BERTL

EXCEPTIONAL

Xerox WorkCentre 5655

55-ppm Monochrome

Print ▪ Copy ▪ Scan ▪ Fax

100% Independent Analysis

www.bertl.com

July 2008

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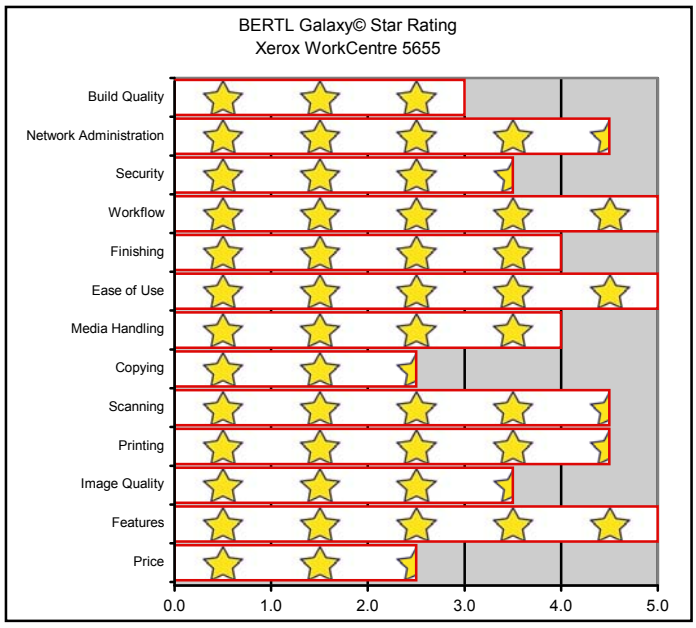
OFFICE



ABOUT BERTL'S GALAXY© STAR RATING

BERTL understands how difficult it is to choose one office-imaging device over another and exists to make this an easier choice for the consumer. That said, how does a consumer decide between two or more devices that carry the same BERTL 3-, 4- or 5-star rating?

Category-Criteria

Build Quality - An analysis of the construction quality of the major components that the user must interact with on a regular basis (e.g.: paper trays, access covers, supplies, etc.).

Network Administration - The quality of administrative and management utilities (both executable and Web-based) when compared to that of a sliding scale benchmark based on the network administration feature set of other vendors.

Security - A security feature-set analysis (removable hard disk, hard-disk overwrite, encryption, IP filtering, Microsoft Windows NT Authentication and LDAP lookup) when compared to a sliding scale benchmark based on the security feature set found on other devices.

Workflow - The quality of the network scanning, job submission, document management, sharpening and enhancement, file conversion and job layout tools based on a sliding scale benchmark when compared to the workflow tools employed by other devices.

Finishing - The productivity penalty (punch, staple, booklets) based on tests and finishing specifications and effectiveness based on a sliding scale benchmark when compared to that of other finishing systems found on other devices.

Ease of Use - Ease of maintenance (adding paper, toner, misfeeds, cleaning) and ease of using the documentation, help, control panel, print drivers and client utilities when compared to a sliding scale benchmark based on of the ease of use of other devices.

Media Handling - Throughput specifications and evaluations based on a sliding scale benchmark when compared with the handling of special media (e.g.: oversize, thick or coated stock) found on other devices.

Copying - Copy productivity based on tests and a feature-set analysis when compared to a sliding scale benchmark based on the feature set found on other devices.

Scanning - Simplex and duplex scan productivity and quality based on tests and a comparison of the overall scan and send feature set when compared to a sliding scale benchmark based on the feature set found on other devices.

Printing - Duplex and simplex print productivity based on tests and a printing feature set analysis when compared to a sliding scale benchmark based on the feature set found on other devices.

Image Quality - The quality of business color images (text, dot, line, halftone and solid quality) based on tests and a subjective rating on the quality of continuous tones (photos) when compared to a sliding scale benchmark based on the continuous tone quality produced by other devices.

Features - The feature set compared to a sliding scale benchmark based on the feature set found on other devices.

Price - MSRP of a system configured with network printing, copying, scanning, and two media trays/rolls (wide format) configuration.

Introduction

In August 2007, Xerox expanded its line of black-and-white office MFPs with six new WorkCentre 5600 Series systems with speeds ranging from 32 to 87 ppm, and total paper capacities of up to 8,700 sheets. The WorkCentre 5600 MFPs are among the company's newest and fastest MFPs, and incorporate the company's Extensible Interface Platform (EIP). EIP is based on Web standards and allows software developers, as well as customers, to quickly and easily create applications tailored to address specific business challenges, such as automating routine document scanning and storage tasks.

BERTL recently tested the WorkCentre 5655, which at 55 ppm, is the mid-range unit in the WorkCentre family. The WorkCentre 5655, which has a list price of $17,000 (print controller is optional) is designed for mid- to higher-volume general office applications.

In its standard configuration, the WorkCentre 5655 is a digital copier that comes equipped with Xerox SMart Controller Architecture, which enables the device to perform five tasks at once: RIP (raster image process), receive, program ahead, process queue and transmit. The WorkCentre 5655's controller is built on the company's SMart Controller Print System, which in turn is based on a powerful 1.4 GHz AMD Athlon CPU, and includes PCL 5, PCL 6 and PostScript 3 print drivers for both Microsoft Windows, Apple Macintosh, Solaris, Linux, HPUX and IBM AIX platforms.

For network and device management, Xerox provides its CentreWare Web Software Suite. With CentreWare Internet Services, administrators and users can quickly obtain system and consumables' status, and administers can configure system and network settings, as well as manage access and accounting controls. The WorkCentre 5655 also offers extensive finishing options that include C- and Z-folding and post-process sheet insertion. Scan-enabled models enable users to create searchable Adobe PDF and XPS files.

Xerox's advanced MFP security features protect the document, the device and the transmission path, and are available on all new WorkCentre multifunction systems. Encrypted Disk and Image Overwrite feature can be used to automatically delete latent images record on the hard drive upon job completion or on demand.

In the following test report, BERTL takes an in-depth look at the WorkCentre 5655, testing and evaluating its productivity, image quality, workflow and ease-of-use.

Xerox WorkCentre 5655 - Features Summary	
List Price	$17,000
Imaging Technology	Laser, electrostatic
Standard Functions	Digital Copier
Optional Functions	Network Printer, Network Scanning, LAN Fax
Maximum Monthly Print Volume	200,000 pages
Mono Print Speed	55 ppm
Color Print Speed	Not Applicable
Mono First Page Out Time	3.4 secs.
Color First Page Out Time	Not Applicable
Automatic Duplex	Yes
Network Scanning	Yes
Color Scanning	No
NT Authentication	Yes
LDAP Compatibility	Yes
Hard Disk Overwrite	Yes

The Xerox WorkCentre 5655 as tested by BERTL.

PPRICING

Xerox WorkCentre 5655 - Pricing	
List Price	$17,000
Print Controller Options	Upgrade Kit to Printer; Upgrade Kit to Printer/Scanner
Network Interface Options	Wireless Ethernet (IEEE802.11a/b/g) via third party adapter; Parallel Port Kit (Copier/Printer option); Token Ring (via adapter)
Media Input Options	High Capacity Tandem Tray (3,600 sheets - 8.5" x 11"); High Capacity Feeder (4,000 sheets - 8.5" x11"); HCF Kits (2,000 sheets - 11"x17"); HCF Kits (2,000 sheets – 8.5"x14"); Envelope Tray Kit for Tray 2 (50 envelopes)
Finishing Options	Office Finisher (2,000 + 250-sheet drawers ($2,500); Professional Finisher (1,500 + 250-sheet drawers ($4,600); High Volume Finisher (HVF) (3,000 + 250-sheet drawers ($6,250); High Volume Finisher w/Booklet Maker ($6,250), Z Fold / C Fold Unit with HVF w/Booklet Maker; Post Process Inserter with HVF and HVF w/Booklet Maker (adds pre-printed inserts); Convenience Stapler (50-sheet stapling)
Software Options	Biscom FAXCOM for Xerox, Captaris RightFax, Castelle FaxPress, Control Systems Copitrak System, Equitrac Express, Equitrac Office, Equitrac Professional, Gravic Remark Office OMR, Omtool AccuRoute, Pharos Uniprint, Blueprint, and Omega, Reportée SmartCover, RSA QDirect, Streem Alert, Streem Connect, Streem Fax, Xerox CentreWare for CA Unicenter, Xerox CentreWare for HP OpenView, Xerox CentreWare for IBM Tivoli NetView, Xerox CentreWare for Microsoft Operations Manager, Xerox CentreWare for Microsoft System Center Operations Manager, Xerox CentreWare for Novell NDPS, Xerox Copier Assistant, Xerox Device Templates for HP Output Management Product Suite, Xerox DocuShare, Xerox DocuShare CPX, Xerox Plug-ins for HP Web Jetadmin, Xerox Secure Access Unified ID System, Xerox SMart eSolutions, Xerox SMARTsend 2.1 (includes 5 device licenses), Xerox SMARTsend 2.1 Pro (includes 5 device licenses), xl print Paris, X-Solutions ScanFlowStore (includes 1 device license), X-Solutions ScanFlowStore 1 additional device license, X-Solutions ScanFlowStore annual maintenance for each additional device license, X-Solutions ScanFlowStore annual maintenance for first software license, X-Solutions ScanFlowStore Barcode Module, X-Solutions ScanFlowStore Lotus Notes Connector, X-Solutions ScanFlowStore Xerox DocuShare Connector
Print/Copy Management Options	Internal Auditron – Copy; Xerox Standard Accounting – Copy, Print, Fax, Optional: Network Accounting enablement thru 3rd Party)
Other Options	Duplex Automatic Document Handler (100 sheets); 300-sheet Offset Catch Tray ($400); Stand

SPECIFICATIONS

Print	
Black Print Speed	55 ppm
Color Print Speed	Not Applicable
Black First Page Out Time	3.4 sec.
Color First Page Out Time	Not Applicable
Print Controller	Xerox
CPU	1.4 GHz AMD Athlon dedicated
RAM and Hard Drive	128 MB (1,024 MB max) 80-GB shared hard drive
Operating Platforms	MS Win 2000, XP, Server XP, Server 2003, Server 2003 64-bit, Vista, Vista 64-bit; Apple Mac OS: 8.x, 9.x, 10.3 and higher
Standard Print Drivers	PCL 6, PCL 5e, PostScript 3 emulation
Optional Print Drivers	None
Standard Interfaces	Ethernet 10/100BaseT, 10BaseT, 10Base2 (IEEE802.5); USB 2.0

Copy	
Black Copy Speed	60 ppm
Color Copy Speed	Not Applicable
Black First Copy Out Time (Platen/DF)	3.4 sec.
Color First Copy Out Time (Platen/DF)	Not Applicable
Job Build	Yes
Scan Ahead Copy	Unlimited
Copy Job Programs	Yes
Customizable Menus	Yes

Copy	
Max/Min Zoom Ratio	25-400%/1% increments
Cover Insertion	Yes
Sheet Insertion	Yes
Page Stamp Options	Yes

Scan	
Maximum Scan Speed (B/W)	85 ipm
Maximum Scan Speed (Color)	Not Applicable
Connectivity Options	Wireless Ethernet (IEEE802.11a/b/g) via third party adapter; Parallel Port Kit (Copier/Printer option); Token Ring (via 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	Yes
Scan to External Memory Source (Optical Drive/USB/SD card)	No
Network Authentication	Yes
LDAP Lookup	Yes
File Formats Supported	Adobe PDF, high-compression Adobe PDF, searchable Adobe PDF, JPEG, TIFF, multi-page TIFF, XPS
Encrypted PDF Format	No
Ad hoc Subject Line Entry	Yes
Ad hoc Message Line Entry	Yes
Ad hoc File Name Entry	Yes
QWERTY-Style Input Keypad	Yes

Maintenance	
Black Toner Yield*	32,000 pages
Color Toner Yield*	Not Applicable
Fuser Life	400,000
Developer Life	Information Not Available

Maintenance	
User Replaceable Drum?	Yes
User Replaceable Waste Container?	Yes
User Replaceable Original/Paper Feed Rollers?	No

*Manufacturer's stated yield based on 5% page coverage.

Media Handling: Input	
Standard Media Capacity	1,100 sheets: 100-sheet bypass tray, 2x500-sheet paper drawers
Optional Media Supplies	High Capacity Feeder (4,000 sheets - 8.5" x11"); HCF Kits (2,000 sheets - 11"x17"); HCF Kits (2,000 sheets – 8.5"x14"); Envelope Tray Kit for Tray 2 (50 envelopes)
Maximum Media Capacity	8,700 sheets
Maximum Media Size (main trays)	11"x17"
Minimum/Maximum Media Weight (main trays)	2x500-sheet drawers: 16 to 53 lb. bond/110 lb index (60 to 200 gsm)
Maximum Media Size (bypass)	11"x17"
Minimum/Maximum Media Weight (bypass)	16 lb to 57 lb bond/80 lb. cover (60 to 216 gsm)
Minimum/Maximum Media Weight (duplex)	DADF:13 lb to 32 lb. bond (50 to 120 gsm)

Media Handling: Output/Finishing	
Standard Output Tray Capacity	Info. not available
Output Option(s)	Office Finisher (2,000- + 250-sheet drawers); High Volume Finisher: (3,000- + 250-sheet drawers); HVF with Booklet Maker: (3,000- + 250-sheet drawers); Z-Fold/C-Fold unit option for HVF with Booklet Maker; Post Process Inserter option for HVF and HVF with Booklet Maker; Convenience Stapler
Maximum Stapling Capacity	100 sheets
Maximum Stacking Capacity	3,000-sheet stacking, plus 250-sheet top tray with High Volume Finisher
Maximum Saddle-Stitch Capacity	15 sheets (60-page booklets)

Media Handling: Output/Finishing	
Hole-Punch Option(s)	Yes
Physical Mail Bin Option(s)	No
Folding Option(s)	Yes
Post Process Inserter Option(s)	Yes
PPI Capacity	250-sheets

FEATURES

Accessibility	
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	Yes*
Voice-recognition software	Yes*
Additional accessibility features	Yes*
Control panel tilts?	Yes

* Xerox provides optional software utilities for disabled users with its Copier Assistant Software Kit. This software enables users to remotely operate the control panel from a computer workstation. An enlarged touch screen provides easier visibility, while the embedded text-to-speech software talks the user through the copying steps, including advanced tasks such as stapling, collating and two-sided copying.

Security	
Hard-Drive Overwrite	Yes
Removable Hard Drive	No
Private Print	Yes
Encrypted Printing	Yes
Secure Fax	Yes
Encrypted PDF Send	No
Network Authentication	Yes
LDAP Authentication	Yes
Kerberos Authentication	Yes
SNMP	Yes
IPv6	Yes
SSL/TLS	Yes
IP Filtering	Yes
MAC Filtering	No

Security	
Other Security Features	Analog Fax Isolation, Follow-You Printing, IPSec, Xerox Secure Access Unified ID System

Batch-Printing	
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

Print-on-Demand	
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?	No
Document Images (incl. thumbnails) Provided on the Desktop?	No
Multiple Jobs Can Be Combined and Printed as One Finished Job?	Yes
Stored Jobs Can Be Edited After Storage?	No

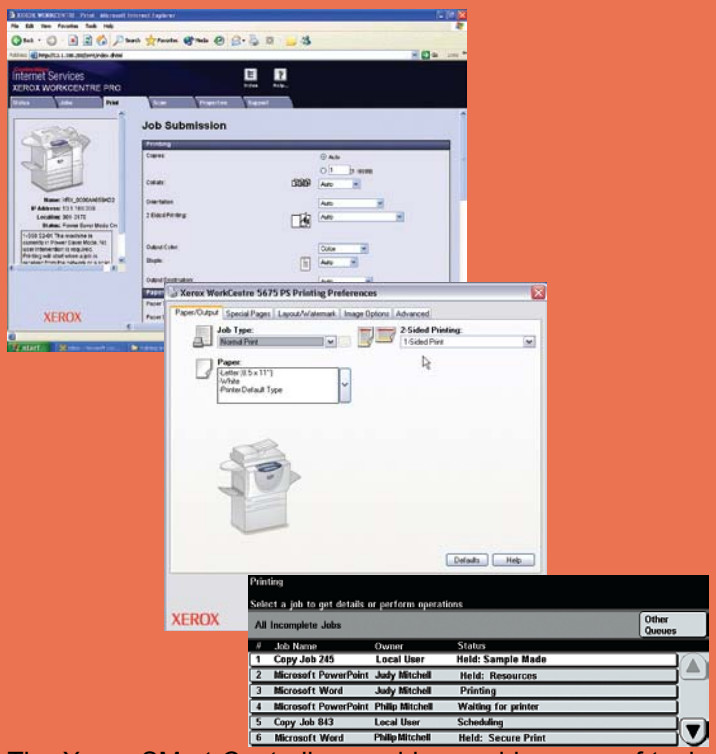
SOFTWARE

Client Software	
Print Drivers	PCL 6, PCL 5e, PostScript 3 emulation
Client Software	CentreWare Internet Service
Desktop Software	Monitoring System Status
Other Software	Xerox FreeFlow SMARTsend, Xerox Scan to PC Desktop, Xerox Barcode Pro PS

Device-Management Software	
Web-based device monitoring	CentreWare Internet Services (detailed status checks on the system and consumables, administer system settings, and manage access and accounting

Device-Management Software	
	controls.), Xerox CentreWare Web (network and device management)
Executable-based device monitoring	Yes
Group management of network devices	Yes
Monitor 3rd-party MIB-compliant network devices	Yes
HP Web JetAdmin compatible	Yes
Other Software	Xerox Secure Access Unified ID System, Xerox CentreWare for Unicenter TNG, Xerox CentreWare for Tivoli NetView, Xerox CentreWare for HP OpenView, Xerox Smart eSolutions MeterAssistant and SuppliesAssitant , Xerox Secure Access Unified ID System, Xerox Device Types for SAP R/3 Environment

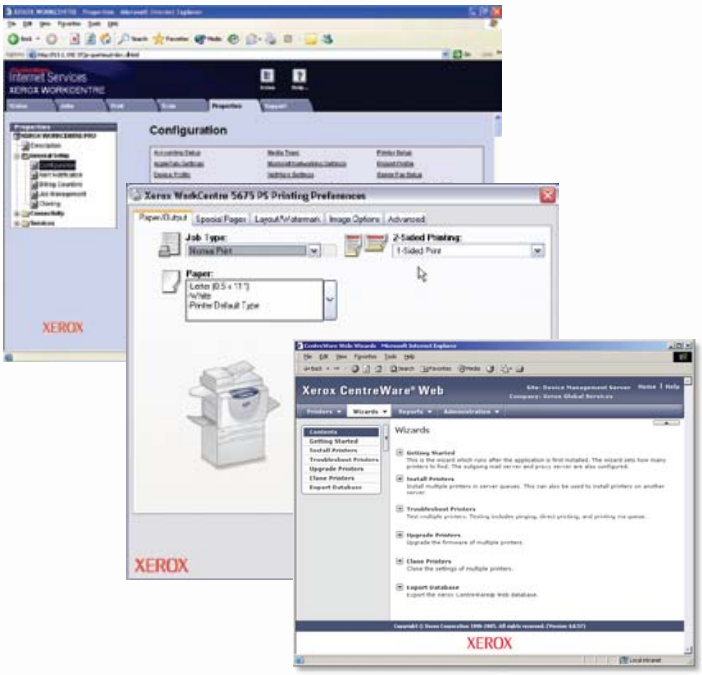
PRODUCT HIGHLIGHTS



The Xerox SMart Controller provides a wide range of tools the help users monitor device, job and consumables status at their computer desktops, at the device, and over the Internet when submitting job to the WorkCentre 5655.

Additional functions include:

- Simple and easy print job submission directly from a Web browser, and which also enables users to specify job attributes such as stapling, duplexing, and delay print.
- Job Queue Management at the device or desktop shows all jobs (copy, print, fax and scan) so users see what's printing and where their jobs are at all times. Users also have the ability to promote, release or delete a job from the queue.
- Bi-directional print drivers indicate current device.
- With "print around" capability, the system holds any jobs requiring additional resources (such as a different paper size) and prints the next job in the queue. This function allows the device to keep working and maintaining consistent productivity, while preventing jobs being printed incorrectly.

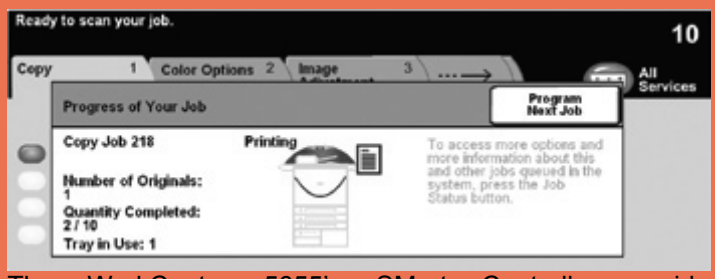


Xerox's CentreWare Internet Services makes it easy to remotely set up, monitor, use and maintain WorkCentre MFPs from any workstation securely using HTTPS-secure device administration.

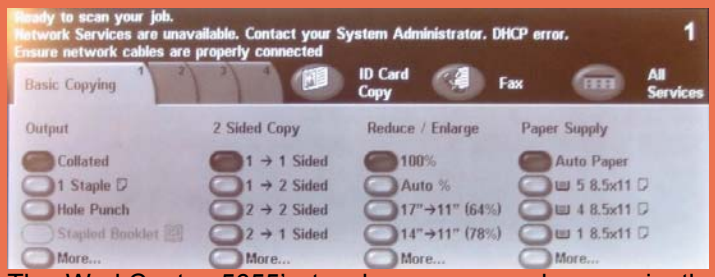
Xerox Standard Accounting allows administrators to track all device usage (copy/print/fax/scan) without any third-party software or peripherals. Administrators can run reports directly from the Web interface to determine a particular device's usage.

With CentreWare Web, administrators can manage an entire enterprise-wide print environment from a single Web interface. It provides the information and control needed to anticipate problems, reduce machine downtime, minimize user frustration and reduce calls to IT staff.

SMart eSolutions provides administrators with automatic secure automatic meter reads and supply replenishment information.



The WorkCentre 5655's SMart Controller avoids bottlenecks at the front panel by providing multitasking functionality. This means users don't have to wait until a long print job is completed to program a fax, scan or copy job. Newly programmed copy jobs will join the job queue and be executed when earlier jobs are completed.



The WorkCentre 5655's touch screen panel conveniently displays frequently used copying options on a single screen.

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 Sizes

	Native File Size	PCL	PS
1-page digital photo PDF	4.48 MB	4.87 MB	17.0 MB
4 page Passport Form PDF	0.08 MB	.64 MB	0.50 MB
16-page Magazine in PDF	1.78 MB	6.70 MB	13.20 MB
22-page Excel Worksheet	0.12 MB	1.50 MB	1.44 MB
32-page Text-Based PowerPoint	0.23 MB	6.25 MB	6.25 MB
32-page Graphic Intensive PowerPoint	4.20 MB	13.8 MB	13.8 MB
38-page Form Word Document	0.91 MB	14.0 MB	13.5 MB
50-page Text-Based PDF	0.17 MB	5.27 MB	1.73 MB

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.

First Page Out Time (seconds)

Job List	Media Size	PCL	PS*
1-page photo print	Letter	16.43	18.28
4-page passport form PDF	Letter	11.82	10.69
16-page Magazine PDF	Letter	12.47	11.12
22-page Excel Worksheet	Letter	11.28	11.94
32-page text-based PowerPoint	Letter	10.50	10.46
32-page graphic-intensive PowerPoint	Letter	11.97	10.44
38-page Word form	Letter	11.44	11.15
50-page text-based PDF	Letter	11.47	10.75
50-page text-based PDF (duplex)	Letter	14.03	13.22

* Visual PostScript driver.

Job Time (seconds)				
Job List	**Media Size**	**Mode**	**PCL**	**PS**
1-page digital photo print original	Letter	1:1	16.43	18.28
4-page passport form PDF	Letter	1:1	16.00	15.50
16-page Magazine PDF	Letter	1:1	31.81	28.85
22-page Excel Worksheet	Letter	1:1	46.22	39.72
32-page text-based PowerPoint	Letter	1:1	49.35	49.90
32-page graphic-intensive PowerPoint	Letter	1:1	52.00	52.16
38-page simplex Word form	Letter	1:1	53.28	54.28
50-page text-based PDF	Letter	1:1	64.16	62.22
50-page duplex text-based Adobe PDF	Letter	1:2	66.82	64.87

Simplex PCL Print Productivity Black-and-White Text (Pages Per Minute)								
	SETS							
PAGES	**1**	**3**	**5**	**10**	**20**	**30**	**40**	**50**
1	5.2	13.2	19.0	28.4	37.6	42.2	44.9	46.8
2	9.6	21.4	28.4	37.6	44.9	48.1	49.8	50.9
3	13.2	26.9	33.9	42.2	48.1	50.4	51.6	52.4
4	16.3	30.9	37.6	44.9	49.8	51.6	52.6	53.2
5	19.0	33.9	40.2	46.8	50.9	52.4	53.2	53.7
6	21.4	36.3	42.2	48.1	51.6	53.0	53.6	54.1
7	23.4	38.2	43.7	49.0	52.2	53.3	53.9	54.3
8	25.3	39.8	44.9	49.8	52.6	53.6	54.2	54.5
9	26.9	41.1	45.9	50.4	53.0	53.9	54.3	54.6
10	28.4	42.2	46.8	50.9	53.2	54.1	54.5	54.7
20	37.6	48.1	50.9	53.2	54.5	54.9	55.1	55.3
30	42.2	50.4	52.4	54.1	54.9	55.2	55.4	55.4
40	44.9	51.6	53.2	54.5	55.1	55.4	55.5	55.5
50	46.8	52.4	53.7	54.7	55.3	55.4	55.5	55.6

Duplex PCL Print Productivity Black-and-White Text (Pages Per Minute)								
	SETS							
PAGES	**1**	**3**	**5**	**10**	**20**	**30**	**40**	**50**
1	4.3	11.1	16.3	25.1	34.4	39.2	42.2	44.2
2	7.9	18.4	25.1	34.4	42.2	45.6	47.6	48.8
3	11.1	23.7	30.6	39.2	45.6	48.3	49.7	50.6
4	13.8	27.6	34.4	42.2	47.6	49.7	50.8	51.5
5	16.3	30.6	37.1	44.2	48.8	50.6	51.5	52.1
6	18.4	33.0	39.2	45.6	49.7	51.2	52.0	52.5
7	20.4	35.0	40.8	46.7	50.3	51.7	52.4	52.8
8	22.1	36.6	42.2	47.6	50.8	52.0	52.6	53.0
9	23.7	38.0	43.3	48.3	51.2	52.3	52.8	53.2
10	25.1	39.2	44.2	48.8	51.5	52.5	53.0	53.3
20	34.4	45.6	48.8	51.5	53.0	53.5	53.8	53.9
30	39.2	48.3	50.6	52.5	53.5	53.9	54.0	54.1
40	42.2	49.7	51.5	53.0	53.8	54.0	54.2	54.2
50	44.2	50.6	52.1	53.3	53.9	54.1	54.2	54.3

Simplex PostScript Print Productivity Black-and-White Text (Pages Per Minute)								
	SETS							
PAGES	**1**	**3**	**5**	**10**	**20**	**30**	**40**	**50**
1	5.6	14.0	20.1	29.7	39.1	43.7	46.4	48.2
2	10.2	22.5	29.7	39.1	46.4	49.5	51.2	52.3
3	14.0	28.2	35.4	43.7	49.5	51.8	53.0	53.8
4	17.3	32.3	39.1	46.4	51.2	53.0	54.0	54.6
5	20.1	35.4	41.7	48.2	52.3	53.8	54.6	55.1
6	22.5	37.8	43.7	49.5	53.0	54.3	55.0	55.4
7	24.6	39.7	45.2	50.5	53.6	54.7	55.3	55.7
8	26.5	41.2	46.4	51.2	54.0	55.0	55.5	55.8
9	28.2	42.6	47.4	51.8	54.3	55.2	55.7	56.0
10	29.7	43.7	48.2	52.3	54.6	55.4	55.8	56.1
20	39.1	49.5	52.3	54.6	55.8	56.3	56.5	56.6
30	43.7	51.8	53.8	55.4	56.3	56.5	56.7	56.8
40	46.4	53.0	54.6	55.8	56.5	56.7	56.8	56.9
50	48.2	53.8	55.1	56.1	56.6	56.8	56.9	56.9

Duplex PostScript Print Productivity Black-and-White Text (Pages Per Minute)								
	SETS							
PAGES	1	3	5	10	20	30	40	50
1	4.5	11.7	17.1	26.2	35.6	40.5	43.5	45.5
2	8.4	19.4	26.2	35.6	43.5	46.9	48.9	50.1
3	11.7	24.7	31.8	40.5	46.9	49.5	51.0	51.9
4	14.6	28.7	35.6	43.5	48.9	51.0	52.1	52.8
5	17.1	31.8	38.4	45.5	50.1	51.9	52.8	53.4
6	19.4	34.3	40.5	46.9	51.0	52.5	53.3	53.7
7	21.3	36.3	42.2	48.0	51.6	52.9	53.6	54.0
8	23.1	37.9	43.5	48.9	52.1	53.3	53.9	54.2
9	24.7	39.3	44.6	49.5	52.5	53.5	54.1	54.4
10	26.2	40.5	45.5	50.1	52.8	53.7	54.2	54.5
20	35.6	46.9	50.1	52.8	54.2	54.7	55.0	55.1
30	40.5	49.5	51.9	53.7	54.7	55.1	55.2	55.3
40	43.5	51.0	52.8	54.2	55.0	55.2	55.4	55.4
50	45.5	51.9	53.4	54.5	55.1	55.3	55.4	55.5

WHAT WE LIKED

- Fast simplex PCL network-printer productivity of up to 55.6 ppm in testing.
- Fast duplex PCL network-printer productivity of up to 54.3 ppm in testing.
- Fast simplex PostScript network-printer productivity of up to 56.9 ppm in testing.
- Fast duplex PostScript network-printer productivity of up to 55.5 ppm in testing.
- Network-printer First Page Out Time (FPOT) as fast as 10.75 seconds in testing.

WHAT WE WOULD LIKE TO SEE

- Overall, BERTL was very satisfied with the WorkCentre 5655's printing capabilities.

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).

Above and below: The WorkCentre 5655's platen (above) and document feeder (below). The document feeder's cover can be opened for easy access to any misfeeds.

PRODUCTIVITY

Advertised speeds are always quoted using the simplest route—in-and-out of a device. Of course, users often apply finishing options, incorporate different media 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.

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 media from the shortest media route to the shortest available output destination. A separate test examines how adding finishing/output destinations affects productivity.

First Copy Out Time*	
	Black-and-White Mode
Number of Originals	Seconds
1 Simplex Original	8.97
2 Simplex Original (Duplex Model)	14.81

*Using the automatic document feeder.

Copy Job Time			
# of originals	**Monochrome Mode**	**Time In Seconds**	**CPM**
10	1 sided to 1 sided	18.75	32.0
10	1 sided to 2 sided	23.65	25.4
10	2 sided to 1 sided	56.41	10.6
10	2 sided to 2 sided	59.25	10.1

Simplex Black-and-White Copier Productivity (Pages Per Minute)								
	SETS							
Pages	**1**	**3**	**5**	**10**	**20**	**30**	**40**	**50**
1	6.7	16.2	22.5	32.0	40.5	44.5	46.7	48.2
2	11.9	25.0	32.0	40.5	46.7	49.3	50.6	51.5
3	16.2	30.6	37.2	44.5	49.3	51.1	52.1	52.7
4	19.6	34.4	40.5	46.7	50.6	52.1	52.8	53.3
5	22.5	37.2	42.8	48.2	51.5	52.7	53.3	53.7
6	25.0	39.4	44.5	49.3	52.1	53.1	53.6	53.9
7	27.1	41.0	45.7	50.0	52.5	53.4	53.8	54.1
8	29.0	42.4	46.7	50.6	52.8	53.6	54.0	54.2
9	30.6	43.5	47.5	51.1	53.1	53.8	54.1	54.3
10	32.0	44.5	48.2	51.5	53.3	53.9	54.2	54.4
20	40.5	49.3	51.5	53.3	54.2	54.6	54.7	54.8
30	44.5	51.1	52.7	53.9	54.6	54.8	54.9	54.9
40	46.7	52.1	53.3	54.2	54.7	54.9	55.0	55.0
50	48.2	52.7	53.7	54.4	54.8	54.9	55.0	55.1

Duplex Black-and-White Copier Productivity (Pages Per Minute)								
	SETS							
Pages	**1**	**3**	**5**	**10**	**20**	**30**	**40**	**50**
1	4.1	10.6	15.6	24.2	33.5	38.4	41.4	43.5
2	10.4	17.7	24.2	33.5	41.4	45.0	47.0	48.3
3	14.2	22.8	29.7	38.4	45.0	47.7	49.2	50.2
4	17.4	26.7	33.5	41.4	47.0	49.2	50.4	51.1
5	20.2	29.7	36.3	43.5	48.3	50.2	51.1	51.7
6	22.5	32.1	38.4	45.0	49.2	50.8	51.6	52.1
7	24.6	34.1	40.1	46.1	49.9	51.3	52.0	52.4
8	26.4	35.8	41.4	47.0	50.4	51.6	52.3	52.7
9	28.0	37.2	42.6	47.7	50.8	51.9	52.5	52.8
10	29.4	38.4	43.5	48.3	51.1	52.1	52.7	53.0
20	38.2	45.0	48.3	51.1	52.7	53.2	53.5	53.6
30	42.4	47.7	50.2	52.1	53.2	53.6	53.7	53.9
40	44.8	49.2	51.1	52.7	53.5	53.7	53.9	54.0
50	46.5	50.2	51.7	53.0	53.6	53.9	54.0	54.0

Document Feeder Productivity

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 Speed			
# of originals	**MONOCHROME MODE**	**Time In Seconds**	**OPM***
10	Simplex Originals	9.94	60.4
5	Duplex Originals	26.09	11.5
10	Mixed-Size Originals	30.85	19.4

*Originals per minute.

Document-Finishing Penalty				
# of originals	**Finishing Selection**	**Time In Secs**	**1 Set Time (Secs)**	**Penalty Per Set (Secs)**
10/5	Corner Staple	71.31	21.44	-0.05

WHAT WE LIKED

- Tested First Copy Out Time (FCOT) as fast as 8.97 seconds in simplex and 14.81 seconds in duplex copier mode.
- Simplex black-and-white copier productivity was as fast as 55.1 ppm printing BERTL's test documents. Duplex black-and-white copier productivity was slightly faster at 54 ppm.
- Minimal document-finishing penalty to copy jobs when performing corner stapling.
- Fast tested document-feeder speed of up to 60.4 originals per minute (opm).
- Standard account tracking (up to 2,150 User accounts, up to 5,925 general accounts, and 250 group Accounts).
- Optional Xerox account/tracking copy management options:, Internal Auditron – Copy; Xerox Standard Accounting – Copy, Print, Fax, (Optional: Network Accounting enablement thru 3rd Party)

WHAT WE WOULD LIKE TO SEE

- Overall, while the WorkCentre 5655 performed well in testing, we would like to see somewhat faster copier performance.

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.

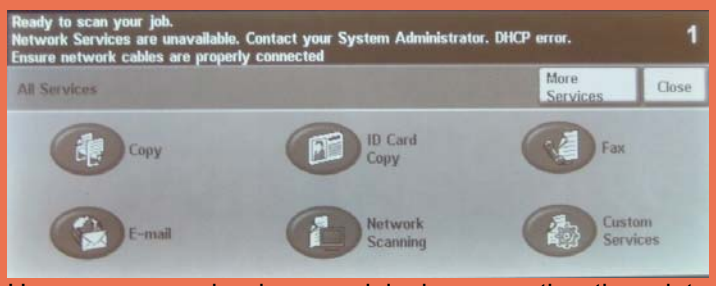
Security

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.

Device Contention	
Print slowdown when scanning copy job?	No
Print slowdown when scanning in scan job?	No
Print slowdown when scan-data transfer underway?	No



Users can scan hard-copy originals, converting them into electronic files, and then send them to e-mail addresses or to a folder on their network.

WHAT WE LIKED

- Files can be scanned or sent from the print driver to user boxes in the device's hard-drive memory. Files stored in the mailbox can then be printed at any time (print-on-demand), e-mailed, sent via fax, sent via Internet fax, or routed to a computer workstation, an FTP or SMB server, etc.
- No print slowdown when scanning in jobs or when scan-date transfer is underway
- Fast tested document-feeder speed of up to 60.4 originals per minute (opm).
- Support for a large number of file formats, including TIFF 6.0, TTN2 with JPEG, G3MH, G4 MMR, JPEG, PDF, XPS Format, MRC (optional), and Text Searchable PDF (optional)
- LDAP compatibility enables users to access the network address book, making destination-management chores easier for network administrators.
- Xerox' Extensible Interface Platform (EIP) permits the ultimate integration and customization of virtually any Xerox or third-party workflow application.

WHAT WE WOULD LIKE TO SEE

- Overall, BERTL was very satisfied with the WorkCentre 5655's network-scanning capabilities.

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

Density of Solid Areas*		
	Copy Density	**Print Density**
Black	1.54	1.52

*Density is on a scale of 0 to 2.5, with 2.5 being the best possible.

Copy & Print Resolution*				
	Copy Resolution		**Print Resolution**	
	Vertical	Horizontal	Vertical	Horizontal
Black	4.5	4.0	3	3

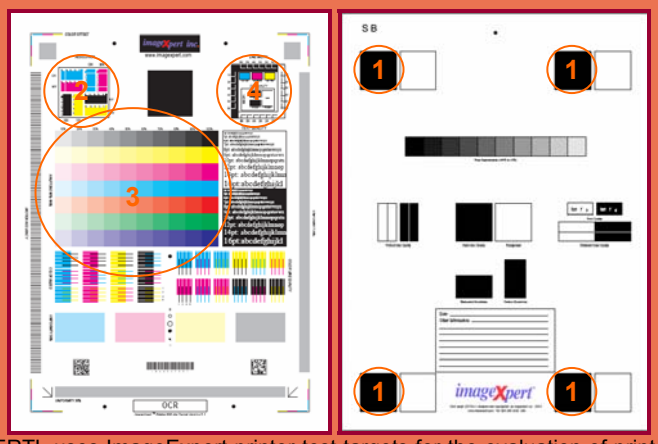
*Line Pairs per Millimeter. For copy resolution, higher is better (range, 2.0-8.0); for printer resolution, lower is better (range, 1.0-5.0).

Print Halftones		
	Min. Gradation*	**Max. Gradation****
Black	10	90

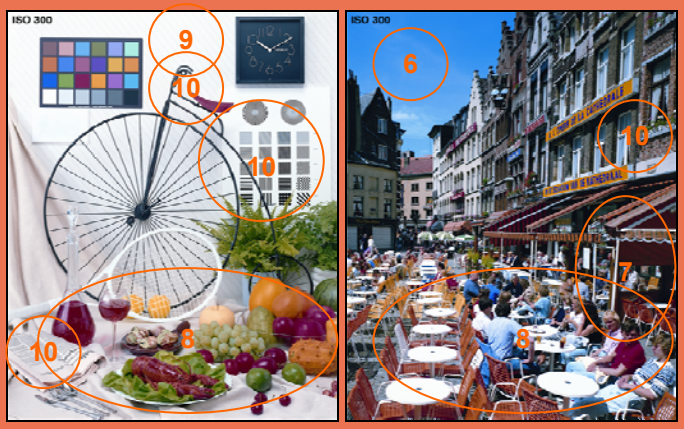
*Minimum gradation is on a scale of 10 – 100 percent in 10 percent increments. The best possible minimum gradation is 10 percent.
**Maximum gradation is on a scale of 10 – 100 percent in 10 percent increments. The best possible maximum gradation is 100 percent.

Copy Halftones		
	Min. Gradation*	**Max. Gradation****
Black	20	100

*Minimum gradation is on a scale of 10 – 100 percent in 10 percent increments. The best possible minimum gradation is 10 percent.
**Maximum gradation is on a scale of 10 – 100 percent in 10 percent increments. The best possible maximum gradation is 100 percent.



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).



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.

IMAGE QUALITY

Negative/Positive Lines*				
Line Width (points)	Negative		Positive	
	Vertical	Horizontal	Vertical	Horizontal
1	√	√	√	√
2	√	√	√	√
3	√	√	√	√
4	√	√	√	√
5	√	√	√	√
6	√	√	√	√

A "√" mark indicates the device was able to print the line width correctly. *Chart cells containing an "x" indicate that the printer was not able to print the line width correctly. Overall, the fewer "x's," the better the image quality. If no cells are marked with an "x," then the device was able to print all line widths correctly.

Negative/Positive Dots*	
Line Width (points)	% of Dots Printed
1 pixel Black	80
1 pixel Black Neg	80
2x2 pixel Black	100
2x2 pixel Black Neg	100
Checkerboard apparent?	No

*On a scale of 0 – 100%. The higher the percentage, the better.

WHAT WE LIKED

- Output displayed competitive overall business image quality.
- Output displayed good copy resolution, and average-to-good printer resolution.
- Output displayed good print density in both copier and printer modes.
- Output displayed above-average production of halftones in both printer and copier modes, as the device was able to correctly print and copy nine out of 10 shades in BERTL's image-evaluation chart.
- Output displayed very good line and dot control when printing BERTL's image-quality evaluation chart.

WHAT WE WOULD LIKE TO SEE

- Overall, BERTL was satisfied with the Xerox WorkCentre 5655's image quality.

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.

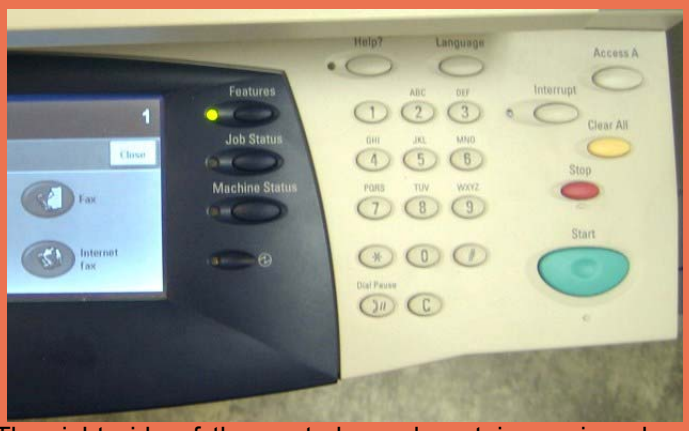
Among touch screens, some utilize a menu-driven system, while others utilize an icon-based system. Some menu-driven touch screens can involve many complicated sub-menus that can be difficult to navigate.

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.

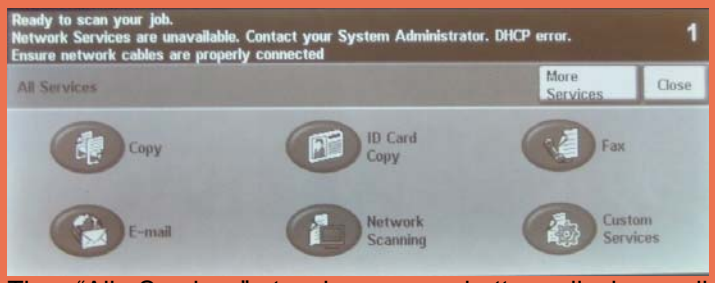
A control panel's ease of use—or lack of—can often have a significant affect on user productivity. The harder it is to select frequently used options such as duplexing, document finishing, etc., the more time the user has to spend programming the device and the less productive they are. In the chart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

Selections Required for Frequently Used Copy Functions	
Corner Staple	1
1:2	1
2:2	1
Photo Mode	3
Copied Front and Rear Covers	6

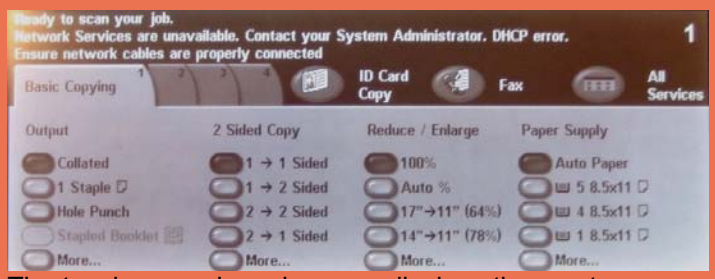
The WorkCentre 5655's Control Panel consists of a touch screen and hard keys.



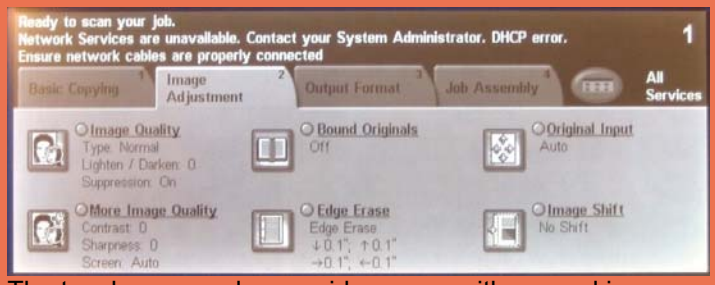
The right side of the control panel contains various hard keys, including keys for "Start," Stop," etc. as well as a numerical keypad for entering number of copies and fax numbers, keys for switching between different functions (copy, scan, fax, etc.), and hard keys for displaying job status and machine status.



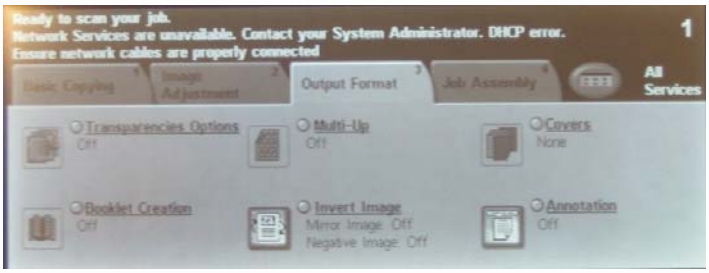
The "All Services" touch screen button displays all available functions.



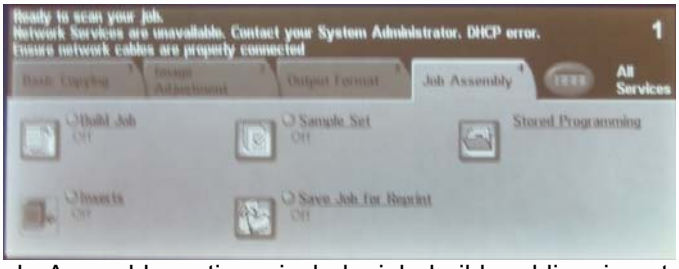
The touch screen's main menu displays the most common copying choices. The bold buttons on the touch screen display currently selected settings.



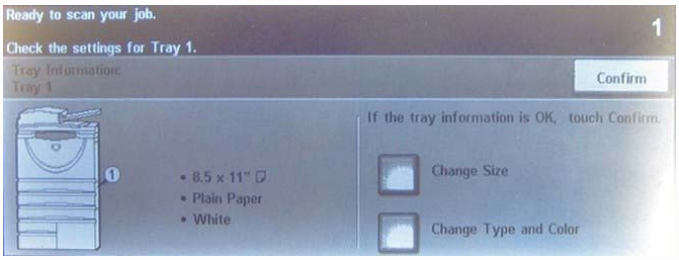
The touch screen also provides users with several image-adjustment options.



The Output Format tab provides options for transparency interleaving, booklet-making, adding covers, etc.



Job Assembly options include job build, adding inserts, printing a Sample Set, storing programming, and saving jobs in hard-drive memory for print-on-demand.



Whenever paper is changed in the paper sources, the touch screen prompt the users to confirm the paper size and type.

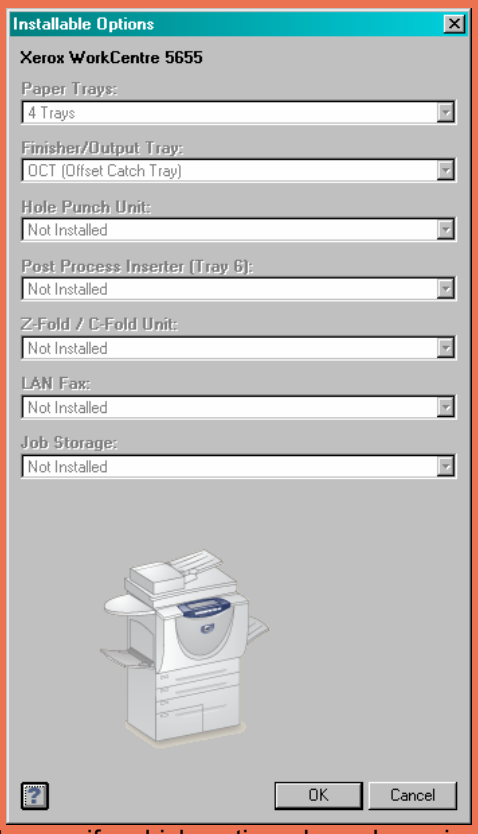
PCL AND POSTSCRIPT DRIVERS

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.

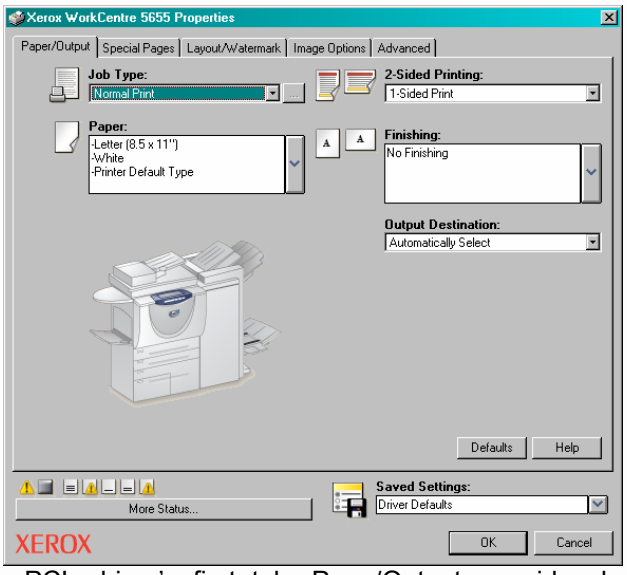
Most vendors provide an emulation of PCL (printer control language) developed by the Hewlett-Packard Company. Some may also provide an emulation of PostScript, developed by Adobe Systems Incorporated, or they may license PostScript directly from Adobe. While the Adobe PostScript driver is not the most 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.

Print-Driver Checklist	
Do print drivers have identical user interfaces?	Yes
Are print drivers interfaces identical to other vendor models?	Yes
Bidirectional communication within print drivers?	Yes
Auto device configuration from within print driver?	Yes
Does print-driver installation require rebooting of the workstation?	No
Are print-driver deployment processes included?	Yes
Are print-driver deployment guidelines and procedures included?	Yes

PCL PRINT DRIVER



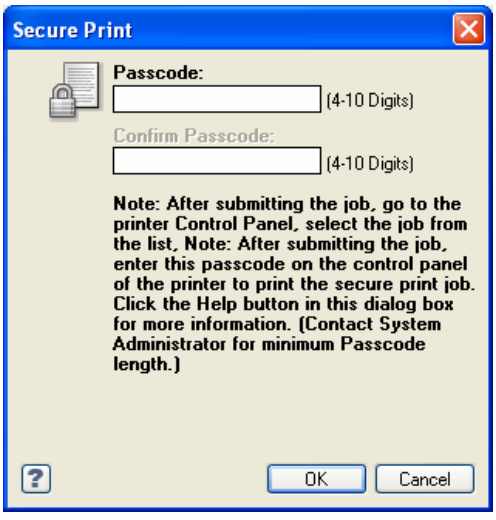
In order to specify which options have been installed, as well as specify system defaults, administrators first access the "Printers and Faxes" folder via the Microsoft Windows' Start menu, and then select the WorkCentre 5655's PCL driver. Administrators can "manually" specify which options are installed, or they may simply enable "Bi-Directional Communication" between the device and the driver, and installed options will automatically appear available for use in the print driver.



The PCL driver's first tab, Page/Output, provides basic options such as portrait/landscape orientation, paper size, reduction/enlargement, etc. The options shown in each section indicate the currently selected options.

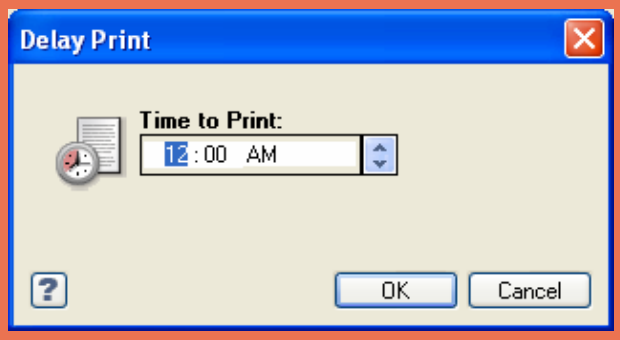
In the "Job Type" drop-down menu in the top left are options for Normal Print, Secure Print, Sample Set, Delay Print, and Saved Job:

- Normal Print: Prints the job immediately without requiring a passcode.
- Secure Print: Prints the job only after the user enters their passcode at the printer's control panel.

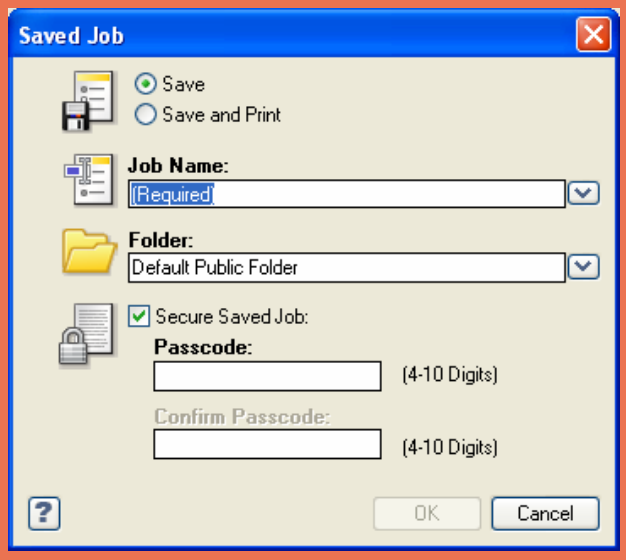


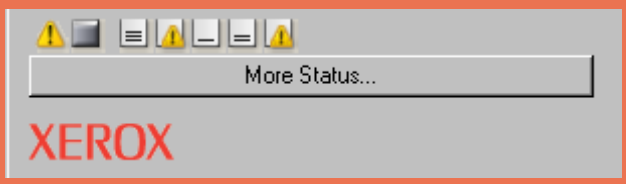
- Sample Set: Prints one copy of the job as a sample and holds the remaining copies of the job at the printer until the user releases them from the printer's control panel.

- Delay Print: Prints the job at the time the user specifies. When this job type is selected, the Delay Print dialog box appears so users can specify the time to print.

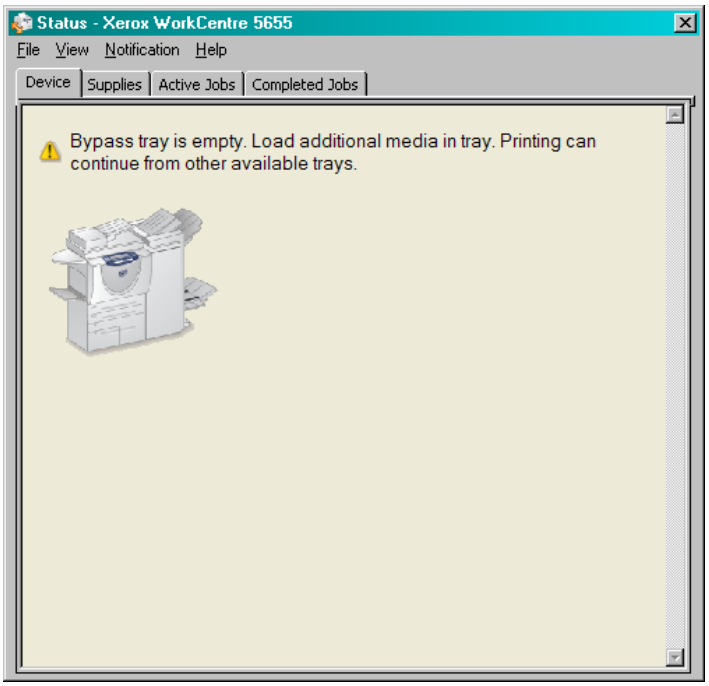


- Saved Job: Stores the job on the printer's hard drive so that it can then be printed on demand from the printer's control panel, or printed from CentreWare Internet Services. When this job type is selected the Saved Job dialog box appears, prompting the user to assign a job name and, if desired, print it and save it.

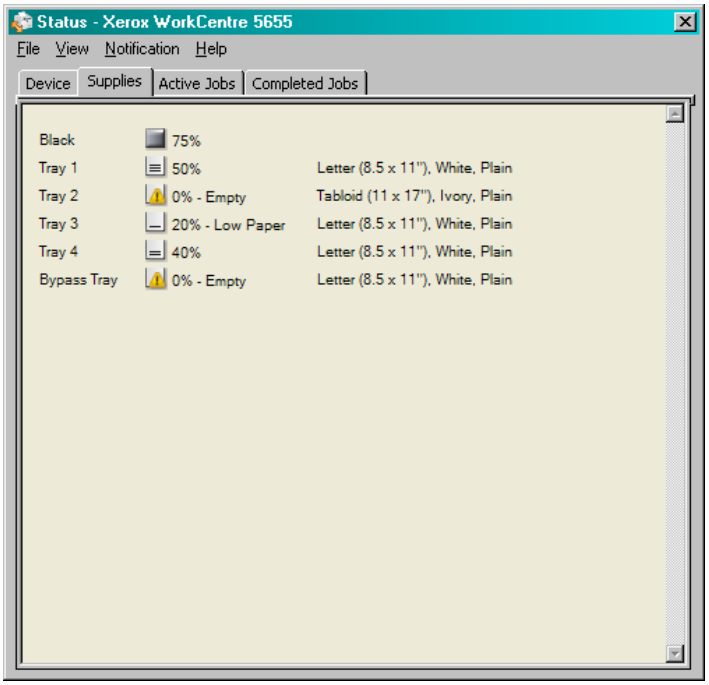




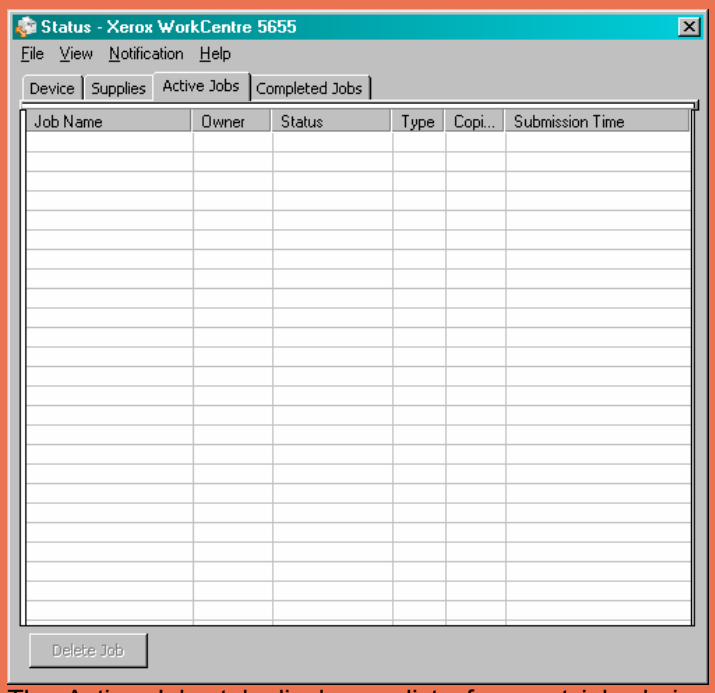
On the bottom of the screen several status icons are displayed alerting users of the device status. When the user selects "More Status," a Status dialogue screen appears (see below).



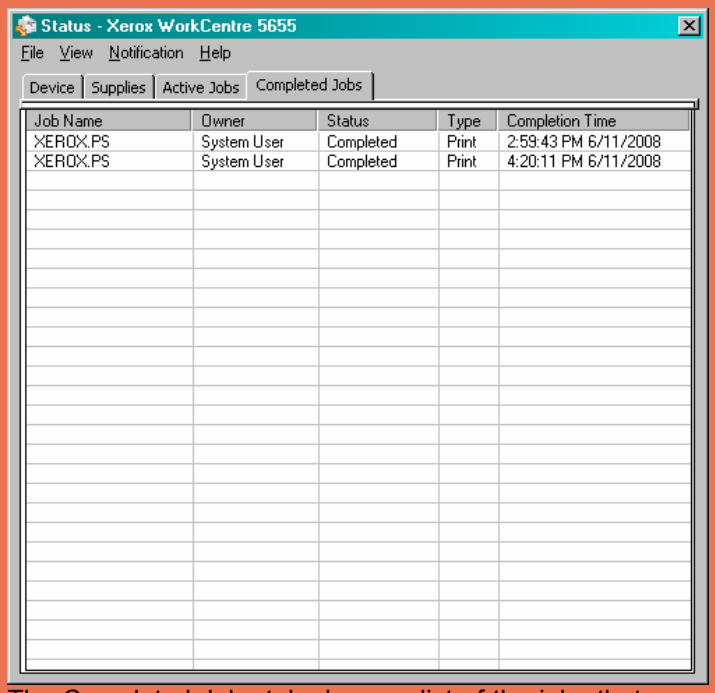
The Status dialogue screen displays the current device status, and alerts users when paper drawers require attention or are running low on paper.



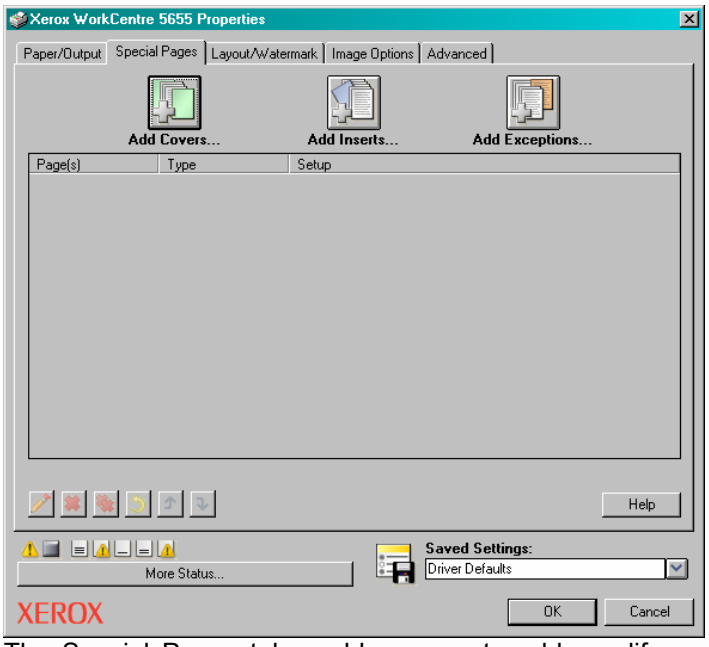
The Supplies tab displays a percentage estimate of the remaining supplies.



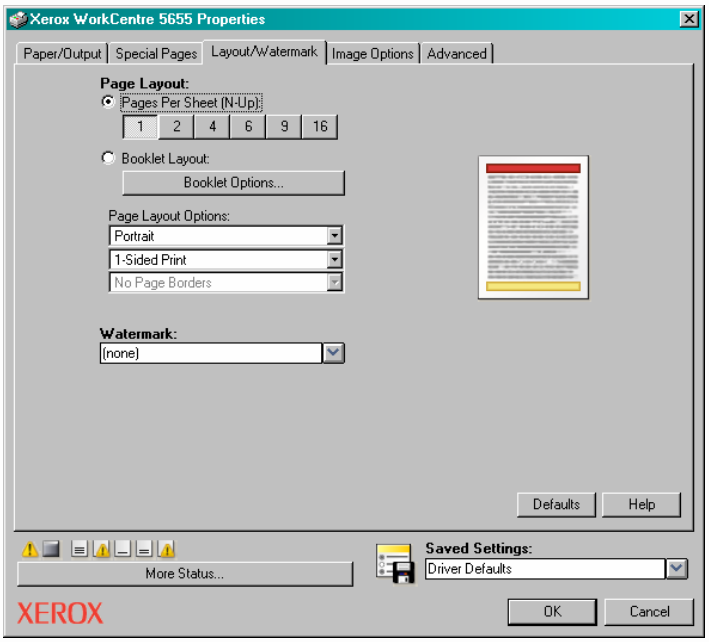
The Active Jobs tab displays a list of current jobs being processed by the device.



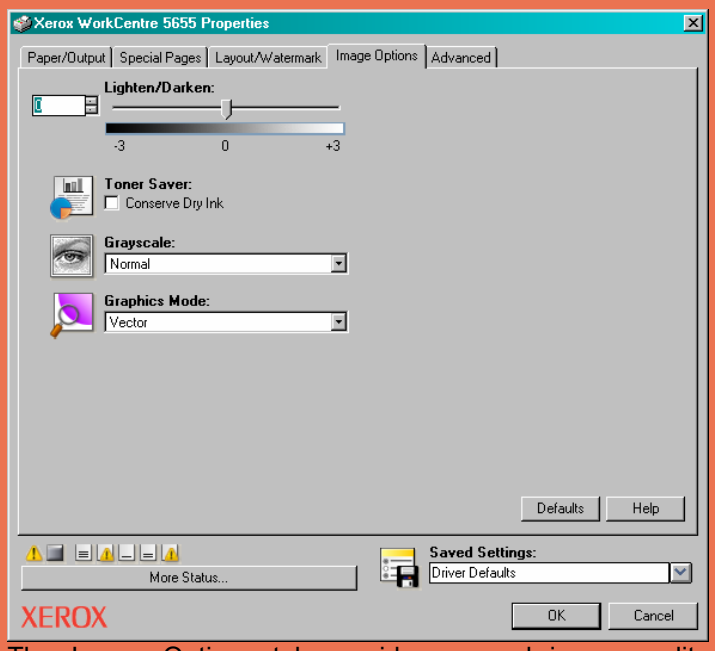
The Completed Jobs tab shows a list of the jobs that were completed and their completed time.



The Special Pages tab enables users to add, modify, or delete cover pages, inserts, or exception pages. Up to 250 inserts and up to 250 exception pages can be selected per print job.

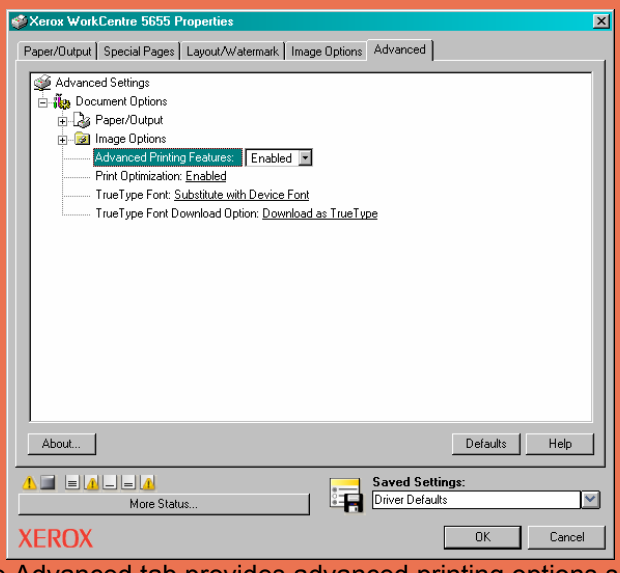


On the Layout/Watermark tab, users can specify layout options and watermarks to be printed on specific pages. Users can also select booklet options, several page layout options, including duplexing, paper orientation, and page borders. Users can also add, edit or adjust watermark selections. The Defaults button returns all options on the tab to the default settings.

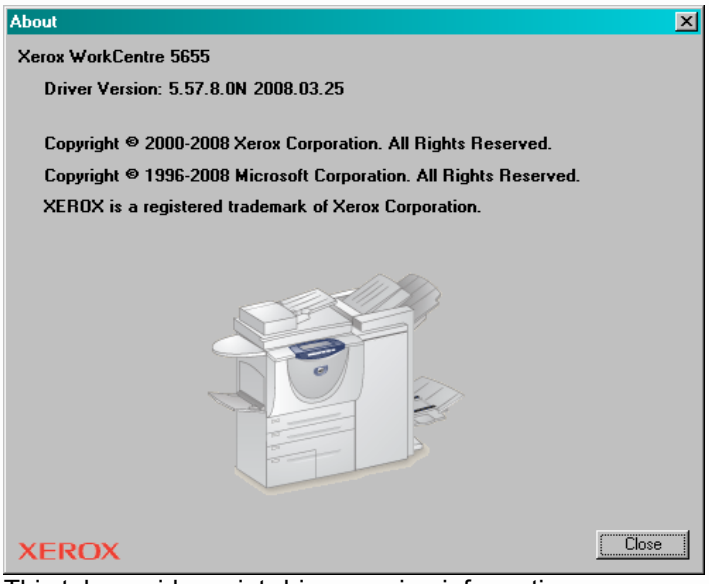


The Image Options tab provides several image-quality adjustments, including Lighten/Darken, Toner Saver, Gray Scale, and Graphics Mode. The Lighted/Darken option allows the user to adjust the overall lightness or darkness of the text and images in their printed documents.

The Gray Scale setting is used to modify the contrast among the different shades of gray, while the Graphic Mode is used to specify how the print driver sends graphic (Vector/Raster) information to the device in conjunction with the Gray Scale setting.

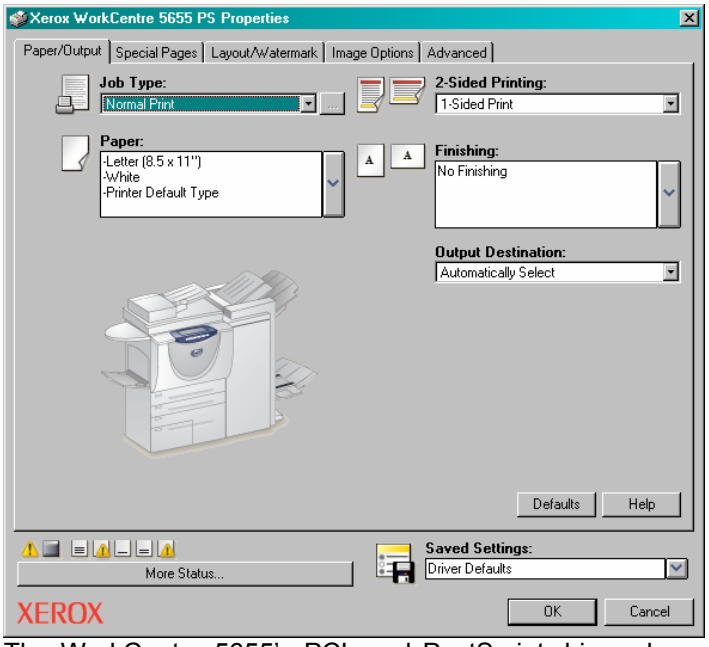


The Advanced tab provides advanced printing options such as Paper/Output and Image Options.

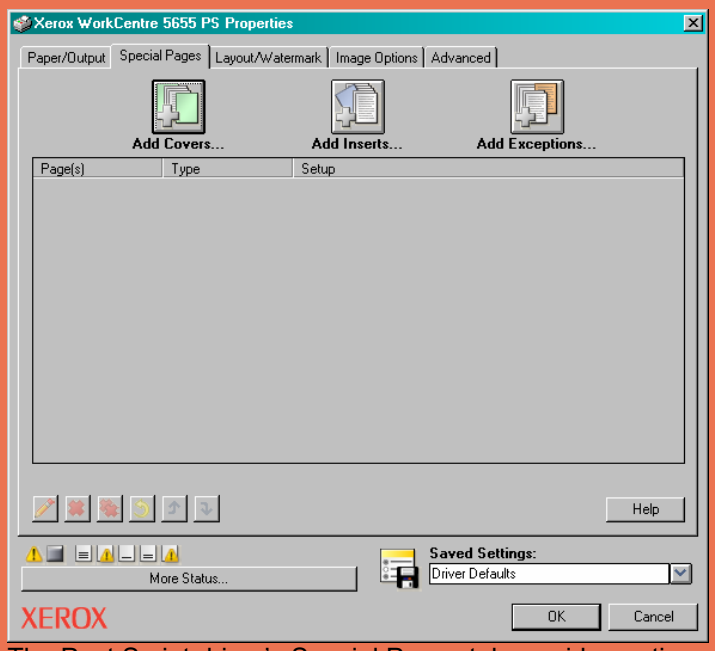


This tab provides print-driver version information.

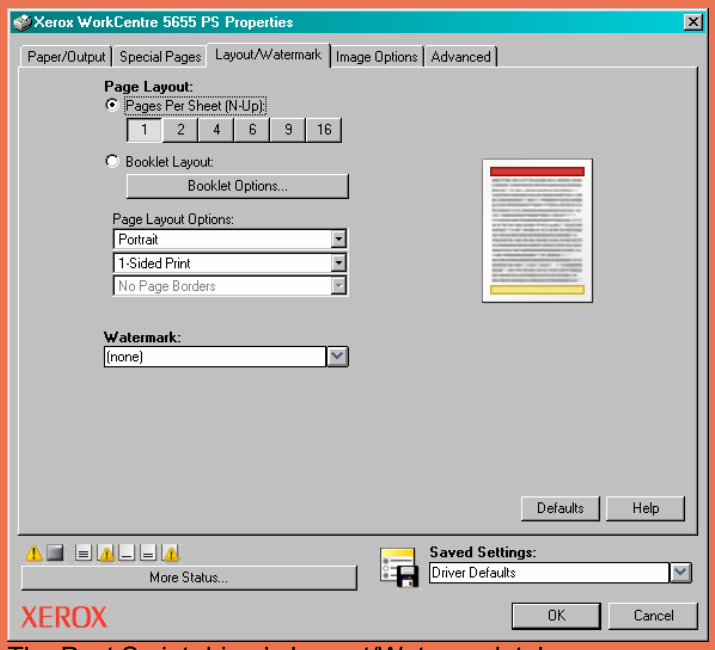
POSTSCRIPT PRINT DRIVER



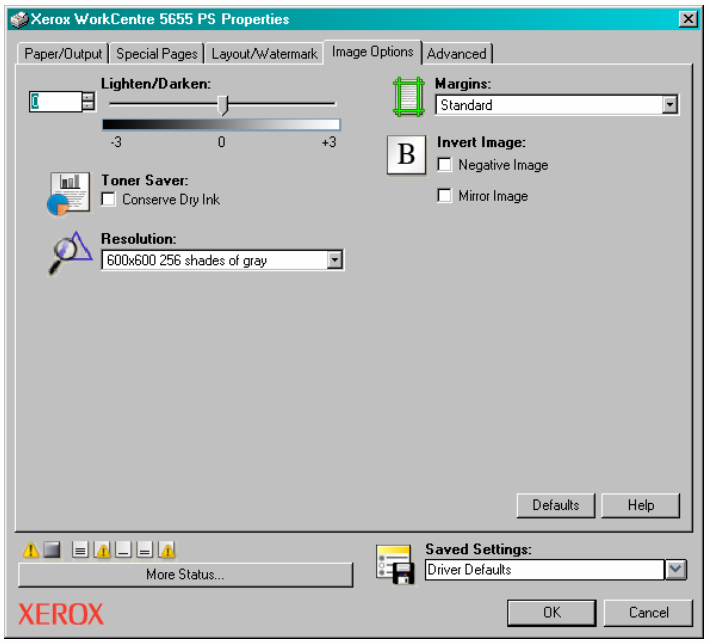
The WorkCentre 5655's PCL and PostScript drivers have very similar user interfaces. The PostScript driver's Page/Output tab provides the same basic options as the PCL driver's Page/Output.



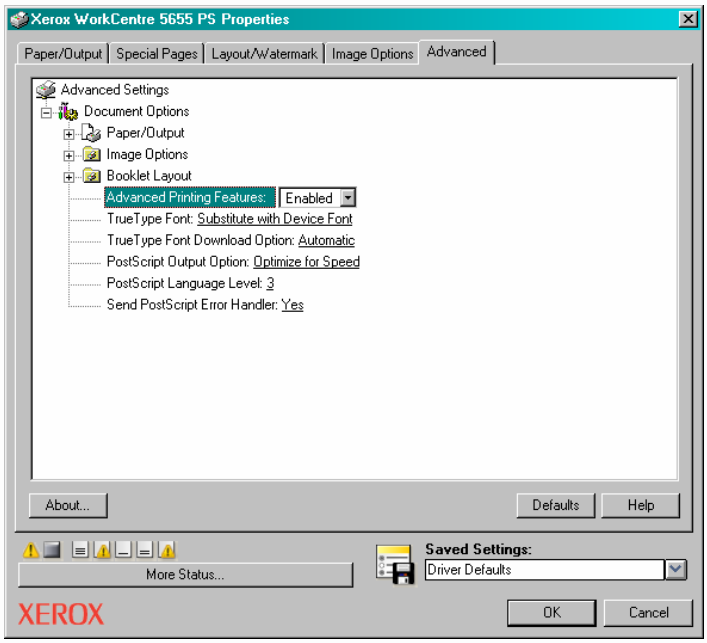
The Post Script driver's Special Pages tab provides options for specifying covers, inserts and exception pages.



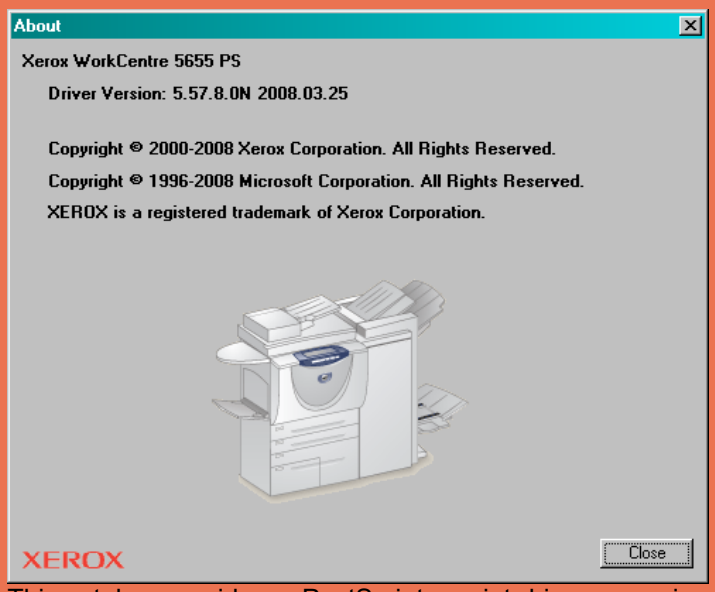
The Post Script driver's Layout/Watermark tab.



The PostScript driver's Image Options tab.



The PostScript driver's Advanced tab provides advanced PostScript options not provided by the PCL tab.



This tab provides PostScript print-driver version information.

CLIENT UTILITIES

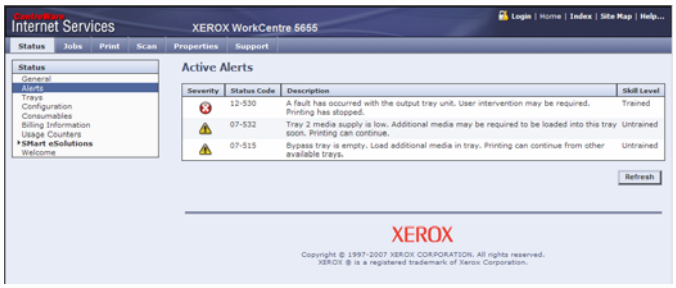
In order to take the best and most efficient advantage of a device and its capabilities, as well as ensure maximum uptime, clients need an efficient way to access and monitor the device. This is true whether the device is an MFP, printer, or scanner.

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 media sizes, or provides certain document finishing, such as stapling or saddle-stitch booklet making.

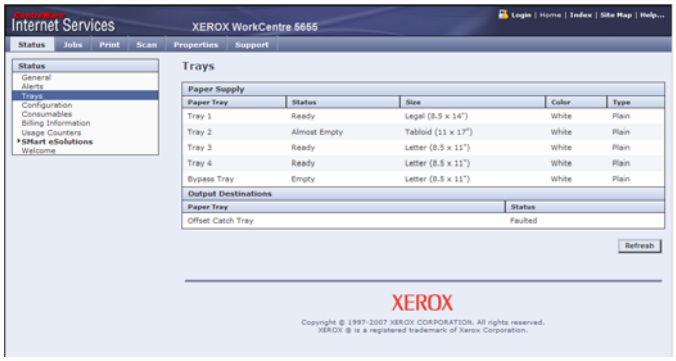
Second, users want to know a device's current status—if it is ready to print or is offline, for instance. Third, they may also wish to know whether it is equipped with sufficient supplies, such as ink and media, to be able to produce their job. Fourth, when the device is shared, they may wish to know 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 media.

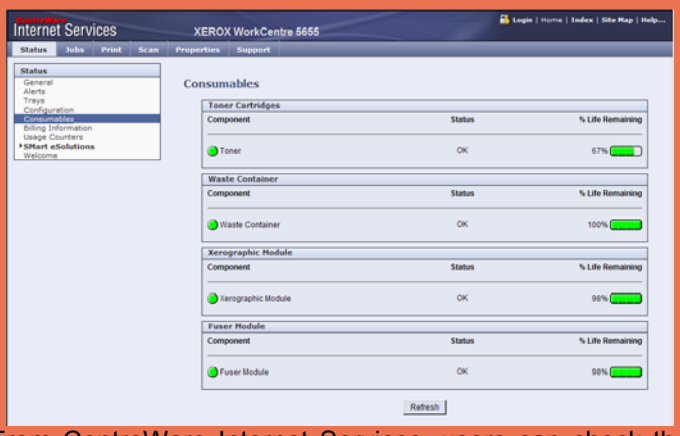
Xerox provides several solutions for monitoring the device and jobs. Among them is CentreWare Internet Services, a Web-based solution that enables clients to view device status and configuration, and enables administrators to manage and configure system and network settings.



CentreWare Internet Services also provides general alerts that automatically alerts administrators and users to current problems with the device, the severity of the issue, a status code, a brief description of the issue and the skill level needed to correct the problem.

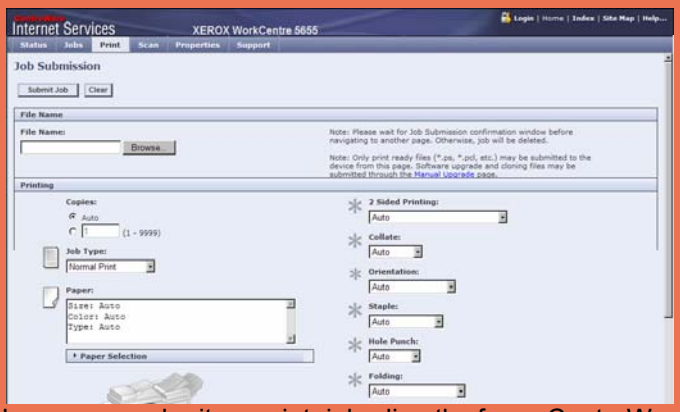


With CentreWare Internet Services, clients can view current device status, current toner levels, and installed paper sizes, types, levels and status.

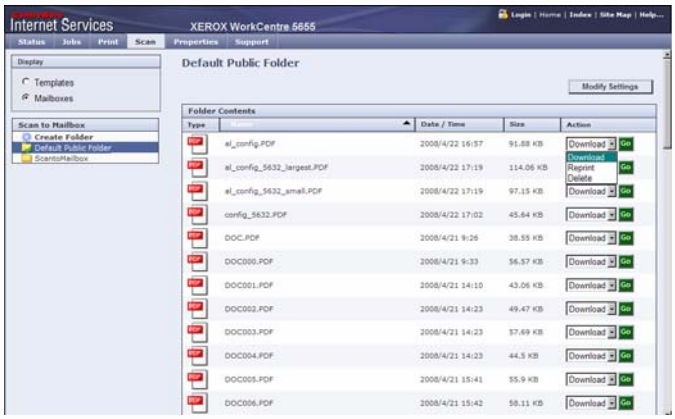


From CentreWare Internet Services, users can check the status of the status of the toner cartridge, waste container, Xerographic module and fuser.

Users and administrators can log onto the CentreWare Internet Services and view the current list of job pending on a device. This function can also be performed directly from the print drivers.



Users can submit a print job directly from CentreWare Internet Services.



Users can log on to the CentreWare Internet Services Scan to Mailbox interface and download the stored files to their computer desktop.

Xerox Copier Assistant™ Software

Xerox offers exceptional tools for disabled users its Copier Assistant Software Kit. This software improves accessibility to copying features and enables users to remotely operate the control panel from a computer workstation. The enlarged on-screen user interface provides better visibility for the visually impaired, while the embedded text-to-speech software talks the user through the copying steps, including advanced tasks such as stapling, collating and two-sided copying. It also indicates when doors are left open or if a paper tray is empty.

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 (or the ink cartridges employed by ink-jet imaging systems). 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 or Ink Replacement

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

Clearing Media Misfeeds

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

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

Loading Media

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

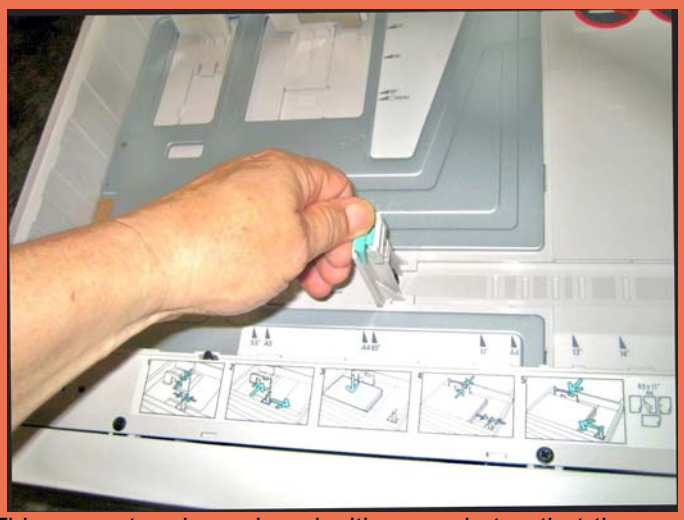
- The user should be able to load an entire ream (500 sheets) in a single step.
- Mechanisms such as corner separators and ramps in the media drawer can impede loading media.
- The most critical factor involved in ease-of-loading media is automatic media-size detection. Ultimately, the device should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

LOADING MEDIA

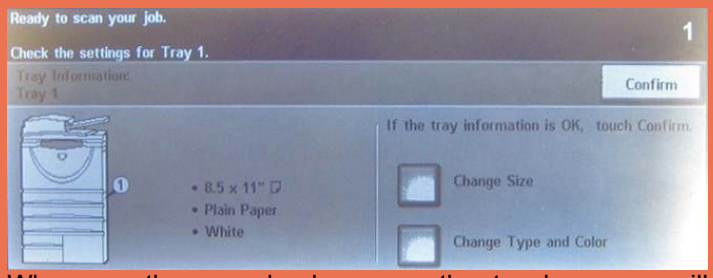
Paper Loading Checklist	
Maximum media weight from all media sources?	Yes
Drop-in loading of a full ream of paper?	Yes
Corner separators in paper trays?	No
Spring-loaded ramps in paper trays?	No
Geared media size side guides?	Yes
Captured rear media guide?	No
Automatic paper size detection?	Yes

Each of the two standard drawers can hold up to 500 sheets of paper ranging in size from 5.5”x 8.5 “(A5) up to 11”x17” (A3).

In order to adjust the user-adjustable paper drawers, the user squeezes this green lever and then slides the guide into place. Overall, BERTL found adding paper and adjusting paper drawers to be easy.



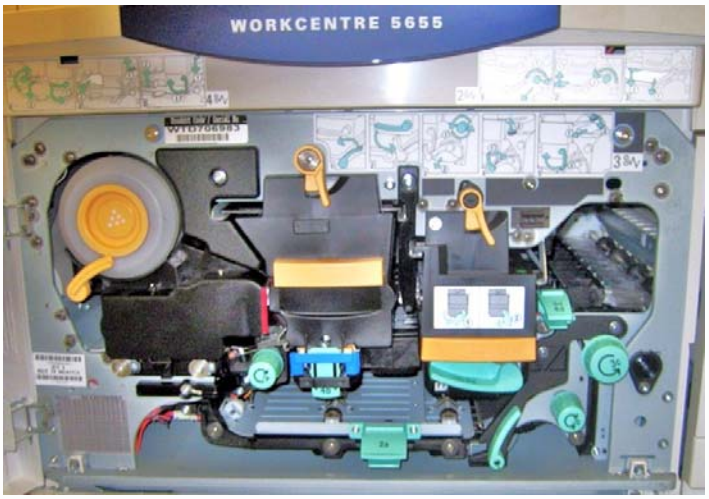
This paper tray is equipped with an end stop that the user must glide in order to adjust the paper drawer to accommodate the desired paper size.



Whenever the user loads paper, the touch screen will prompt the user to confirm the paper size, type, and color.

ROUTINE MAINTENANCE–REPLACING TONER

Maintenance Checklist	
Load ink/toner while running?	No
Requires rear access for access to maintenance items?	No
Requires side access for access to maintenance items?	No
All-in-one imaging units?	No
User-disposable waste item(s)?	Yes



BERTL Analyst found replacing the WorkCentre 5655's toner cartridge to be effortless. The user first opens the device's front door shown above. The toner cartridge is located in the upper left side of the photo above.

The next step is to move the orange securing lever to the left, and then simply pull out the toner cartridge. The user then pulls out the toner cartridge. It is a simple process to first remove the cover from the new toner cartridge, slide the new carriage back into the system, and close the front door. Note that the drum is replaced by service.

MISFEED ACCESS

To access the front misfeed area, the user first opens the front door.

In order to access any misfeeds that may occur in the automatic document feeder, the user lifts up this cover.

In order to access any misfeeds that may occur in the Professional Finisher Top Tray, the user lifts up this cover.

In order to access misfeeds that may occur in the optional document finisher, the user first opens the finisher's front door, as shown above.

DEVICE MANAGEMENT

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

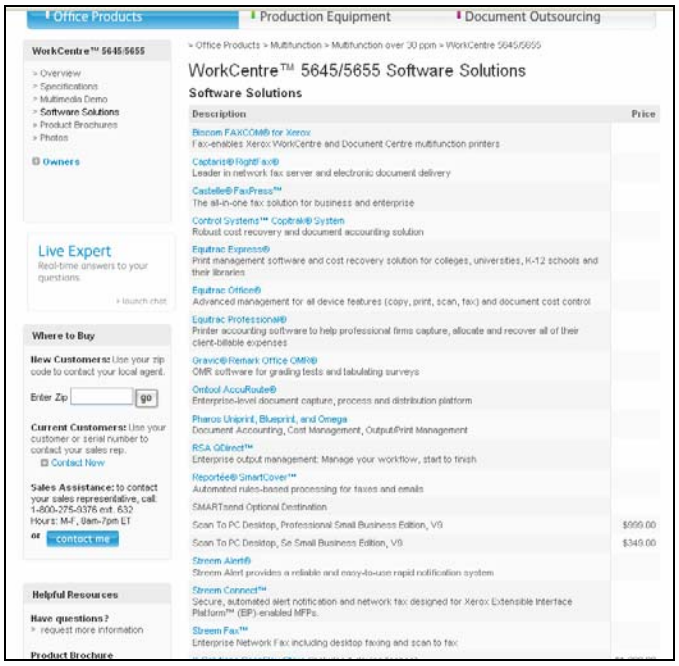
As noted previously, end users want to know if a device is capable of handling a particular job, current status (such as "Ready"), and current supply levels (media, toner, ink), as well as if there are any other jobs waiting to be printed.

Administrators

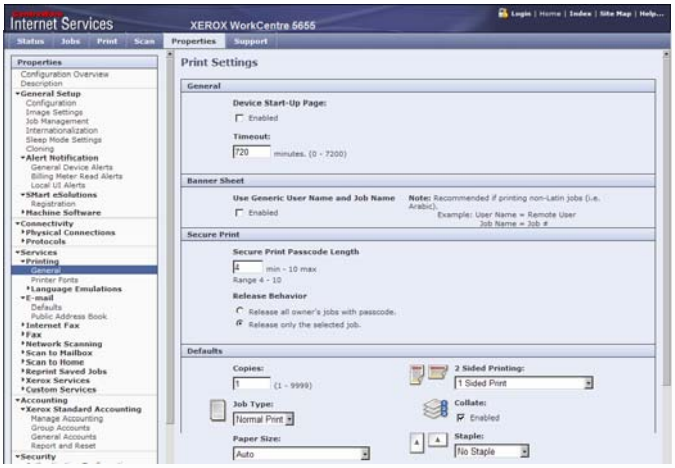
The aim of most network administrators is to obtain greater control over networked devices without having to leave their own desk. From their computer desktop, they would like to be able to set up the device on the network, establish security for IP filter ranges, apply cost-control measures, check supply 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.

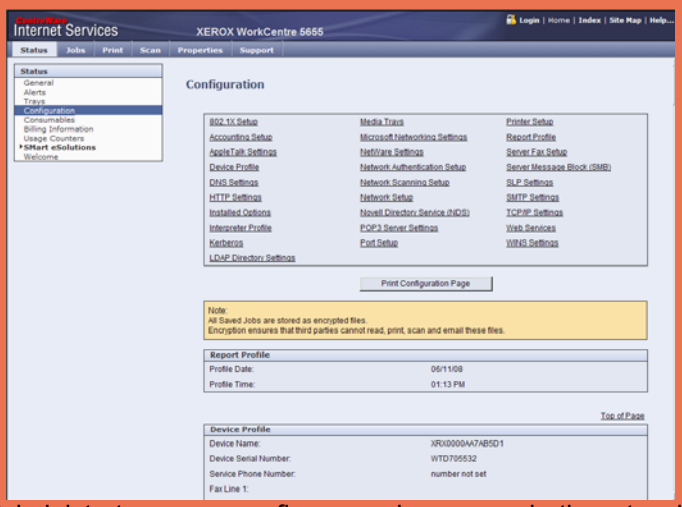
Using CentreWare Internet Services, administrators can clone a device with a file containing previously set configurations. This is especially useful in a fleet deployment, as it eliminates administrators having to individually configure each network device.



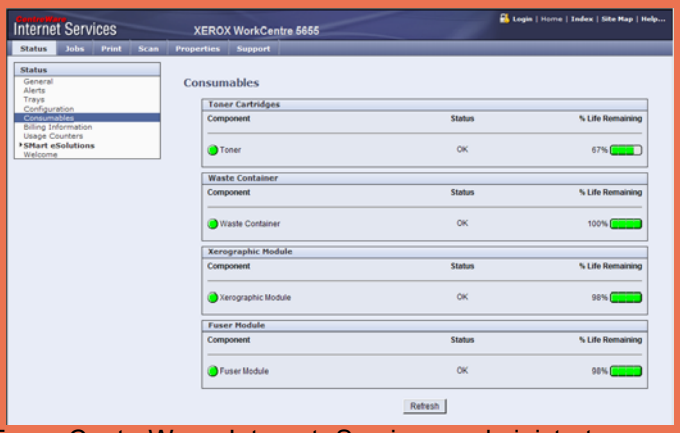
Xerox provides a host of solutions for managing and monitoring the WorkCentre 5655, as well as solutions for managing files stored in user boxes, account-tracking, direct printing, faxing, scanning, as well as plug-ins for output management for RSA Qdirect, HP Open View, CA Unicenter, IBM Tivoli NetView, Microsoft Operations Manager, Novell NDPS, HP Output Management, and HP Web JetAdmin network-management solution.



Administrators can modify the device's printer settings from CentreWare Internet Services and enable or disable the setting to print out banner pages, set the secure print passcode length, and other basic print defaults.

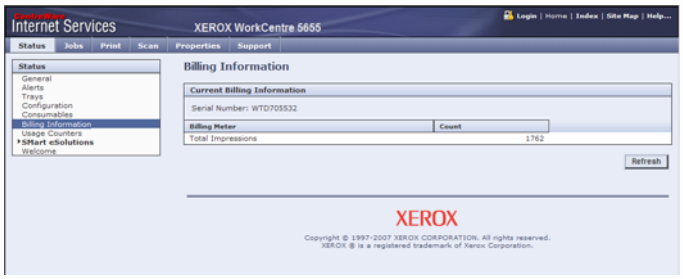


Administrators can configure and manage both network and device settings with CentreWare Internet Services.

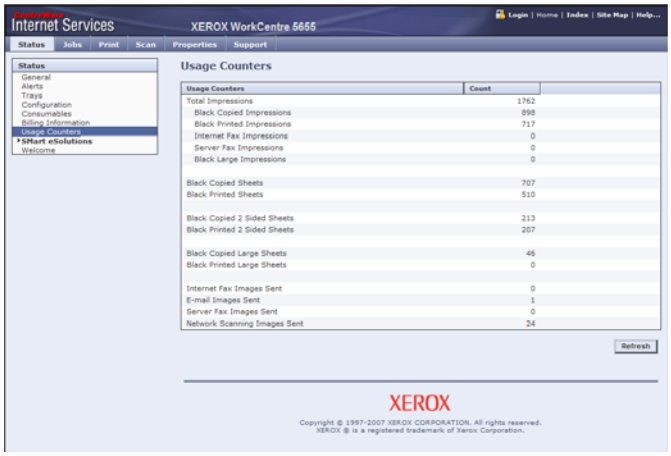


From CentreWare Internet Services, administrators and users can check the status of the toner cartridge, waste container, Xerographic module and fuser.

Administrators can log onto the CentreWare Internet Services and view the current list of job pending on a device. This function can also be performed directly from the print drivers.



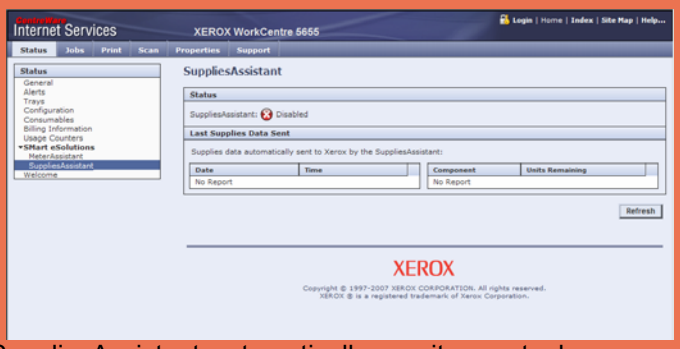
Billing information and total impression counts can be viewed from CentreWare Internet Services.



Usage Counters provide administrators with a line item breakdown of the different jobs executed on the device.

MeterAssistant automatically submits meter readings from Xerox equipment and generates meter reports for billing reconciliation.

CentreWare Internet Services' accounting functionality enables administrators to track usage by individual user or group account. To enable accounting, the administrator must configure the printer and printer drivers for accounting, so that users must enter a code before they can print.



SuppliesAssistant automatically monitors actual usage on Xerox devices that are on a Xerox meter or "cost-per-copy" plan that includes supplies.

CentreWare Internet Services also provides general alerts that automatically alert administrators and users to current problems with the device, the severity of the issue, a status code, a brief description of the issue and the skill level needed to correct the problem.

WHAT WE LIKED

- The control panel's hard keys are large, well-organized and clearly labeled, while the touch screen features large text for easy viewing, as well as a simple design for easy navigation. The touch screen is virtually the same as other Xerox WorkCentre devices' touch screens, which will make it especially easy for WorkCentre users to quickly acclimate to it.
- The WorkCentre 5655's touch screen displays the most common and frequently used copier settings on the Basic Copying screen. This enables copy users to quickly and easily make settings without having to navigate through sub-menus, and significantly reduces the time to make copy-job settings. BERTL was able to make frequently used copier settings in a matter of only 1 or 2 key presses (see "Selections Required for Frequently Used Copy Functions" chart on page 19).
- For network and device management, Xerox provides its CentreWare Web Software Suite. This includes Web-based CentreWare Internet Services, which displays detailed device, consumable and job status. Administer can configure network and system settings, as well as manage access and accounting controls. Administrators can a fleet of devices from any workstation on the network.

- Network-management and configuration of the Xerox WorkCentre 5655 via CentreWare Internet Services Network Setup Utility. Administrators can clone multiple devices with the settings from one device.
- CentreWare Internet Services provides automatic e-mail alerts when the system requires attention.
- Both PCL and PostScript drivers are relatively easy to use and logically organized. Both drivers have nearly the same exact user interface. This will enable users to quickly and easily switch between drivers and allow them to find the settings they need from one driver to another with ease.
- Both print drivers provide bi-directional communication, so users can quickly check device and consumables' status.
- Very easy toner and paper replacement.
- Misfeed-access areas are easy to locate and access.
- Compatibility with Hewlett-Packard's Web JetAdmin network-management solution.
- Xerox provides a wide array of features and options for disabled users such as of the Xerox Copier Assistant Software Kit.

WHAT WE WOULD LIKE TO SEE

- ccdBERTL found that the WorkCentre 5655 was very easy to use and maintain on a daily basis.

MEDIA INPUT

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

A device's media-handling capability basically concerns how it can handle two key criteria: the media size and media 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 media capacity, the less time users will spend reloading media.

The standard trays (Tray 1 and 2) each can each hold 500 sheets. The optional high-capacity tandem tray (trays 3 and 4) can hold 1,600 and 2,000 sheets each of 8.5"x11" (A4) paper.

Media Handling Checklist	
Minimum Media Weight	16 lb bond (60 gsm)
Maximum Media Weight	80 lb cover (216 g/m²)
Feeds maximum media weight from all sources?	No
Offset Stacker	Standard
Finisher	Optional
Hole Punch	Optional
Saddle-Stitch Finisher	Optional
Post-Process Insertion (PPI)	Optional
Trimmer	No
Folder	Optional
Mail Bins	No
Booklet Maker	Optional

MEDIA OUTPUT AND FINISHING

Office workgroup devices' media-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 heat-sensitive media.

ORIGINAL HANDLING

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

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.

Document Feed Speed			
# of originals	**MONOCHROME MODE**	**Time In Seconds**	**OPM***
10	Simplex Originals	9.94	60.4
5	Duplex Originals	26.09	11.5
10	Mixed-Size Originals	30.85	19.4

*Originals per minute.

The WorkCentre 5655's document feeder and document-feeder misfeed access.

WHAT WE LIKED.

- Standard paper capacity is a generous 1,100 sheets, and can also be expanded to a substantial 8,700 sheets.
- Fast tested simplex document-feeder speed of up to 60.4 originals per minute (opm).
- Broad range of document-finishing options.
- Choice of document finishing, from basic stapling, to saddle-stitched booklets, and document hole-punching.

WHAT WE WOULD LIKE TO SEE

- Faster duplex document-feed speed.

Summary

Like other Xerox office imaging products evaluated by BERTL, Xerox's WorkCentre 5655 displayed solid overall performance in BERTL's tests. Designed for mid-sized workgroups with black-and-white printing needs, the WorkCentre 5655 delivers performance that most workgroups and offices truly need: fast high-quality black and-white MFP with an extensive list of workflow and finishing capabilities.

Rated at up to 55 ppm by Xerox, BERTL observed the following when testing the WorkCentre 5655:

- The WorkCentre 5655 provides a long list of security and advanced workflow options.
- The WorkCentre 5655 was exceptionally easy to use and maintain, from the large and easy-to-navigate touch screen to using the print drivers and device-management software.
- Ease of maintenance is very good, with a front-loading toner cartridge that even novice users will find easy to replace, and uncomplicated misfeed access and paper-replacement.
- Bi-directional communications within the print drivers enables users to quickly check on their print jobs as well as device status and configuration without the use of any other software utilities.
- As with most Xerox imaging products, overall image quality was highly competitive in both copy and print modes: the system produced above-average halftones, and displayed good line and dot control, which is essential for producing fine detail.
- In printer mode, First Page Out Time (FPOT) was as fast as 10.97 seconds. All FPOTs were faster using the Post Script driver.
- PCL simplex printer productivity was as fast as up to 55.6 ppm printing BERTL's test files, and PCL duplex printer productivity was as fast as 54.3 ppm.
- The Post Script driver's simplex printer productivity was as fast as up to 56.9 ppm, while duplex printer productivity was as fast as up to 55.5 ppm.
- FPOT in copier mode was as fast as 8.97 seconds in simplex and up to 14.81 seconds in duplex mode.
- Simplex black-and-white copier productivity was as fast as up to 42.4 ppm printing BERTL's test documents. Duplex black-and-white copier productivity was as fast as up to 44.1ppm.
- Minimal document-finishing penalty.
- Document-feeder speeds were as fast as 60.4 originals per minute (opm) in simplex mode and 11.5 opm in duplex mode.
- Also contributing to the WorkCentre 5655's overall productivity was Web-based CentreWare Internet Services, which provides detailed device and consumables' status, and provides network configuration access management and accounting controls for administrators.
- The WorkCentre 5655 provides an extensive array of accessibility options for disabled users.
- Xerox CentreWare Scanning Services is the most powerful, easy-to-use and manageable scanning platform found on MFPs. Additionally, scanning services are also available from a wide array of third-party vendors providing a solution for virtually every vertical market.
- Xerox Extensible Interface Platform (EIP) enables customers and developers to develop custom applications accessible from the touch screen that streamline frequent applications.

As is the case with all digital imaging products, the WorkCentre 5655 is not perfect:

- Users with mission-critical Adobe PDF printing applications should note that any digital imaging device that provides PostScript emulation may not print Adobe PDF files with the same level of predictability as those that provide Adobe PostScript print drivers.

In light of these many advantages, its outstanding overall feature set and highly-competitive tested performance, BERTL highly recommends the WorkCentre 5655 for offices, mid-size to large workgroups and enterprises that require a sophisticated, highly productive black-and-white digital MFP. Users will appreciate the WorkCentre 5655's reliable monochrome printing and advanced scanning and workflow capabilities. Administrators will appreciate Xerox's support services, the WorkCentre 5655's ease of use and maintenance, support and training, job tracking/accounting capabilities, and easy device monitoring and management.

OFFICE

WHAT WE LIKED

- Fast simplex PCL network-printer productivity of up to 55.6 ppm in testing.
- Fast duplex PCL network-printer productivity of up to 54.3 ppm in testing.
- Fast simplex PostScript network-printer productivity of up to 56.9 ppm in testing.
- Fast duplex PostScript network-printer productivity of up to 55.5 ppm in testing.
- Network-printer First Page Out Time (FPOT) as fast as 10.75 seconds in testing.
- Tested First Copy Out Time (FCOT) as fast as 8.97 seconds in simplex and 14.81 seconds in duplex copier mode.
- Simplex black-and-white copier productivity was as fast as 55.1 ppm printing BERTL's test documents. Duplex black-and-white copier productivity was slightly faster at 54 ppm.
- Minimal document-finishing penalty to copy jobs when performing corner stapling.
- Fast tested document-feeder speed of up to 60.4 originals per minute (opm).
- Standard account tracking (up to 2,150 User accounts, up to 5,925 general accounts, and 250 group Accounts).
- Optional Xerox account/tracking copy management options:, Internal Auditron – Copy; Xerox Standard Accounting – Copy, Print, Fax, (Optional: Network Accounting enablement thru 3rd Party)
- Files can be scanned or sent from the print driver to user boxes in the device's hard-drive memory. Files stored in the mailbox can then be printed at any time (print-on-demand), e-mailed, sent via fax, sent via Internet fax, or routed to a computer workstation, an FTP or SMB server, etc.
- No print slowdown when scanning in jobs or when scan-date transfer is underway
- Fast tested document-feeder speed of up to 60.4 originals per minute (opm).
- Support for a large number of file formats, including TIFF 6.0, TTN2 with JPEG, G3MH, G4 MMR, JPEG, PDF, XPS Format, MRC (optional), and Text Searchable PDF (optional)
- LDAP compatibility enables users to access the network address book, making destination-management chores easier for network administrators.
- Xerox' Extensible Interface Platform (EIP) permits the ultimate integration and customization of virtually any Xerox or third-party workflow application.
- Output displayed competitive overall business image quality.
- Output displayed good copy resolution, and average-to-good printer resolution.
- Output displayed good print density in both copier and printer modes.
- Output displayed above-average production of halftones in both printer and copier modes, as the device was able to correctly print and copy nine out of 10 shades in BERTL's image-evaluation chart.
- Output displayed very good line and dot control when printing BERTL's image-quality evaluation chart.
- The control panel's hard keys are large, well-organized and clearly labeled, while the touch screen features large text for easy viewing, as well as a simple design for easy navigation. The touch screen is virtually the same as other Xerox WorkCentre devices' touch screens, which will make it especially easy for WorkCentre users to quickly acclimate to it.
- The WorkCentre 5655's touch screen displays the most common and frequently used copier settings on the Basic Copying screen. This enables copy users to quickly and easily make settings without having to navigate through sub-menus, and significantly reduces the time to make copy-job settings. BERTL was able to make frequently used copier settings in a matter of only 1 or 2 key presses (see "Selections Required for Frequently Used Copy Functions" chart on page 19).
- For network and device management, Xerox provides its CentreWare Web Software Suite. This includes Web-based CentreWare Internet Services, which displays detailed device, consumable and job status. Administer can configure network and system settings, as well as manage access and accounting controls. Administrators can a fleet of devices from any workstation on the network.
- Network-management and configuration of the Xerox WorkCentre 5655 via CentreWare Internet Services Network Setup Utility. Administrators can clone multiple devices with the settings from one device.
- CentreWare Internet Services provides automatic e-mail alerts when the system requires attention.
- Both PCL and PostScript drivers are relatively easy to use and logically organized. Both drivers have nearly the same exact user interface. This will enable users to quickly and easily switch between drivers and allow them to find the settings they need from one driver to another with ease.
- Both print drivers provide bi-directional communication, so users can quickly check device and consumables' status.
- Very easy toner and paper replacement.
- Misfeed-access areas are easy to locate and access.
- Compatibility with Hewlett-Packard's Web JetAdmin network-management solution.
- Xerox provides a wide array of features and options for disabled users such as of the Xerox Copier Assistant Software Kit.

- Standard paper capacity is a generous 1,100 sheets, and can also be expanded to a substantial 8,700 sheets.
- Fast tested document-feeder speed of up to 60.4 originals per minute (opm).
- Broad range of document-finishing options.
- Choice of document finishing, from basic stapling, to saddle-stitched booklets, and document hole-punching.

WHAT WE WOULD LKE TO SEE

- Faster duplex document-feed speed.
- Overall, while the WorkCentre 5655 performed well in testing, we would like to see somewhat faster copier performance.

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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