the waste-toner container, the user first presses down on the tab labeled "A," then pulls up the handle to the right.

Ease of Use
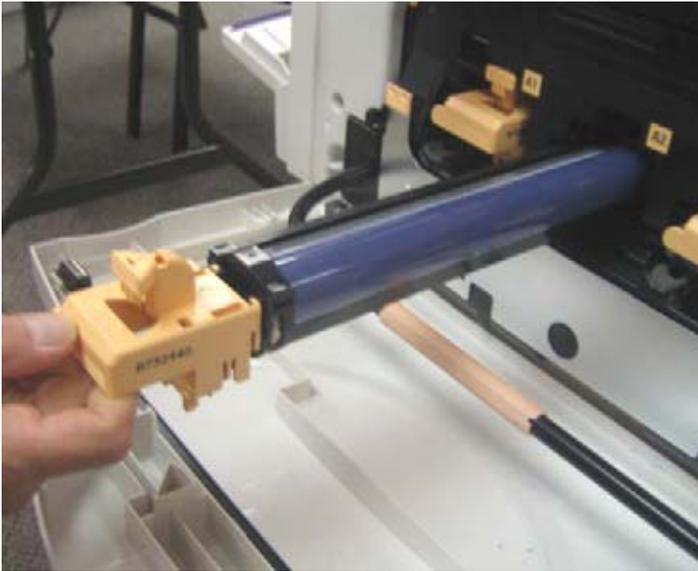
Removing and replacing the imaging drums is an easy process.

ADDING PAPER

Adjusting the WorkCentre 7345's paper drawers is relatively easy; users squeeze the drawers' guides into place as shown above. There are no removable guides that must be removed and reinserted into the drawer.

In order to load paper in the bottom drawer, users press down on this plate. Note that whenever a user opens a paper drawer—regardless of whether or not they change the installed paper size—the touch screen prompts them to confirm the installed paper sizes in all paper drawers.

MISFEED ACCESS

The WorkCentre 7345's bottom-left misfeed-access area.

Ease of Use

MISFEED ACCESS

The document-feeder misfeed-access area.

This portion of the finisher may be pulled out for easier access to misfeeds.

The finisher bridge misfeed-access area. This tray may be lifted up in order to more easily access any misfed paper.

The misfeed-access area for the Professional Finisher (saddle-stitch booklet maker).

MISFEED ACCESS

The top left misfeed-access area.

The main misfeed access area on the left side of the device. The touch screen provides explicit instructions for accessing and removing any misfeeds that may occur.

WHAT WE LIKED

- Users can obtain device status from the print drivers—they do not have to launch a printer Web page or other status-monitoring utility. Instead, on the bottom of all of the PCL and PostScript drivers' tabs, the remaining percentage of each toner (black, cyan, yellow and magenta) and remaining percentage of paper and installed paper sizes and types in each source is indicated. A link indicates current device status and the job queue. This saves users a considerable amount of time when they are seeking to view device and consumables status, as with other devices, users must typically launch a Web browser or utility to obtain this information.
- The two print drivers—PCL and PostScript—are also easy to navigate, and provide an exceptionally easy-to-use user interface.
- The touch screen indicates the status of current print and copy jobs. Users simply press the "Job Status" hard key, and the touch screen displays the current job (number of pages already printed and number of pages remaining to be printed), as well as the current job queue. This is especially convenient for walk-up copier and network-scanning users, so that they can see how many jobs may be ahead of them.
- Front-loading toner, drums and paper makes it easy to replenish these supplies.
- Replacing toner is mess-free and relatively easy, as is replacing the drums and emptying the toner-waste container.
- The WorkCentre 7345's large high resolution color touch screen is exceptionally easy-to-use—text is large and clear, instructions are easy to follow, and the screen itself is very easy to view, with no glare. There are no confusing sub-menus or cryptic instructions or labels. Even novice users should have no difficulty navigating the system.
- Xerox provides three posters containing graphically illustrated guides for copying, network scanning and scan-to-e-mail that users and administrators may download, print and affix near the WorkCentre 7345 for quick reference.
- Paper drawers easily slide out and it is easy to add paper as well as adjust the drawers to accommodate a different paper size.
- General misfeed access is good as virtually all misfeeds are located on the left side of the device.
- The touch screen is displays helpful misfeed-removal instructions.
- Automatic paper-size detection ensures that network print jobs are not printed on the wrong paper size, which would cause a backup of print jobs in the print queue.

- With Xerox's SMart Kit technology, critical supply components are constantly monitored, and designated users or administrators are automatically notified via e-mail, the print driver or via the Web when supplies are low, so that supplies can be proactively monitored and ordered, and downtime minimized.

WHAT WE WOULD LIKE TO SEE

- Easier misfeed access in the Professional Finisher
- Automatic wake-up from sleep mode when users insert originals into the document feeder or lift the platen cover. As it stands, the user must press the "Power Save" button to "wake-up" the device.
- Users should be able to manually place the device into power-save mode by pressing the "Power Save" button. Currently, the device reverts into power-save mode after a preset period of non-use.

PAPER INPUT

Substrate (paper) handling is a core requirement of every device. If a device cannot print a file on specific paper desired by the user, it hardly matters how fast the print engine is, or how many pages it can produce.

A device's paper-handling capability basically concerns how it can handle two key criteria: the paper size and paper weight it can feed, as well as the maximum number of pages that can be loaded in the device's drawers, trays, etc. The greater the paper capacity, the less time users will spend reloading paper.

Paper Handling: Input-Features Summary	
Standard Paper Capacity	620 sheets: 100-sheet bypass, 520-sheet paper drawer; High Capacity Option (520-, 800-, 1,200-sheet drawers)
Optional Paper Supplies	3x520-sheet drawers
Maximum Paper Capacity	3,140 sheets
Minimum/Maximum Paper Size	5.5"x8.5"/(148x210mm)A5 - 11" X 17"/(297x420mm)A3
Minimum/Maximum Paper Weight (main trays)	17 lb. bond – 80 lb. cover (55 – 220 gsm)
Maximum Paper Size (bypass)	12"x18"/304.8x457.2mm
Minimum/Maximum Paper Weight (bypass)	16 lb. bond – 80 lb. cover (55 – 220 gsm)
Minimum/Maximum Paper Weight (duplex)	Info not available
Automatically Senses Paper-Size Changes?	No
Drop-In Loading of Entire Ream of Paper?	Yes

The WorkCentre 7345's 100-sheet bypass tray, which is located on the left side of the device.

All of the WorkCentre 7345 paper sources can handle substrates as thick as 80-lb. cover stock.

PAPER OUTPUT AND FINISHING

Office workgroup devices' paper-output handling options range from duplex printing to saddle-stitch booklet making. Many devices offer a choice of finisher/staplers, which provide a low-cost, minimum footprint solution, or a high-capacity, fully featured solution such as multi-position stapling, saddle-stitch booklet maker and/or document hole puncher.

BERTL evaluates these functions looking at how the same job outputs at different speeds when different finishing options are specified. The impact of the finishing selection is determined by timing jobs that are sent to a device with various finishing settings.

Stapling

Lower-cost finisher/stapler units often have a 15- to 30-sheet maximum stapling capability and are often limited to corner stapling. Floor-standing, higher-cost finishers typically provide 50-sheet capability and provide both corner and double stapling.

Saddle-stitch booklet making allows users to create folded, center-stapled booklets. Some saddle-stitch finishers only handle 10 sheets (for producing 40-page booklets), while others handle up to 15 sheets (for producing 60-page booklets).

Mail Bin Units and Offset Output

Many workgroup devices provide offset stacking (each set is offset from the next) to make it easier to separate jobs. Some also provide physical mailbox units that allow each user to send jobs to their own mailbox tray. However, most mailbox units do not accept finished (such as stapled) jobs. A multi-tray finisher can also offer some form of job separation typically used to separate different types of jobs (fax, print, copy) for easier identification.

Post-Process Insertion (PPI)

A post-process insertion unit can be used to automatically insert pages into completed print or copy jobs. These inserts can include chapter covers, color pages and specialty material, such as heat-sensitive materials that may be damaged if run through the device. The advantage of course is that no human intervention is required to manually insert pages into completed jobs.

Output/Finishing Features Summary	
Standard Output Tray Capacity	400 sheets
Optional Output Option(s)	Office Finisher, Advanced Office Finisher Professional Finisher
Maximum Stapling Capacity	Office/Advanced Office/Professional Finishers: 50 sheets
Maximum Stacking Capacity	Office Finisher: 1,000 sheets; Advanced Office Finisher: 3,000 sheets; Professional Finisher: 1,500 sheets
Maximum Saddle-Stitch Capacity	15 (60-page booklets)
Hole-Punch Option(s)	Advanced and Professional Finishers include 2 -4 hole punching
Physical Mail Bin Option(s)	No
Folding Option(s)	V-folding (Professional Finisher)
Post Process Inserter Option(s)	No
PPI Capacity	Not applicable

Document Finishing Penalty

Time Penalty per Set in Seconds
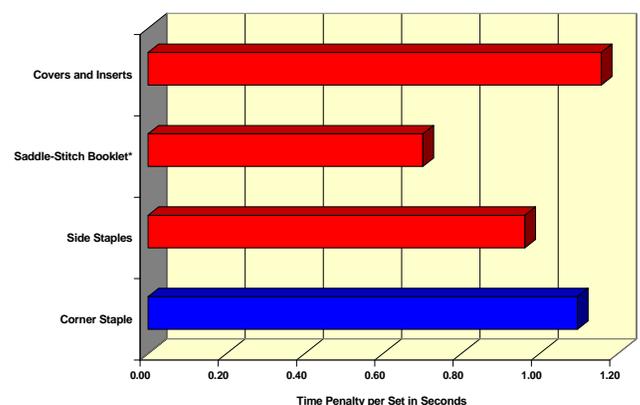
ORIGINAL HANDLING

While scanning speeds and duty volumes may be based on perfect, standard letter/A4 size office-grade laser printer paper, a much wider range of media substrates is commonly used and handled in the office world every day.

Manufacturers advertise a range of media sizes and weights that they have tested and feel comfortable with their device handling efficiently.

BERTL looks beyond the manufacturer quoted capabilities and on many occasions finds that the limits can be considerably extended to accommodate those occasions when office staff need to copy non-standard office paper.

Note that a device should not be considered a "failure" if it does not get a 100-percent success rate in any of the original tests. These tests are deliberately designed to push the boundaries.

Scanning Speed

Obviously, the faster a scanner can scan originals, the faster the user can retrieve those originals and return to their desk, the sooner the device is available for someone else to use. Slower scanning means diminished productivity.

Original-Handling Results	
Yellow Pages	Fed successfully
Magazine Pages	Fed successfully
Carbonless Forms*	Fed successfully
Business Cards*	Would not feed
Coated Inkjet Paper	Fed successfully
4" x 6" Index Cards*	Would not feed

*Out of document-feeder specifications
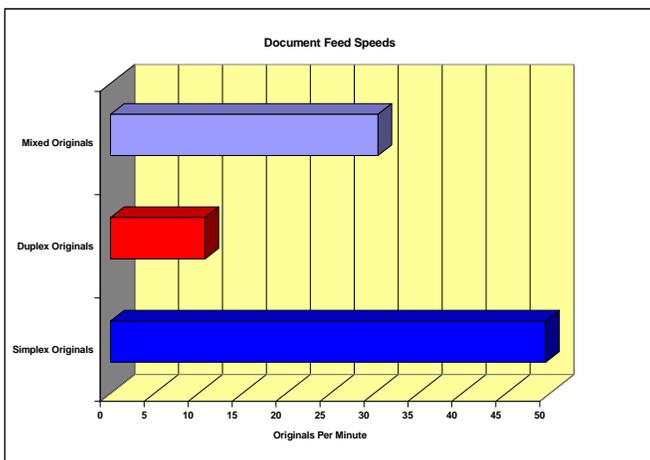
WHAT WE LIKED

- 12" x 18" paper capability via the bypass tray for producing full-bleed (edge-to-edge) 11" x 17" images.
- All paper sources accept up to 80 lb. cover stock.
- Accepts wide range of paper stock, from plain paper, to transparencies, lables, glossy, heavyweight, etc.
- Standard 75-sheet Duplex Automatic Document Feeder that Xerox rates at 50 images per minute (ipm).

WHAT WE WOULD LIKE TO SEE

- A dual-head document scanner so that duplex originals can be scanned in a single pass, without the inversion steps that significantly affect scanning/copying productivity.

BACKGROUND

An efficient device-management software system is critical in order to take maximum advantage of a device's feature set, be it a printer, fax, scanner or multifunctional peripheral (MFP).

Device management is typically provided via a Web server on the device controller. This Web server is accessed using any desktop Web browser. The user simply enters the device's IP address into the address line of their Web browser. Note that administrators and office users have different management and monitoring needs.

General Office Users
As noted previously, end users want to know if a device is capable of handling a particular job, current status (such as "Ready"), and current supply levels (paper, toner), as well as if there are any other jobs waiting to be printed.

Administrators
The aim of most network administrators is to obtain greater control over networked devices without having to leave their own desk. From their computer desktop, they would like to be able to set up the device on the network, establish security for IP filter ranges, apply cost-control measures, check supply levels, and set up automated e-mail alerts for different staff members when problems occur or maintenance needs must be met.

Due to the nature of a device's Web server, this capability is usually limited to an individual device. However, many manufacturers also include a network device- management fleet tool, which allows for the concurrent monitoring and management of multiple devices connected to the network. Many also provide plug-ins for the most popular IT device-management utilities in order to ensure that the maximum amount of information can be relayed from their device to the third-party application.

Device-Management Features Summary	
Web-based device monitoring	CentreWare Internet Services; CentreWare Web; CentreWare for Unicenter TNG, Tivoli NetWare, Microsoft Management Console (MMC), HP OpenView; Xerox Device Types (SAS R/3), SASP R/3 Intelligent Barcode Utility, Barcode Pro PS
Executable-based device monitoring	Yes (via print drivers)
Group management of network devices	Yes
Monitor 3rd-party MIB-compliant network devices	Yes
HP Web Jetadmin compatible	Yes (Web Jetadmin plug-in provided)
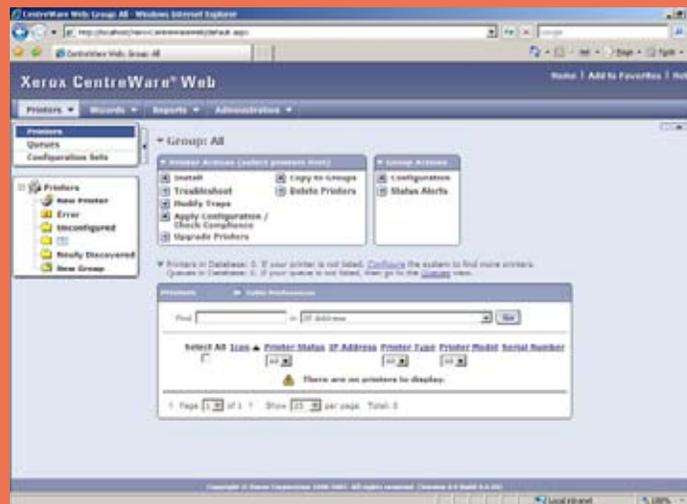
Xerox's CentreWare Web provides advanced device management for Xerox and MIB-compliant third-party network devices.

CentreWare Web provides automatic device discovery, so that administrators can identify new devices on the network and retrieve device information.

CentreWare Web provides various automated tools or "wizards" for automating various printer-management tasks. With these tools, administrators can simultaneously install, upgrade and configure multiple printers at the same time, saving considerable amounts of times. Administrators can also "clone" device settings—that is, copy the settings of specified network devices to other network devices, instead of having to "manually" make these settings.

CentreWare Web provides links not only to Xerox devices' home page (CentreWare Internet Services), but also links to other third-party devices' home pages, such as home pages for the Hewlett-Packard LaserJet 4100 and Panasonic DP-C354 as seen below:

Device Management

With a quick glance at CentreWare Web, administrators can view the status of networked devices. After selecting the device, CentreWare Web provides additional device information. Below, the administrator has requested more information for a Hewlett-Packard printer:

CentreWare Web provides additional information for Xerox printers, including a very detailed page counter that indicates total number of pages printed, black-only pages printed, color pages printed, pages copied, etc.:

CentreWare Web also provides Xerox's Smart eSolutions utility. With this utility, administrators can enable registered Xerox devices to automatically submit meter reads and supply status to Xerox's Web site for automatic scheduling of service and replacement of supplies.
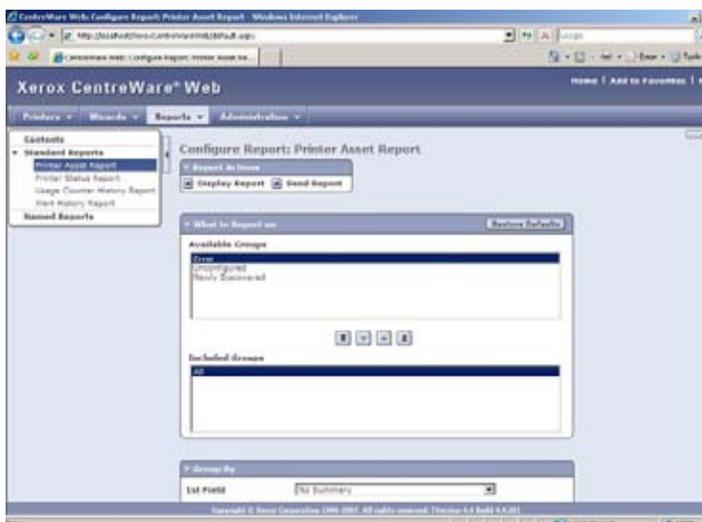
CentreWare Web can be enabled to automatically generate various usage reports for network devices and send them to specified users.
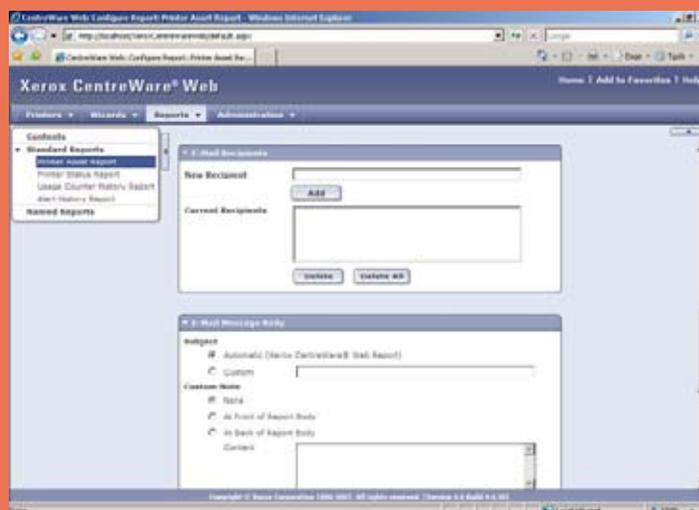
Administrators may specify which users should be sent specified usage reports via e-mail.
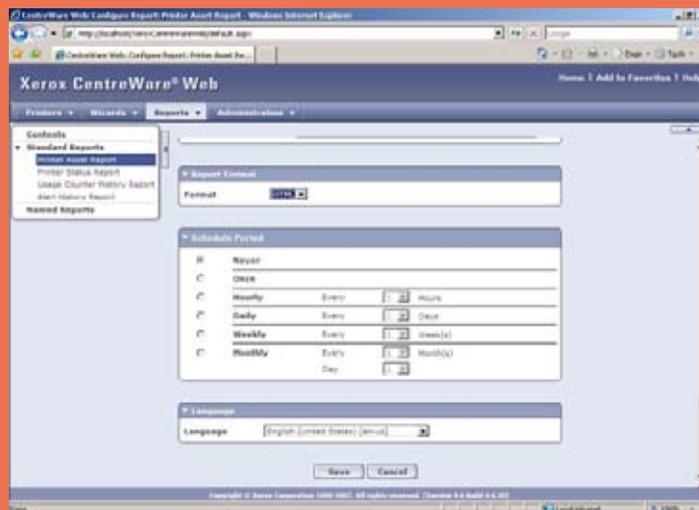
Administrators may schedule when reports should be periodically sent, and in what format they should be sent.
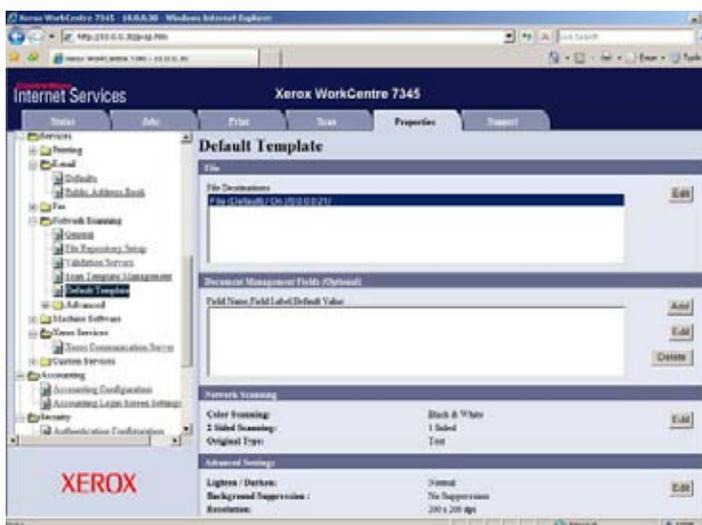
CentreWare Internet Services may be accessed via CentreWare Web or by entering the printer's IP address in the address field of a Web Browser. With CentreWare Internet Services, administrators can configure templates that automate the network-scanning process. The administrator specifies the file destination and scan settings, such as scanning in duplex, color, etc. At the device touch screen, the user simply scrolls through a menu to locate the template (or enters its number) and selects it. This eliminates users having to repeatedly specify file destinations and scan settings at the touch screen.

With CentreWare Internet Services, administrators can import network address books to the WorkCentre 7345.

WHAT WE LIKED

- CentreWare Web provides advanced group management of Xerox and MIB-compliant third-party printers. With CentreWare Web, administrators can group, install, troubleshoot, upgrade and configure multiple network devices, eliminating having to individually perform these tasks for each device. The more network devices, the more time will be saved.

- While CentreWare Web is designed exclusively for administrators and IT staff for managing and monitoring multiple network devices, CentreWare Internet Services provides easy and convenient management of just the WorkCentre 7345 when needed.

- Administrators can promote, delete and hold jobs in the CentreWare Internet Services' WorkCentre 7345 print-job queue.

- Xerox Auditron enables administrators to control black-and-white and color usage by user for each function (copy, print, fax and scan).

- Xerox Standard Accounting enables administrators to track copy, print, scan and fax use. Administrators can create up to 1,000 user accounts, and data may be exported via CSV file for cost calculation.

- With Color Access Via Active Directory, administrators can set up the WorkCentre 7345 so that users must log-in before printing or copying in color.

- Xerox also provides various third-party accounting solutions for comprehensive usage tracking and reporting.

WHAT WE WOULD LIKE TO SEE

- Xerox's CentreWare Internet Services and CentreWare Web provide state-of-the art network device management capabilities.

BACKGROUND

It seems high-tech security is never out of the news, with reports of information theft and hacking making headlines almost every day. And, unfortunately, by their very nature, network printers and MFPs are security risks if not managed correctly.

For instance, advanced network connectivity options open ports to hackers. Industry-standard Java and Web browser design elements are vulnerable to virus attack. Large hard drives store a latent copy of every document flowing through the device data for years. Devices link directly to core network components such as the LDAP address list or the central file server. Plus, fast communication options let insiders send information to the outside with no method of being traced.

Security and data-compliance regulations such as Common Criteria (CC) certification, HIPAA, Gramm Leach Bliley, FERPA, SEC, FSMA, and the Patriot Act are aimed at safeguarding information, and force companies to conform to best practices in document and data-security management.

Security-Features Summary	
Hard-Drive Overwrite	Yes
Removable Hard Drive	No
Private Print	Yes
Encrypted Printing	Yes
Secure Fax	Yes
Encrypted PDF Send	Yes
Network Authentication	Yes
LDAP Authentication	Yes
Kerberos Authentication	Yes
SNMP v3.0	Yes
IPv6	Yes
SSL	Yes
IP Filtering	Yes
MAC Filtering	Yes

PRIVATE/SECURE PRINTING

The purpose of private/secure printing is to keep printed documents secure. It is an important feature when devices are shared and/or out of sight of the user.
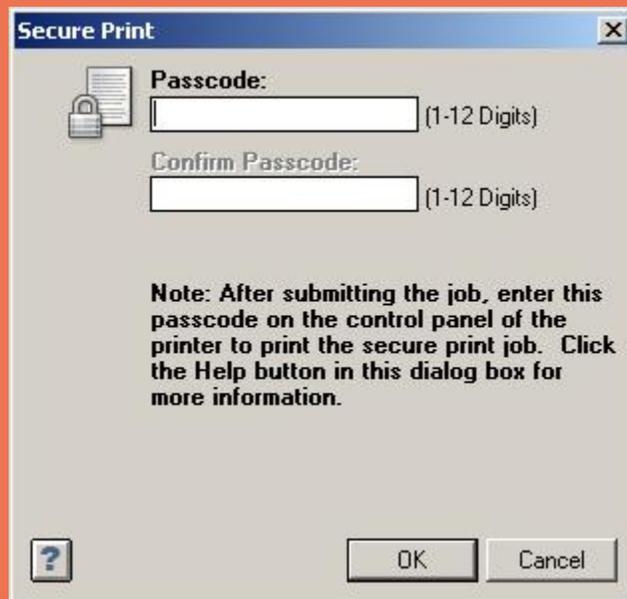
In the past, when a user printed a document containing sensitive or confidential information, unless the user "stood guard" at the printer, the printed document would simply be output to a tray or bin. Other users, including those searching for *their own* print jobs, could then easily view and read any other jobs lying in the tray.

With printers that provide private printing, however, the user typically enters a code of their choosing in the print driver before printing. Even after the user executes the print command, the device will not actually print the job until the user enters their code at the device's control panel.

Some printers' control panels display the file names of all held private jobs. This can be a problem if even a file name (such as one detailing a merger or litigation) must be kept confidential. Other control panels only display the file name when the user actually enters their code, providing more security.

Both PCL and PostScript print drivers provide a secure printing option, which is accessed on each driver's first tab. The user is prompted to enter a passcode, which they must enter at the device control panel in order for the WorkCentre 7345 to actually print the job.

WHAT WE LIKED

- Extensive device and data security, including Kerberos authentication, SNMP v3.0, IPv6, IP filtering and MAC filtering. Also provides hard-drive overwrite (immediate or on demand), LDAP authentication, network authentication, audit log, and optional ID card system (users must utilize a card in order to use the device's walkup functions).
- Extensive document security, ranging from encrypted scan-to-e-mail, password-protected PDF, Secure (private) printing, etc.

WHAT WE WOULD LIKE TO SEE

- A removable hard drive would provide maximum security.

Throughout BERTL's extensive testing program, Xerox's WorkCentre 7345 proved to be a robust, mid-volume office-color MFP that at Xerox's rated print speed of 45/35 (color) ppm is well-equipped to handle substantial black-and-white and color print and copy volumes in the office. BERTL was impressed with how easy it is to use the latest touch screen incorporated in the WorkCentre 7345. This color touch is large, easy-to-read and exceptionally easy to use—the last of which is a hallmark of Xerox MFPs and printers. Unlike other competitive systems whose touch screens often incorporate very complicated menus and sub-menus that can be overwhelming to use, Xerox touch screens are very cleanly laid out, and text is large and very legible. BERTL also appreciated the fact that the touch screen displays the status of current jobs and waiting jobs, so that it was easy to keep track of the print, copy and scan jobs involved in BERTL's extensive testing. Another of the WorkCentre 7345's big advantage is its PCL and PostScript print drivers. Whenever the BERTL analyst needed to print, they simply launched the print driver, and from there were able to quickly see if the device was ready to print, current toner and paper levels, installed paper sizes and types, and even see the print queue and status of current jobs. There was no need to launch a Web browser to obtain this information.

In testing, BERTL observed the following:

- Overall, print-file sizes tended to be smaller in Adobe PostScript mode as opposed to PCL mode.
- Tested First Page Out Time (FPOT) was as fast as 17 seconds (black-and-white and simplex mode).
- Tested FPOT was as fast as 18 seconds in color (simplex) mode.
- In color printer mode, the WorkCentre 7345 was as fast as 23 ppm in testing.
- In black-and-white printer mode, the device was as fast as 37 ppm (simplex) mode.
- Overall, the WorkCentre 7345 was faster in PostScript mode producing color output, and faster in PCL mode producing black-and-white output.
- Tested First Copy Out Time (FCOT) was as fast as 16 seconds in both black-and-white and color (simplex mode).

Additionally, the WorkCentre 7345 produced considerably above-average office-color image quality in testing. In testing, the device produced output that displayed:

- Excellent copy and printer halftone resolution.
- Excellent copy and printer density.
- Excellent printed photo image quality. The WorkCentre 7345's output displayed well above-average fleshtones, excellent saturation, caste and print density, with no banding observed at all.

Xerox has also made network scanning and scan-to-e-mail much easier to use and manage than with most other competitive systems. The company also provides several options for enhancing network scanning, such as a Thumbnail Preview option so that thumbnails of scanned documents are displayed on the touch screen. Similarly, with Xerox's optional SMARTSend software, users can automate complex document workflows, making the scanning and distribution process faster and easier, a key capability when large volumes of documents are regularly scanned.

The WorkCentre was fully configured in testing, which included the base configuration ($13,799), network scanning ($1,400), Group 3 fax ($995) and Professional Finisher ($4,995). This would amount to a total suggested list pricing of $21,189 (customers would of course expect to spend less than this, as this is list pricing).

Considering the WorkCentre 7345's excellent performance in testing, well above-average office color image quality, exceptional ease of use, exceptional management capabilities, IT friendliness, and network-scanning enhancements, BERTL highly recommends the Xerox WorkCentre 7345 for offices, mid-size workgroups and enterprises that require a solid, very user-friendly, easy to manage mid-volume MFP for virtually any black-and-white and office-color print, copy or network-scanning application.

OFFICE

WHAT WE LIKED

- Users may scan and store electronic and scanned documents in password-protected user mailboxes in hard-drive memory for print-on-demand. Documents may be converted into various file formats, including encrypted PDFs and text-searchable PDFs. Encrypted PDFs may only be opened and read by authorized recipients. With text-searchable PDFs, their content may be searched for easy retrieval.

- As with Xerox's other WorkCentre units, the WorkCentre 7345 features an exceptionally easy-to-use, large color touch screen with large easy-to-read text. Indeed, it is the easiest touch screen to use among the many touch screens BERTL has evaluated. There are no complex and confusing sub-menus or cryptic instructions. Even novice users will be able to navigate the touch screen in just a matter of minutes.

- All Xerox WorkCentre products feature the most sophisticated, manageable, and easy to use color network-scanning system in the industry. Administrators may configure destination templates that automate the scanning process. The templates may be centrally stored on a network template repository (server) so that administrators can easily manage the scanning workflow processes at an enterprise level.

- Extensive real-time printer status is available from within the print driver. Many competitors require the use of an executable utility or a Web browser in order to achieve similar results. This means that with the WorkCentre 7345, users do not have to launch a Web browser or run a utility in order to see device readiness, paper levels, current print jobs, and toner levels. It also means that IT does not have to support the installation and use of yet another memory-resident utility (which many prefer not doing) on each user's workstation.

- Xerox's optional SMARTSend software provides automated scanning and document routing and workflow. In a single operation, users can configure (and save and recall) a workflow so that a scanned document is sent to multiple destinations.

- CentreWare Web provides advanced group management of Xerox and MIB-compliant third-party printers. With CentreWare Web, administrators can group, install, troubleshoot, upgrade and configure multiple network devices, eliminating having to individually perform these tasks for each device. The more network devices, the more time will be saved.

- While CentreWare Web is designed exclusively for managing and monitoring multiple network devices, CentreWare Internet Services provides easy and convenient management of just the WorkCentre 7345.

- Administrators can promote, delete and hold jobs in the CentreWare Internet Services' WorkCentre 7345 print-job queue.

- Xerox provides a variety of usage and accounting tools, including Auditron, Xerox Standard Accounting, and Color Access Via Active Directory. It also provides various third-party accounting solutions for comprehensive usage tracking and reporting.

- As with other Xerox network devices, the WorkCentre 7345 system as a whole represents the ultimate in convenience for users, administrators and IT staff as all installation, software and management processes are simple yet powerful, and of the highest quality.

- All Xerox WorkCentre's feature Microsoft Windows NT authentication system and LDAP-lookup. This makes security administration a much easier task for the IT staff.

- Optional ability to print files stored on USB Flash Drives (Thumbdrives), and, with optional convertors, print files stoared on SD memory cards.

WHAT WE WOULD LIKE TO SEE

- A dual-head document scanner so that duplex originals can be scanned in a single pass, without the inversion steps that significantly affect scanning/copying productivity.

- A removable hard drive would provide maximum security.

- Automatic wake-up from sleep mode when users insert originals into the document feeder or lift the platen cover. As it stands, the user must press the "Power Save" button to awaken the device.

- Users should be able to manually place the device into power-save mode by pressing the "Power Save" button. As it stands, the device reverts into power-save mode after a preset period of non-use.

About BERTL -

The success of an organization depends on its ability to manage its information and assets. An effective workflow process requires the complex integration of information, devices, software, and people.

IT managers, office managers, and other knowledge-management professionals need to know what digital imaging devices would best serve their specialized workflow processes.

BERTL's services are designed around this real-world framework, delivering business consumers the independent analysis and insight needed to make critical decisions about digital imaging's role in their organization.

Independent Analysis and Insight

BERTL's reports, comparative data, and strategic guides look at digital imaging through the eyes of the business user. The research examines not only the technical features, but also vertical market applications, and business benefits. The impact on worker productivity is a primary concern.

BERTL is 100 percent independent. It receives no funding from manufacturers and all product evaluations and reports are published at BERTL's own expense for its subscribers. Business users worldwide trust BERTL for objective, unbiased analysis of digital imaging systems.

BERTL Services

Reports and Star Ratings
BERTL analysts provide detailed reports on the technical and practical benefits of thousands of color and monochrome workgroup, office, graphic arts, and production devices.

Product Specifications
DataCheck Gen II provides the most current competitive data on printers, copiers, MFPs, fax devices, wide format printers, scanners, and more.

News, Interviews, and Analysis
The ITchat online magazine provides insight into the dynamics and trends of the digital imaging marketplace through interviews, feature articles, and software reviews.

BERTL Awards
BERTL analysts recognize the leading devices and software solutions in the annual BERTL's Best awards. BERTL also honors the performance of manufacturers in the annual Readers' Choice selections.

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