BERTL® Exceptional

Color at Work™

100% Independent Analysis

Lexmark C920

32 ppm Color, 36 ppm Monochrome Printer

Key Buyer Benefits

Quick and easy installation of both hardware and software components.

Walk-up PDF printing capability directly from device front console interface.

Simple right-click direct PDF utility saving users from having to open separate utilities or browsers.

Automated URL/file printing schedule utility.

Common interface design between PCL and PostScript drivers makes navigating between the two PDLs seamless.

User-friendly icon-driven walk through when user intervention/maintenance is required.

Good paper input and output handling options.

BERTL 5-Star Award Winner

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Lexmark C920

Color at Work™

Product Dynamics

The Lexmark C920 heads up Lexmark's extensive color printer range, with a headline speed of 32ppm and ledger printing capability. The C920 is the successor to the 28 ppm Lexmark C912. While the C920 shares the same single-pass, 4-photoconductor chassis (with internal duplexer), the Lexmark C920 adds a host of new improvements:

- Faster color speed (32ppm vs. 28 ppm).
- Faster mono speed (36ppm vs. 28ppm).
- Faster processor (1 GHz vs 600 MHz).
- New user interface with 10-digit keypad and graphic LCD allowing illustration walk through of user maintenance tasks.
- IEnhanced ColorCare technology feature set with new print permissioning on a user/host-basis (with MarkVision 10.2) and improved coverage estimator.
- ImageQuick comes as standard providing pull printing from file and web/ URL destinations.
- Direct USB port Interface at device for walk up PDF printing from flash USB drives.
- Even more extensive security options spanning production and storage, transmission, access and management.

Lexmark C920 under scrutiny by a BERTL analyst

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Product Dynamics

Target Market:

The Lexmark C920 is targeted primarily as a corporate color device focussed on delivering high speed good corporate color quality ledger/A3 output.

In our opinion the image quality on the C920 is to a high level and will satisfy the needs of any general corporate office user, but may not be quite high enough to be the machine of choice in the graphic art studio (which is not it's intended market).

The added functionality that Lexmark has built into the C920, namely the USB Direct Print and ImageQuick feature add some unique selling features that make a very strong case for placing the Lexmark C920 into walk-in service print locations such as print for pay high street businesses, business centers in hotels, airports, conference centers, Internet café's etc.

The speed, size, price and noise level of the device make it a good workgroup capable color printing solution satisfying the needs of multiple users. With high paper input and output capabilities and a powerful controller the device should be able to handle a busy workflow throughout the day.

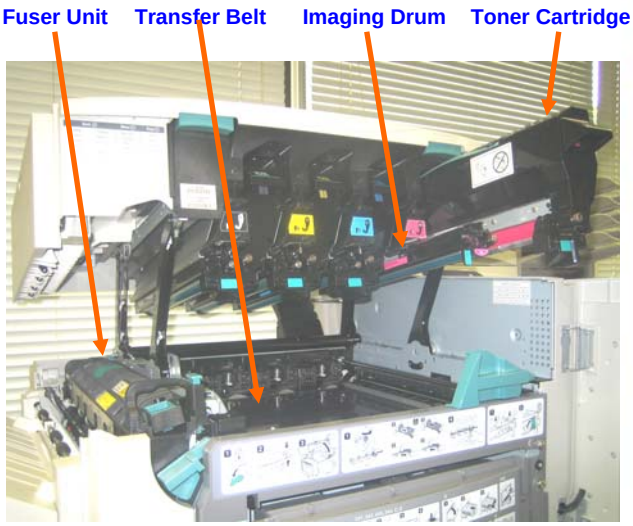
While in reality no-one is going to be placing 200,000 pages per month through a device of this type the design of the unit in our opinion looks up the job of handling significant workloads when required. This is aided by the easy end user replaceable consumable items that reduce the need for service engineer visits.

Design:

The Lexmark C920 is engineered like a giant clam-shell. To access the printing mechanics of the device you press a button at the top of the console and lift the lid of the unit up (see image below).

From here you can now gain access to the four in-line 600dpi, 4-bit LED engine components. The four photoconductor drum units slide into housing mounted on the underside of the lid of the unit. The separate toner cartridges slot in alongside the imaging drums.

The lid is then lowered positioning the imaging units over the transfer belt which carries the paper under the drum units where the four toner layers are built up in a single pass. The sheet is then fed through the fuser unit and either output or fed through the duplex unit, flipped over and re-fed through the same paper path to create the double-sided output.



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Product Dynamics

Hardware Installation:

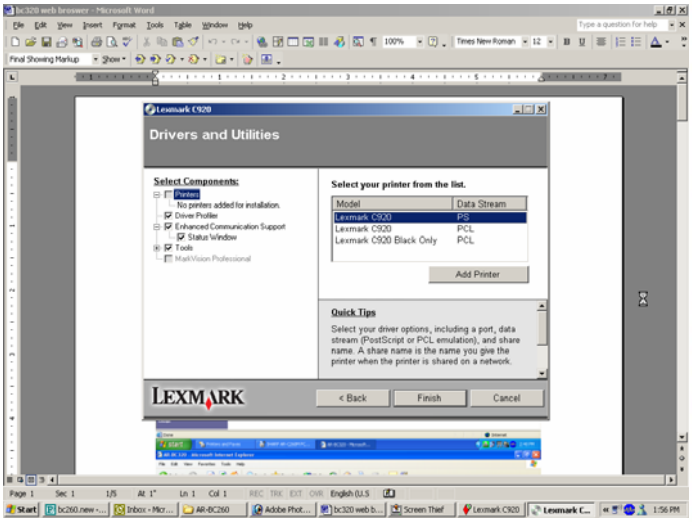
Continuing Lexmark's tradition in the workgroup space, the C920 is easy to install and set-up. We would recommend that a minimum of four people aid with the lifting and positioning of the device. From the point where the device had been manually lifted to the desktop, the entire hardware installation to the point where a test page could be output from the device control panel was 25 minutes.

Device Driver Installation:

The installation of the device onto a PC was equally simple and quick. The Lexmark installation CD wizard asks users or the administrator to follow simple instructions which guide them through the process.

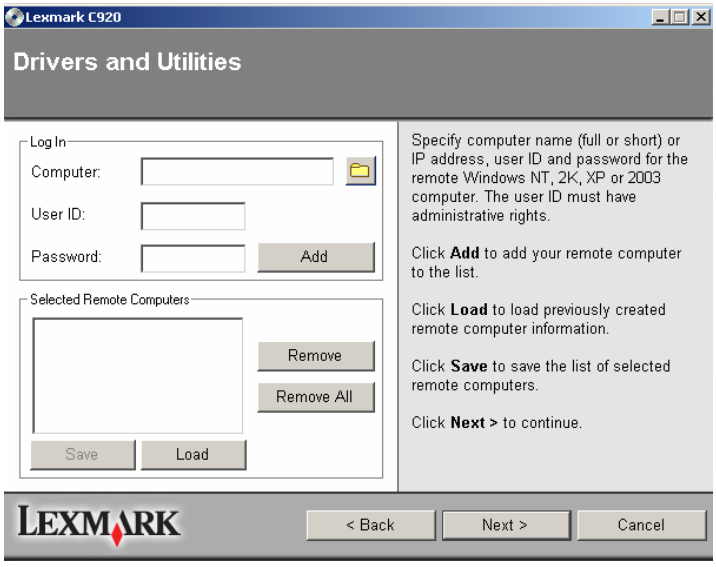
Administrators will like the ability to install the driver onto one or multiple remote PC desktop locations within a single installation process. To achieve this the administrator chooses the remote installation and then either enters the specific network location, browses across the network to the location or specifies a pre-defined list of PCs. For example, an administrator could set up a list of all the PCs under the second floor sales department.

He/she wants all users on the second floor sales department to have access to the Lexmark C920, a process that, with Lexmark's installation wizard, can be achieved in a matter of seconds. Administrators can at the same time designate which of the drivers they want to install on each PC, including the option to install black only drivers which allows the administrator to keep better control over color usage. The installation of the driver software added only a few minutes to our total set-up time.



Above: **Administrators can specify black only or full color driver installations**

Below: **Administrators can specify remote PC locations**



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Product Dynamics

Maintenance:

All the consumable components on the Lexmark C920 can be user-replaced without the need for sophisticated tools or a high level of technical ability.

To aid users with user intervention tasks such as paper jams and other events the new Lexmark interface now includes a larger LCD panel that supports icons.

The allows the device to prompt users on how to resolve issues with a walk-through series of screens actually showing the user images of the steps that need to be taken.

This is a great step up in terms of user-friendliness compared to the text driven prompts of the past.

In the images to the right the device is talking us through how to rectify a loose component in the fuser unit.

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Paper Handling

Input:

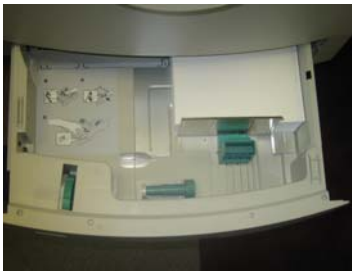
A maximum of four 550-sheet universal trays can be stacked below the main printer unit. These trays can accept paper sizes up to ledger/A3.

Positioned on the printer's right side, a 100-sheet multipurpose bypass tray handles paper sizes up to 12 " wide and length up to 48 ". This means that in addition to being able to handle oversized A3/ledger printing onto 12" x 18" paper stock, Lexmark C920 users can also create banner print outs.

The ability to print on oversized ledger/A3 paper allows users to reproduce edge to edge ledger/A3 documents onto the oversized sheets and guillotine down the white unprinted sides to create a high quality professional output.

The ability to print banner pages is growing in popularity as companies look to reduce printing overheads and reduce waiting times by taking more print runs in-house rather than send jobs to an external agency or printshop. All trays can feed paper weights from 60 to 176 gsm (16lb bond to 47 lb bond).

Each universal drawer has sliding paper guides which allows for easy realignment whenever paper sizes change. This is an advantage versus some competing units with precut holes that must be aligned with the paper guides.
The Lexmark's sliding guide approach makes it easier for those with physical handicaps to use the device effectively.



The Lexmark C920's 550-sheet universal trays accommodates paper weights up to 176 g/m2 (47 lb. bond) and has sliding guides on both axes.

In addition to the universal trays the Lexmark C920 can also be expanded via a 3,000 sheet large capacity feeder which sits to the right side of the device.

3,000 sheet large capacity unit takes capacity up to a maximum 5,300 sheets

The feeder can accommodate letter/A4 sized paper only and requires that either the four universal trays are installed or the dual universal tray and cabinet configuration is in place, thus ensuring that the paper exit feed guide to the high capacity unit is aligned to the print engine. Equipped with this unit the Lexmark C920 now boasts an impressive maximum paper capacity of 5,300 sheets, placing it well above the capacity of its main rivals which max out at 3,000 sheets.

Finishing:

The Lexmark C920 can be equipped with an optional finisher unit. In addition to offering corner stapling and hole punch finishing capabilities the finisher unit also increases the overall output stacking capacity of the device up to 1,100 sheets. We would have liked to have seen a saddle-stitch finisher option, a feature that is available on some rival units and a popular finishing option in certain environments.

Finishing option for the Lexmark C920

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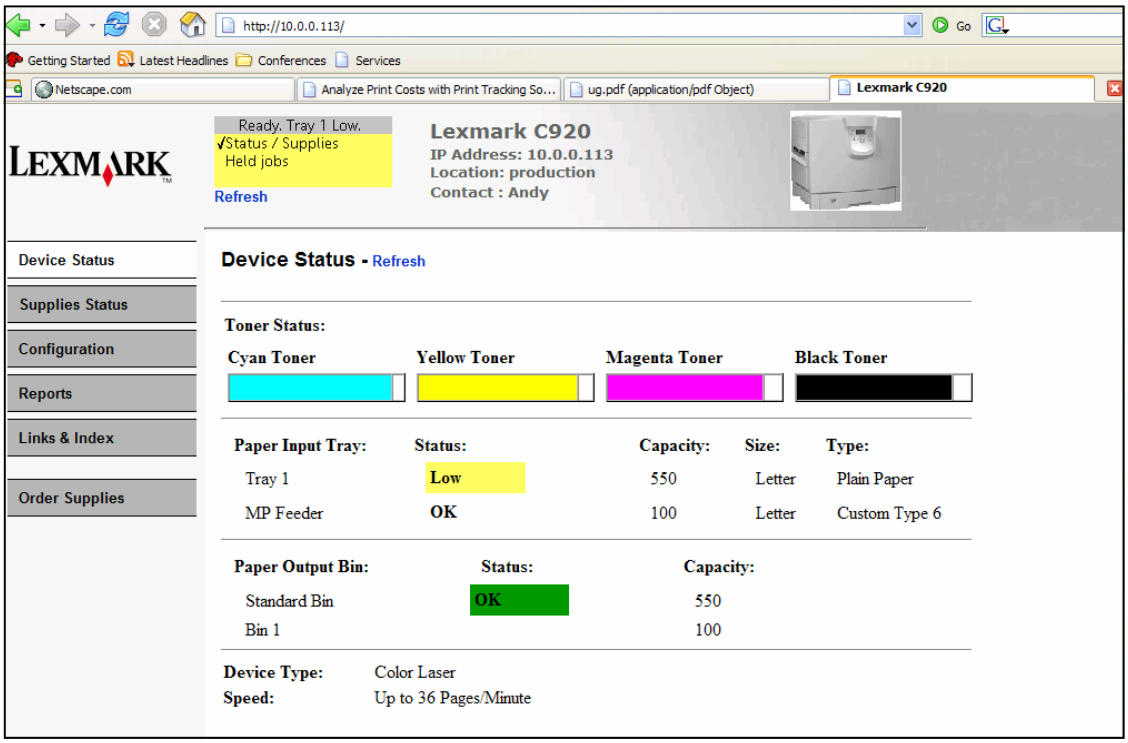
Device Management

Remote management of the Lexmark C920 for the average office user can be accomplished through the device's embedded Web Server. By entering the IP address of the printer into their browser search window users can view features such as toner and paper levels, see what jobs are scheduled at the device, and other information.

Administrators can also, with the correct authority, configure network and security settings, check print statistics, and establish email alert conditions. A nice extra in their Web implementation is an emulated console display, which is automatically refreshed, showing the desktop user what is being displayed on the device's touchscreen. This is a useful aid for technical support when trying to talk users through problems at the device.

A feature that we would like to have seen in its Web implementation is the ability to see the job queue. While we were able to see that a job was in progress, we were unable to see how long that job was going to take, nor know what jobs lay behind it in the queue. This means that a user out of line of sight must take a risk on the device not being busy when they submit a job.

Toner levels and emulated console are displayed on the Lexmark C920's home page.



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Device Management

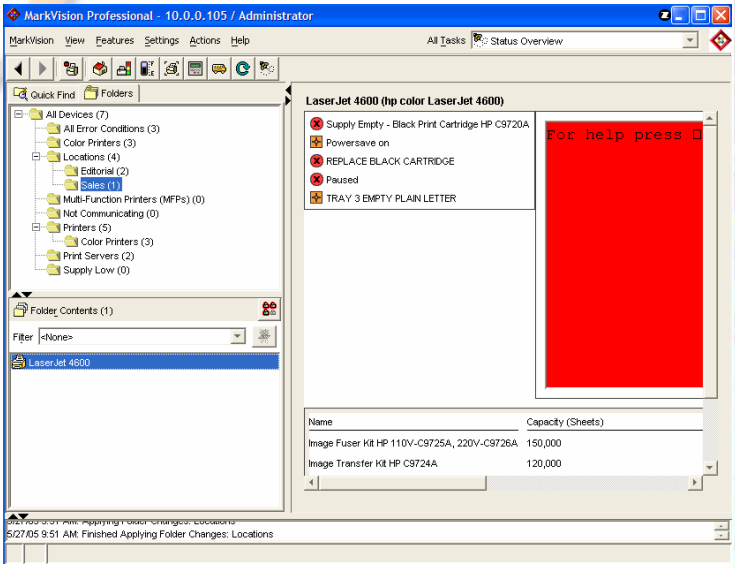
MarkVision:

Lexmark provides powerful Windows-based management utility called MarkVision Professional, free via the web.

BERTL has always been impressed with the level of functionality, integration and desk-based management capabilities available to the end user (and the IT Manager) through MarkVision.

Acting like a sophisticated NMS—Tivoli and OpenView—MarkVision lets administrators organize printer and MFP devices into a logical categories based on MarkVision's internal SNMP-based fields. Using a folder metaphor, administrators can then quickly navigate to an area of interest. For each folder, they can choose filter criteria from a set of static fields (location, paper size, etc.), or dynamic ones tied to status or resource levels. Since sub-folders inherit the parent folder's filter settings, administrators can create a hierarchy of device groupings—e.g., printers, color printers, color printers within the sales department, etc.

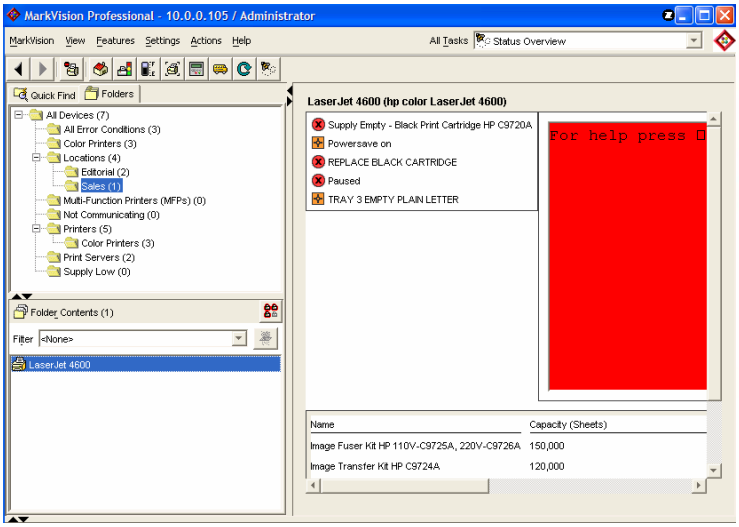
Overall, the software's features, settings, and and action menus provide administrators with many ways to arrange and display device data. They can also create custom "views" to display built-in graphics and tables. And they can create new tables by selecting from



With MarkVision, administrators can create customer views to display both tabular and graphic data.

MarkVision's set of device fields.

Folders organize printer devices—both Lexmark's and other vendors'—by both static and dynamic fields. Sub-folders inherit filter criteria from all parent folders.



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Device Management

Print Permission Technology:

In MarkVision 10.2 and later, new internal tables allow administrators to control color permissions. Lexmark's "Print Permissioning Technology" bases color authorization on both host computer names and user identifiers.

With a specific computer enabled for color, any user—regardless of individual permissions—can print color documents.

The alternative offered to the administrator is the ability to restrict color job delivery on a user ID basis.

As the screenshot below illustrates John and Ringo are prohibited from printing in color.

This list of user IDs is created using MarkVision but downloaded and stored on each individual printer. The list can be updated whenever required and a broadcast list set up so the updating on the list can be achieved in a single operation rather than on a device by device basis.

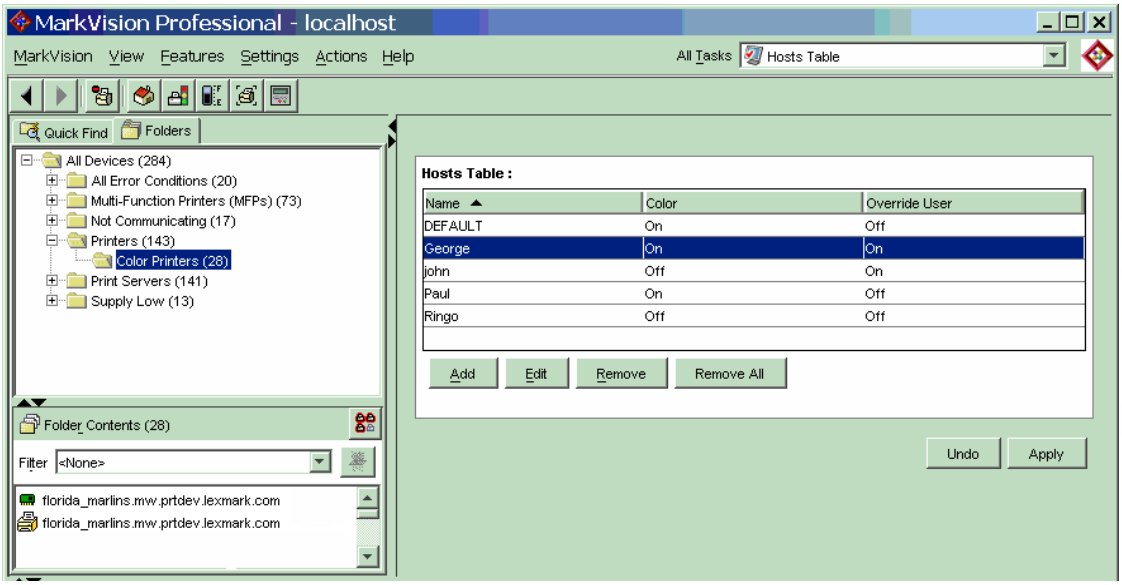
We would have preferred to have a centralized list with devices checking back to the central user list for authorization. This would make the administration even easier and also tie in better to any future plans to build in cost control and auditing procedures.

There is also no ability to specify a quantity of pages for a user, the user is either color enabled or not, which puts it at a slight disadvantage versus some rival cost containment packages.

We would have also liked the ability set a threshold level that a user could print in color, with a warning email sent informing the user when they were approaching their limit.

Lexmark does offer a cost containment solution through Pharos, which provides a range of hardware and software cost containment and print auditing capabilities.

MarkVision host table allocating users with color printing rights



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Device Management

MarkVision Messenger:

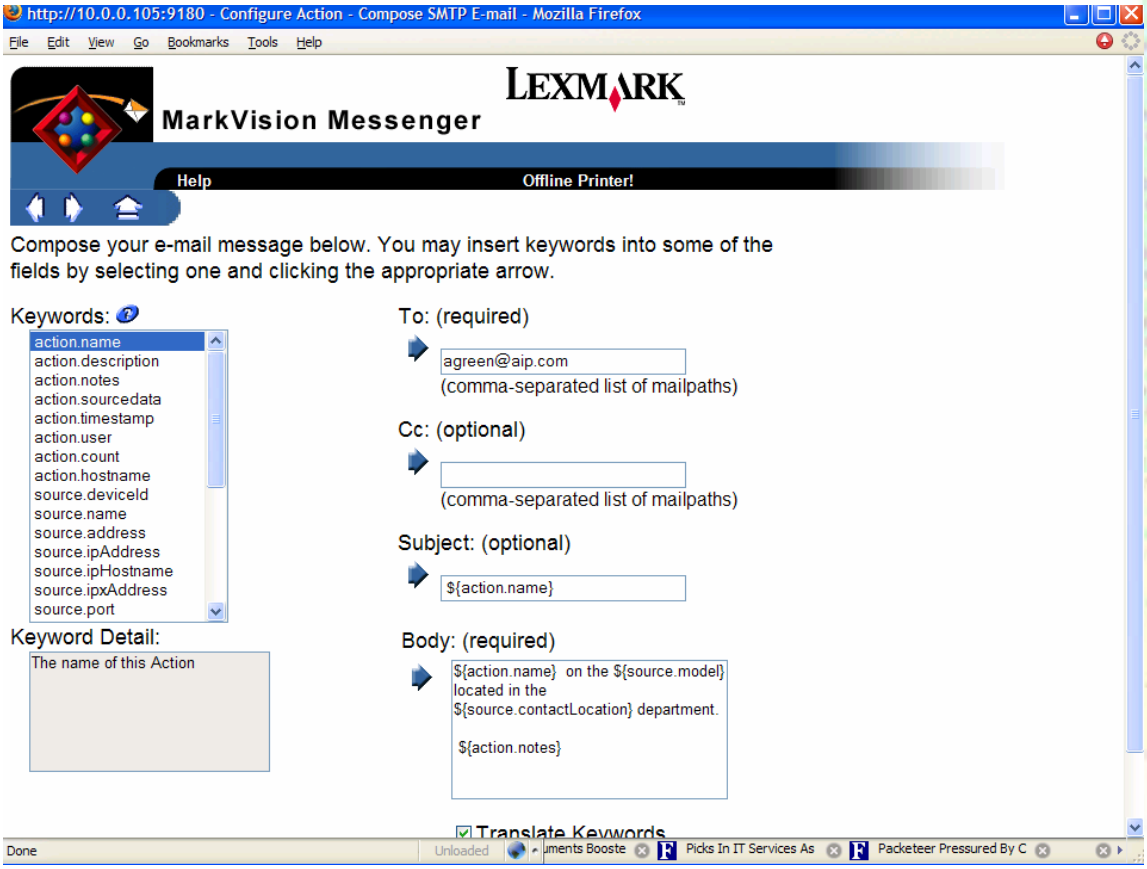
MarkVision is designed as server-based software and supports a Web interface in addition to Windows. Roving administrators can therefore manage printers remotely.

The Web interface includes MarkVision Messenger. This application allows administrators to build email alerts on a large set of conditions—e.g., finisher , defective supply, and life waning. Messages can include macro fields allowing device specific information to be inserted into the message text.

For convenience, MarkVision lets administrators tie alerts to individual folders containing a filtered set of devices. With a single click, alert conditions can be targeted to group devices, rather than forcing manual entry of IP address or host names.

This is a valuable administrative feature allowing IT managers to set up the alert support structure once for each group of devices, or each floor of a building rather than having to go into each device individually and set up the same system time after time. This also allows for much faster switching out of support staff details and replacement with new personnel made responsible for taking over the task of maintaining devices around the network .

Email messages can contain device specific information.



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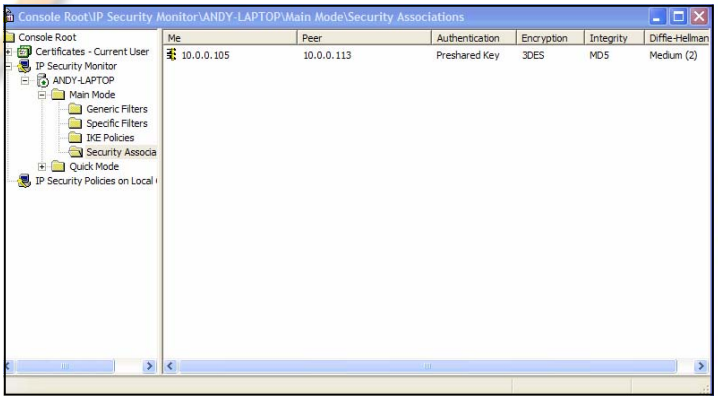
Security

IPsec

Through the Lexmark C920's embedded Web interface, administrators can turn on the standards-based IPsec (Internet Protocol Security) protocol. IPsec is a framework for a set of protocols for security at the network layer of the TCP/IP protocol. IPsec supports both authentication and encryption. A major advantage of IPsec is that security arrangements can be implemented without requiring changes to existing user software. For example, with Windows XP and 2000, IPsec can be enabled through the Microsoft Management Console (MMC). Networking protocols like telnet, FTP, HTTP, LPR, Discovery and others can then be secured transparently.



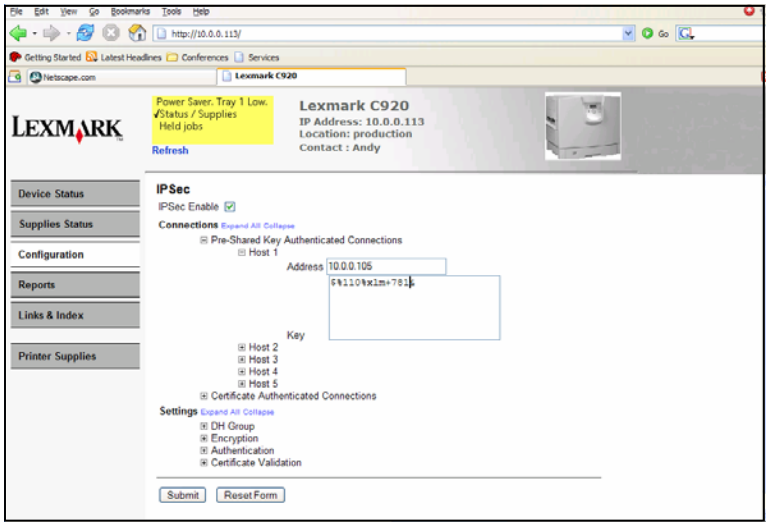
Microsoft Management Console shows security bindings

To enable security for the Lexmark C920, administrators must first configure how the initial authentication of devices is performed. They can choose from pre-shared keys, digital certificates, or Kerberos authentication.

In many LAN environments, the pre-shared key may be sufficient and is simpler to implement. Administrators enter the same secret shared key on both the Lexmark C920 and on Windows by setting up an MMC policy.

After the device's authenticate each other they can then, depending on the policy configured, encrypt the data or print stream. The Lexmark C920 supports DES, 3DES, and AES. These standards must be included in the Windows encryption policy for a security negotiation to complete successfully.

Pre-shared secret keys can be quickly configured on both Lexmark and in Windows.



With authentication and encryption configured, administrators then use "TCP/IP Port Access" Web page to select which ports to enable security on. If desired, ports can be configured to accept both secure and non-secure

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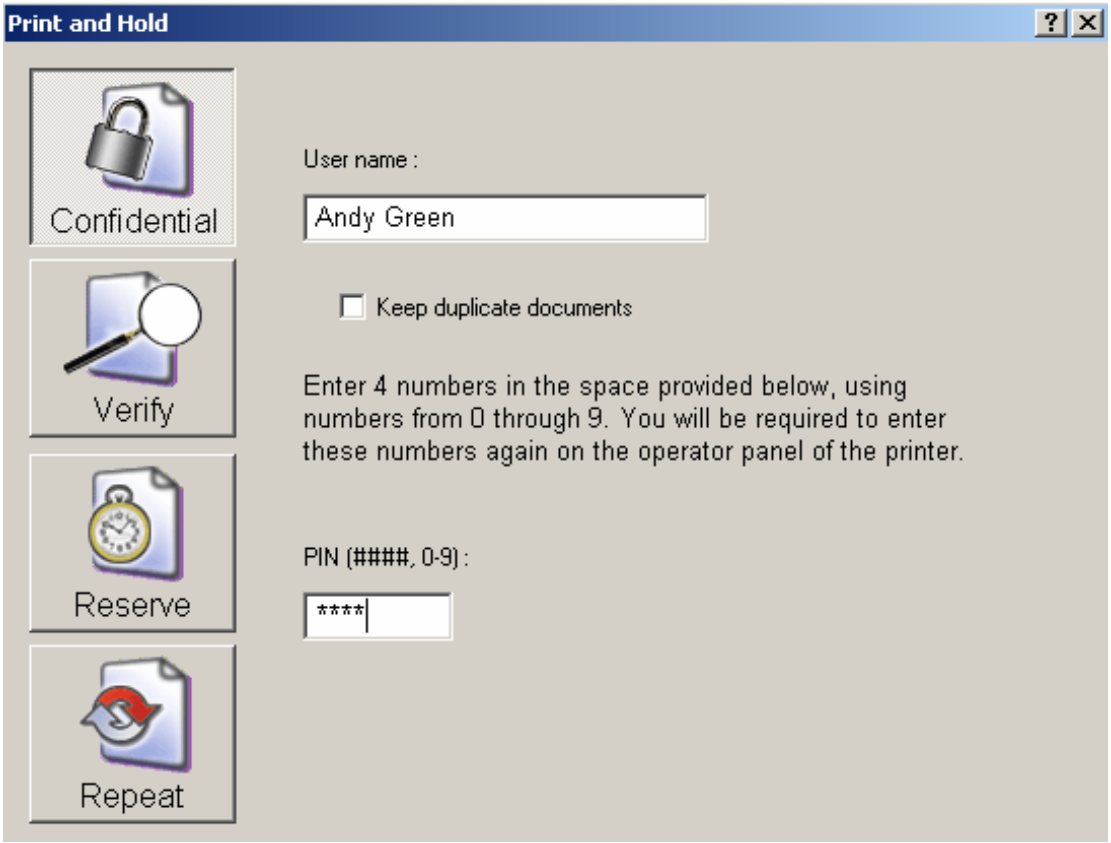
Security

Lexmark also offers a host of other security features to accommodate the need to keep information safe.

To safeguard the production and storage of documents the new ten digit button interface now allows users to enter PIN values from 0-9, when on previous models it was limited to 6 digit combinations. We were also pleased to find that the entry of the PIN is also now displayed as a * upon entry. On previous Lexmark drivers the PIN had been displayed as a number thus giving a potential thief the opportunity to watch from afar and observe the PIN displayed on the PC screen.

To further protect against forced code breaking attempts, the C920 can be set up to lockout access to documents where incorrect PINs have been entered. Confidential jobs can now be set to delete after a period of time. This means that a user sending a confidential document and forgetting to release the job at a later stage will not have left confidential information on the device for ever and a day.

Data can also be stored in an encrypted format on the drive, rendering it useless if stolen. To secure transmission Lexmark utilizes its own PrintCryption feature. To safeguard passwords etc as they are sent across the network the device utilizes SSL (Secure Socket Layer) protocol.



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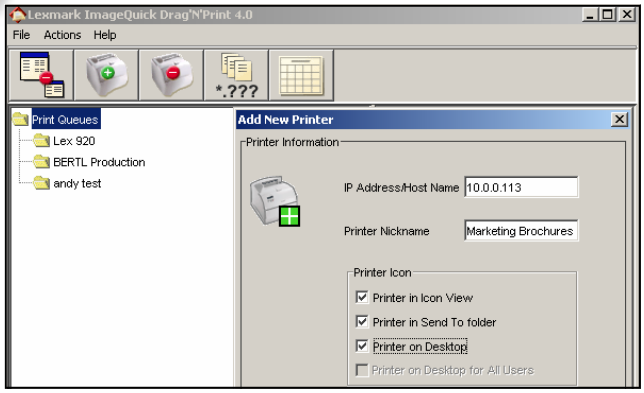
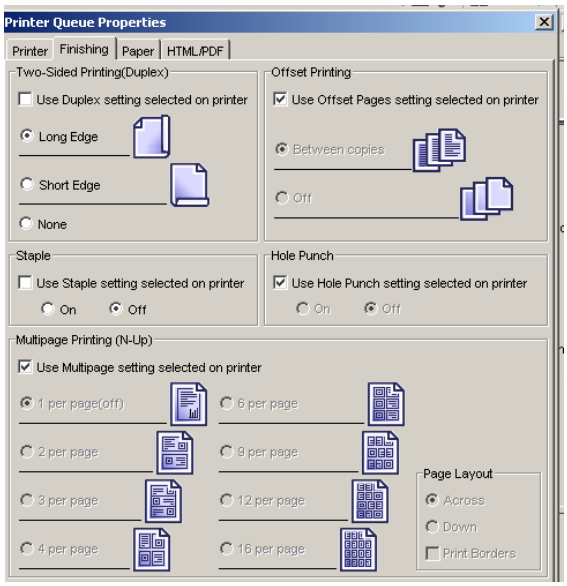
Direct Print

ImageQuick Drag'N'Print:



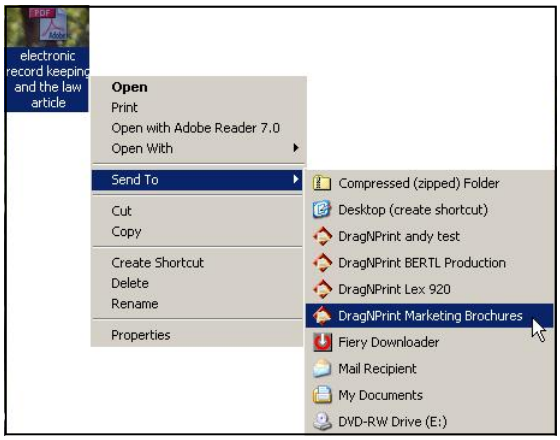
Drag'N'Print is a direct print utility that is provided with the driver CD as a standard feature for the Lexmark C920.

Lexmark's Direct printing will be a popular resource among users looking for fast reproduction of high bandwidth graphic files. The reason being that Lexmark's direct printing allows users to send PDF, JPEG, HTML, TIFF, GIF, BMP, and PS files directly to the print engine without launching an application or RIPing the file into a PCL or PostScript file. The time alone required to open an application such as Photoshop can be longer than the time it takes to print the file in some instances.



Users are able to set up as many direct PDF queues as they require. This is a valuable feature allowing users to set up a direct print queue with the required document production features necessary for a specific job type. For example, a user could set up one job queue defaulted to duplex output on paper from tray one, while another queue could be set to incorporate n overlay of the company letterhead and print from the bypass tray.

We also liked the ability to be able to use the direct print facility without having to first open a browser or windows application. This step, which is found on many rival devices can swallow up much of the time advantage that the process is supposed to deliver.



Users of the Lexmark C920 have multiple ways in which they can route a job into a direct print queue. They can either drag a file on the desktop onto the ImageQuick icon or they can simply right click on the file and select the direct print queue from the 'Send To' options. (as shown to the right.)

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Direct Print

Another valuable and unique feature on the Lexmark's ImageQuick utility is the ability to set up automatic print scheduled events.

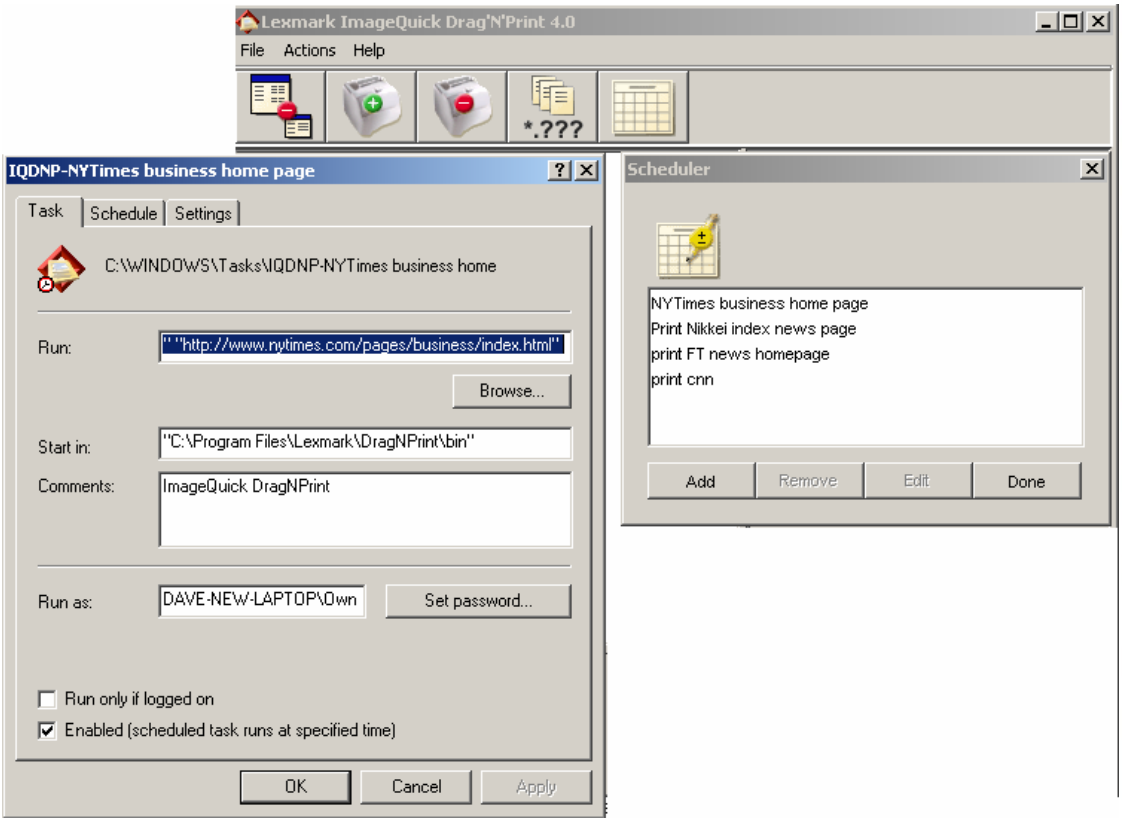
These can be files stored on a local device, networked device or even URL's pulled directly from the world wide web.

Scheduled events can be set up to go out on a one off basis or at regular intervals, to be set by the user.

The user simply sets up the location of the file, be it a network folder location or the URL address (if a web site address), the print parameters and saves the job as a scheduled task.

This function has a broad range of real-life applications. In the example below a stock broker in New York has set up a series of scheduled print events that ensure that when the brokers arrive in the morning that they have the main news page of the NYtimes, CNN, Financial Times and the Nikkei Index all ready to scan before the days events get underway. In a business where time is money this can be invaluable.

In another example a retail head office could set up a specific URL with the flyer design for the day's promotions. Each regional store sets up a scheduled print so that each morning the point of sale material and daily flyers are ready to be displayed and handed out immediately.



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Direct Print

There is another way in which files can be submitted directly to the Lexmark C920 without the need for a printer driver, or indeed without the need of a desktop PC.

We were very pleased to see that, after years of asking, a manufacturer has finally included a USB flash drive reader on the device console. For years manufacturers have been boasting about their ability to handle raw PDF data. However, it is only now that a user is finally able to walk up to a device with a USB flash drive (an IT gadget that has moved away from being a geek must have to being a standard piece of equipment for the IT literate) and print a PDF directly from the device.

This function has a great number of potential real-world benefits. The most obvious being in the service print industry, namely business centers in hotels, airports, conference centers, internet cafes and high street print for pay businesses. In these instances travelling business people will frequently have laptops and USB pocket flash drives. If they receive a contract or order form via email and need to get the file printed they have only to transfer the file to the USB card, pack away the laptop and walk down to the hotel business center or airport lounge and print the file.

To use this novel feature we simply had to insert the USB flash drive into the socket on the front console panel. We were then able to browse through the folder tree of the drive until we reached the PDF file we wanted to print.

At this point users can only select the number of sets they require. We would have liked to have the ability to choose features such as duplex or finishing options (if available) allowing for even greater document flexibility.

Browsing through subfolders on the USB drive

Select the PDF file you want to print

Specify the number of copies required

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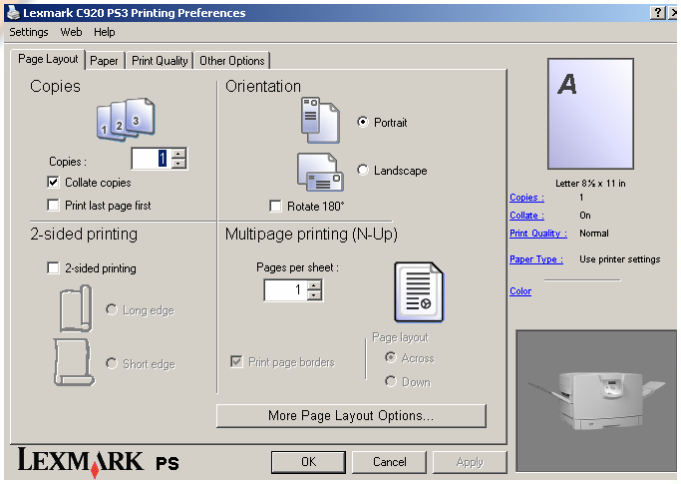
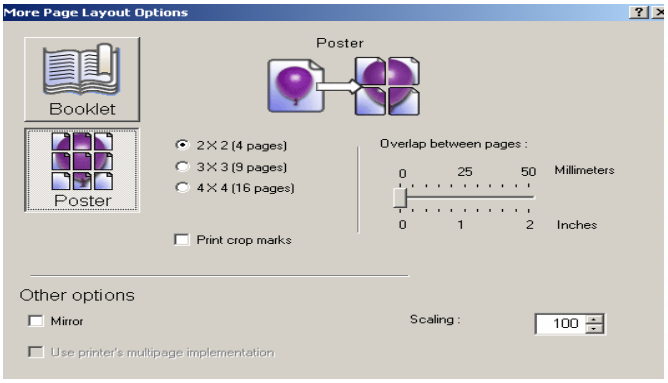
Print

Printer Driver Functionality:

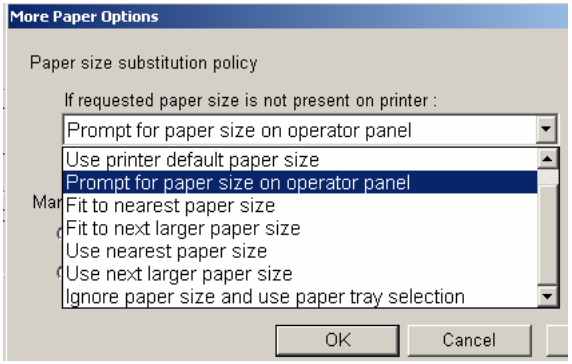
Lexmark users will feel at home when they first open up the printer drivers of the C920. We were pleased to see that the layout of the PostScript and PCL drivers is virtually identical, allowing users to switch between the two PDL's with no difficulty.



The drivers are split out into four tabs; Page Layout, Paper, Print Quality and Other Options. The tabs clearly define which printing features they cover, so no time is wasted browsing from tab to tab.



The one production feature that differs between the two drivers is the poster mode, which is missing from the PCL driver. This valuable feature allows users to split a document up into multiple printable portions which can then be attached to create a large poster. A common application for this would be in an education center or a retail outlet where budget restraints prevent print outsourcing.



Within paper mode there is the option to specify the paper source for the document. There is no ability to select a different paper source for the front or back cover. This is a feature that may restrict the device's suitability in environments that use, for example, pre-printed header stock or use heavy card stock for cover pages on manuals, brochures, presentations, etc.

Stapling, hole punch and offset are also selected from here (if installed.) We were impressed by the ability within 'More Paper Options' to be able to set up a substitution policy when a paper size is submitted to the device that is not currently loaded. Users can choose between multiple options that allow productivity to continue, rather than clog up the print queue, waiting for assistance.

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Print

Printing PDF files in booklet mode using the PostScript Driver:

Like many other printer and MFP manufacturers, Lexmark uses its own emulation of PostScript, rather than have to pay the royalty attached to using the true Adobe PostScript 3 driver. While testing, we found one instance where the non-Adobe PostScript driver created an issue.

The test involved printing a PDF file in booklet format. The task requires the driver to reorder the pages in the document, arrange them two-up on the page and print the document in duplex, so that when the pages come out the document can be folded over creating a booklet. Using the PCL5c driver the job was carried out exactly as described.

However, when we attempted to carry out this job using the Lexmark's PostScript 3 driver the results were not as expected.

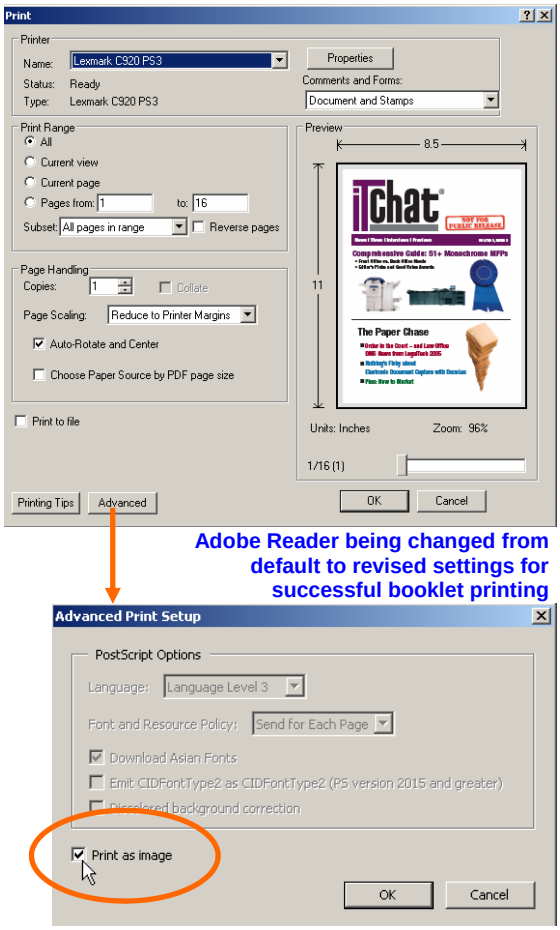
Instead of the two-up, duplexed booklet layout, the document appeared to spool but nothing ever appeared at the printer queue.

This same test is also creating problems for other non Adobe PostScript driven printers. The test was repeated using both the full Adobe Acrobat package and the Adobe Reader free utility, with versions ranging from 5.0 to the new 7.0 with the same result.

BERTL analysts looked into the issue further and discovered that the issue could be resolved by selecting a specific advanced feature within the print command in the Adobe Acrobat or Reader application. The feature is 'Print As Image.' This feature creates a substantially larger file than the default print setting. However, the output is a correctly laid out booklet. The feature is not an obvious choice to the average office user and is not one than an IT manager would want to set as a default setting within the device.

For example, a 16 page PDF test file spooled into a 6.55MB file using the default PDF print settings but became a 36MB spooled file when sent in 'Print As Image' file.

The resulting output is standard simplex print mode is also significantly slower (over 200% slower on the same 16 page PDF we had used for the booklet test), not taking into effect the five-fold increase in bandwidth that the MIS is not going to be pleased about.



Adobe Reader being changed from default to revised settings for successful booklet printing

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Print

Color Controls:

The PostScript 3 driver (illustrated right) lets users select from a number of color options, including the ability to manually set color contrast, color balance and color matching. Toner darkness can be manually set, and ColorSaver (which applies less color to save money on color draft prints).

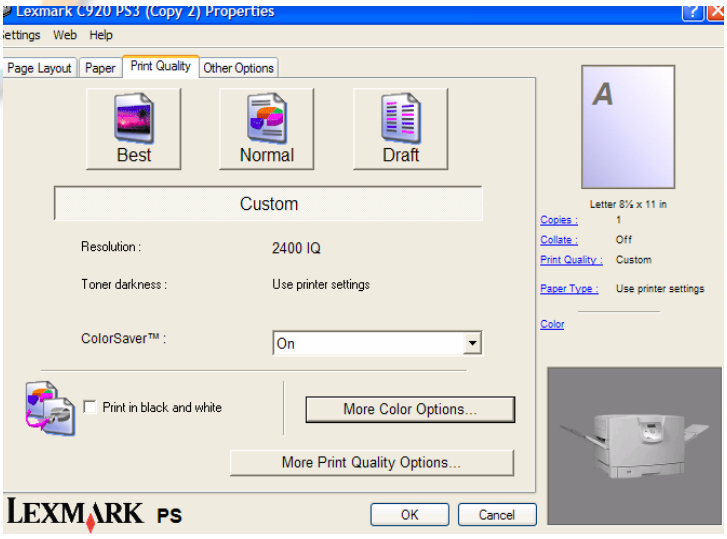
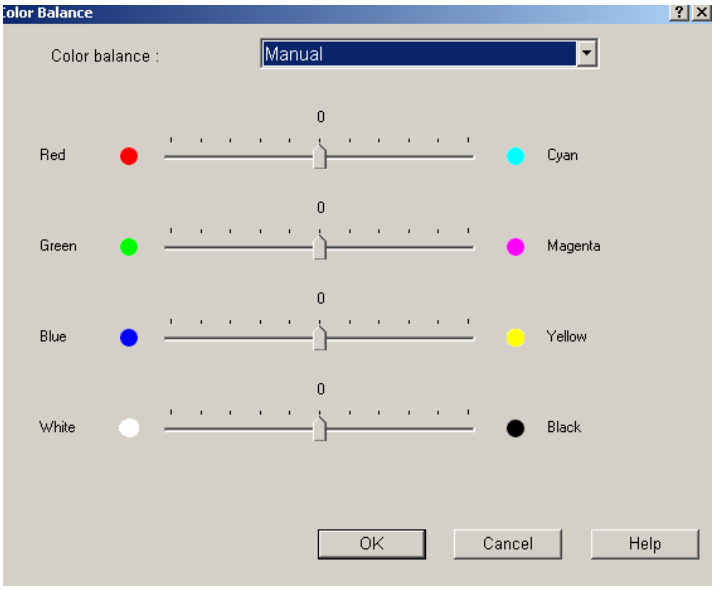


Image management tools on the Lexmark C920 PostScript 3 printer driver

Using RGB options, PostScript users can manually set images, text and graphics color corrections individually or as a set. Options include sRGB Vivid, sRGB Display, and Vivid. CMYK options allow users to configure controls for images, text and graphics at once. Options include Vivid CMYK, Euro CMYK and US CMYK.



The color controls on the PCL driver are identical to the PostScript driver with the exception that there is no Color Matching tab.

The color matching tab specifies whether the user wants to use ICC profile-based color matching, allowing users to more accurately match colors to those displayed on the screen.

We would have liked a more visual guide to how these color adjustments would affect image quality. This is achieved by some rival companies through the use of a thumbnail image which changes its appearance as color factors are adjusted by the user.

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Print on Demand

Both drivers include a range of job delivery options. In addition to sending a job to print, we could also choose between:

Verify Print:

Prints the first copy of a multiple copy print job, then holds remaining copies until you either continue printing the job or delete the job using the printer operator panel.

Reserve Print:

Stores a print job on the printer for printing at a later time, i.e Print on Demand functionality. To find stored jobs, we had to scroll through the job menu to our username, then scroll to the job we wanted to reprint.

Repeat Print:

Does the same as reserve print but produces a printed set of the job at the same time.

Confidential Print:

Sends print jobs to the device with a secure PIN. Users must first scroll to their username, then enter the PIN number using the keys on the printer operator panel. We were pleased to see that the PIN is now displayed as asterisks when entered by the user. In the past, the PIN had been displayed as the actual numbers on screen allowing a potential thief to oversee the data entry code.

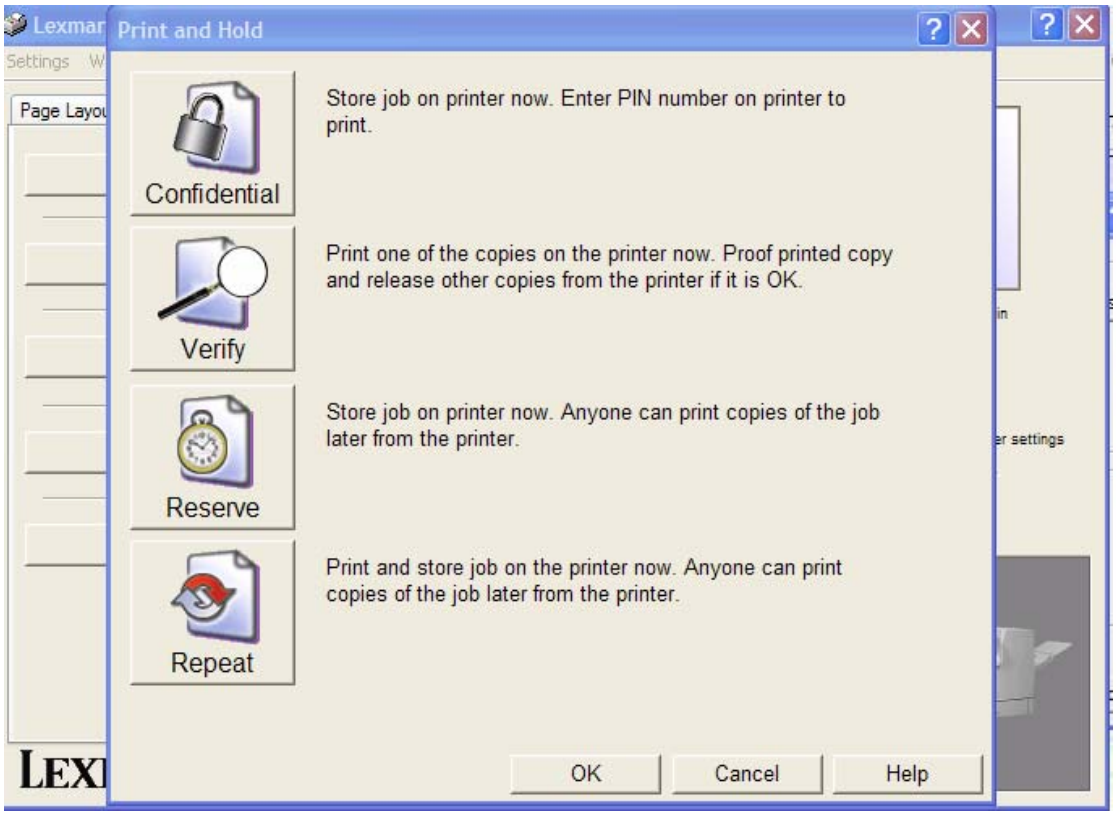

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Image Quality

Lexmark will be first to tell you that they are not envisioning the C920 as the ultimate tool for the graphic artist, a claim made by some other manufacturers with their ledger-capable desktop printers.

That is not to say that the image quality from the device is not to a high standard. In fact, the quality of the C920 is the best we have ever seen from a Lexmark device, and is certainly more than up to the job of producing any color output that would normally be required within a corporate or general walk up service print environment.

Above: Lexmark C920 PostScript 3 reproduction of a high-resolution Photoshop file

Below: The same file reproduced on a high-cost graphic art device

Note: Both images have been scanned at 600dpi, zoomed to 172% for illustrative purposes only.

The overall appearance of the output was more matt than gloss, a factor that will be appreciated by corporate users. While high gloss may look more professional it is often harder to use in an office environment with overhead lighting creating glare.

Colors were reproduced well, large areas of solid were reproduced without any banding or streaking.

Fine lines, grayscales and small text fonts were all reproduced accurately.

Compared to the output of a high powered graphic-arts device the output has a slightly flat appearance and looks at time very slightly hazy compared to the super crisp appearance of a graphic art print out.

Having said that, to be making these types of observations you have to get your nose up to the output or bring out the eye magnifier, two practices that do not occur when corporate users judge the quality of materials they are producing for presentations, sales demos, management reports, etc.

The images above show the difference between a $30,000+ graphic art solution versus the Lexmark C920, priced many times less.

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Summing Up

Summary:

While the Lexmark may have its flaws, it has an enviable number of unique features that put the device on its own in terms of user-friendliness and productivity in various real-world settings.

The installation and maintenance procedures are up to Lexmark's usual high standards, with MarkVision providing a professional means of managing one or multiple devices around the enterprise.

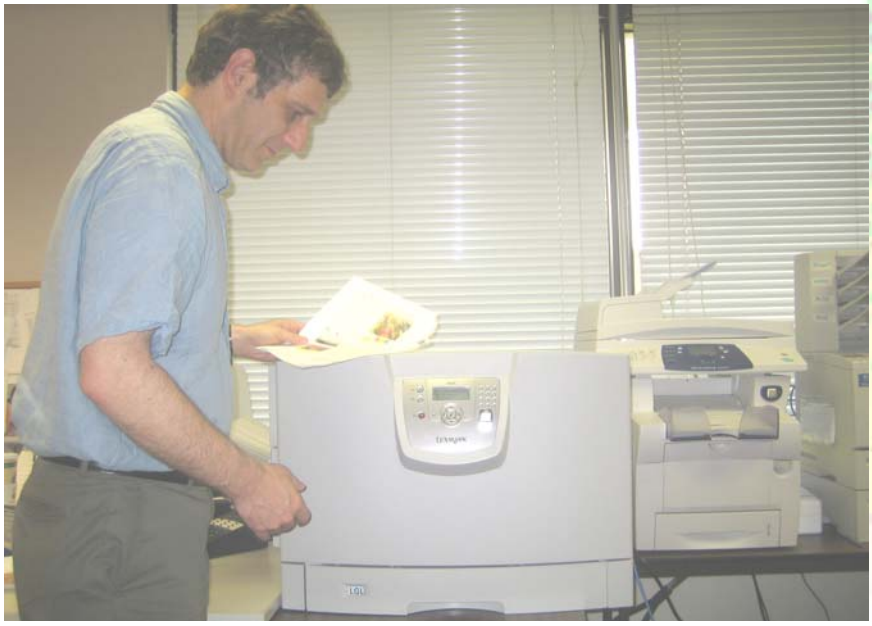
The direct print facility via ImageQuick and the USB interface on the device front panel provide a wealth of walk-up and automated printing abilities that are designed to make the job of printing business critical tasks as streamlined as possible.

Image quality will satisfy all but the most critical of business users.

There are areas we would like to see improved on the next generation product, including a more flexible user ID cost control system allowing users to be allocated a set limit per month rather than the yes or no option currently available.

We would also like to see the USB direct print facility expanded to include the ability to choose finishing/ document production options in addition to the quantity choice option, this would make the unique feature even more impressive, especially if a saddle-stitch bookletmaker could be added, the third of our wish list items.

While no device is perfect, the Lexmark C920 is certainly setting the standard for products in its sector, and will be a tough device to beat when placed in the hands of a sales rep who knows how to tie in the device's feature rich attributes to a customer's real-life needs.



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