Rheinner eGuide

August 15th, 2005 Volume VII

Review of the Panasonic KV-S3065C Series Color Document Scanner

We're not sure that *anything* was left off the table when this product was designed. A simple review of the data sheet reads like Panasonic engineers looked at all of the features the competition offers, tried to double or triple the capabilities, lowered the price, and provided the longest warranty in the industry for the whole package.

Its no wonder this product won "Best of Show" at the 2005 AIIM Conference and Exposition, and numerous other kudos. We had heard about it of course, but had to see for ourselves if the "buzz" was in fact true. Panasonic sent us an evaluation unit, and we put it through its paces and report the results back to you.

We're not sure that there is anything else anyone could want feature-wise in a $6,000 ($7000 for the CW version) color document scanner.

Like all Panasonic products, there is a "substantial" look and feel to this scanner, it just looks and feels like it's built to last. Maybe that explains the industry leading 1 year advance exchange warranty Panasonic supplies with this product.

Panasonic's Line of Document Scanners

With the addition of the 3065CL/CW (here referred to as "series"), Panasonic provides one of the most complete professional duty scanner lines in the document imaging industry. Ranging from the KV-S2025C at the low end (not the same low end you find at Staples) to the KV-S3105C the company offers the document management community seriously engineered machines for professional business applications.

In the United States, Panasonic Digital Document Company, unit of Panasonic Corporation of North America, markets a broad line of digital imaging systems, computer peripherals and office system products designed specifically for business use.

http://www.techinfocenter.com

Physical Properties

The first step in our scanner product reviews is to examine the physical features, appearance and apparent manufacturing quality of the scanner.

Click the Picture to Play the Video: (not available in this version)

In the not too distant past it was almost unthinkable to get this level of performance at a roughly $7,000 price tag. In a nutshell, the KV-S3065C series has all of the hallmark features of a production scanner, but at a departmental scanner price. For example the KV-S3065C series is the only scanner in its class with a 300 sheet motorized input tray, a feature normally only found on models costing considerably more. At 75 PPM simplex, and 142 PPM duplex its not a dawdler either.

While it looks bigger than it really is, its size in comparison to competitive models (that appear to be much slimmer), that perception is in fact deceptive. It has become fashionable to reduce the footprint of the scanner by housing the scanning elements, (bulbs, ccd assembly etc) in a small narrow case in order to give the appearance of space saving. In reality once you add the feeding tray, and the output basket the apparently small scanner suddenly takes up an awful lot more desk space. Comparing in inches, the KV-S3065C series leaves a footprint roughly half that of the the leading competing models.

The KV-S3065C comes in two models, the “CL” and the “CW”. The “CL” accommodates paper sizes ranging from business card to legal size, and the “CW” from business card to ledger size paper. The scanner uses a “clamshell” architecture which is a feature found in the higher end of production document scanners. It is desirable because it allows full and rapid access to the entire paper path for clearing jams, as well as offering convenient access to internal components that require periodic maintenance.

Unique Features

The KV-S3065C series is feature packed but there are two design details that stand out for us because they are so unique. The first is the type of camera (image sensor, or the “eyes” of the scanner) that the KV-S3065C series uses. Most scanners use a Charge Coupled Device (CCD) to “see” the document and turn it into an image. CCD’s are highly regarded for the image quality they produce. The KV-S3065C series uses something called a Contact Image Sensor (CIS) in order to “see” the document and turn it into an image. In common parlance, a CIS is typically the kind of image sensor that is used in cheap and inexpensive digital cameras, producing average or below average picture quality. No doubt Panasonic’s competitors will use this as a negative and attempt to paint the KV-S3065C as a “cheap” scanner because of this. It would be unfair and misleading to do so how-

ever. While it is true that CIS sensors are built around more inexpensive CMOS (Complementary Metal Oxide) technology and these kind of image sensing "packages" are used in cheap camera's, that's not the same type of CIS that is used inside the KV-S3065C series. In fact the CIS used inside the KV-S3065C series is a hybrid of both CCD and CIS technologies. In other words, it combines the best of both worlds.

The negative about CCD based scanning is the fact that the image is bent along a series of mirrors that is then reflected into the CCD for rendering. The bending light can cause distortion in the image. CIS sensors (not the Hybrid CIS Panasonic uses) use CMOS instead of CCD for rendering. It is the CMOS component that is responsible for producing inferior image quality. However there is also a strong plus. The sensing package is smaller and more compact and there are no mirrors. Panasonic has taken the best of both worlds, it uses a CCD to get a superior image, and uses the "no mirrors" package found in other contact image sensor packages to make the image quality even better. As a result the image quality is outstanding.

The second significant design detail is the unique way in which the image sensor is protected from the rigors of the scanning environment. As many of you may know, the lens can easily be scratched by staples, forgotten paperclips and other document "artifacts". Replacing the lens is not often that simple, or inexpensive. In an effort to reduce downtime due to maintenance, and in order to spare unnecessary expense Panasonic has designed the lens covering in an innovative way. Unlike virtually all other scanners (in this category) the lens cover on the 3065 is concave instead of flat. That means that the paper passing over it does not really make contact with the lens cover itself. While this does not eliminate all failures associated with the wear and tear the assembly receives by paper passing over it, it does greatly extend the life of the lens assembly. Should it need to be replaced however, Panasonic has also made that an easy and hassle free procedure. A simple thumb screw is used to remove the cover and a new one can be installed in seconds.

Clam-shell Type Design

As we have said before, the KV-S3065 series features a clam shell type design. While typically found in more expensive scanners, clam-shell designs are advantageous because they provide the operator with full access to "the guts" of the scanner, making it quick and easy to perform maintenance and remove paper jams. A stainless steel interior is also a feature commonly found in more expensive models, but again is included in the KV-S3065C series. Stainless steel protects the interior of the scanning device and provides a wear resistant maintenance free interior capable of withstanding (in this case) an impressive 10,000 page per day duty cycle. Plastic would have been cheaper. Nearly all scanners in this range come with feed detection, and the KV-S3065C series is no exception. The KV-S3065C series however comes with another feature that is most commonly found on more expensive products, and that is twin ultrasonic feed detection, a feature commonly found in much more expensive products.

The KV-S3065C series also comes with an installed set of high yield rollers capable of taking 300,000 page before requiring a replacement, giving it a very high availability rating. Replacing the rollers is literally a snap.

Paper handling on the KV-S3065C series is, as is the case with most Panasonic scanners, is quite excellent. The KV-S3065C series has the ability to scan everything from plastic ID cards to long paper printouts up to 183 feet. This makes this model ideal for healthcare, or scientific applications. Support for an optional pre/post scan imprinter is also provided. As special note we should point out that the pre-imprinter prints on the FRONT of the document just like it is supposed to, and the post-imprinter prints on the back. This is important to know, because not all imprinters work in that way. Since pre-imprinting is something that you want in the image that is

captured and post-imprinting is information that relates to the fact that the document has been scanned and is available via some kind of document management solution.

The KV-S3065C series provides the operator with the ability to manually select a black background or white background reference. This is important because not all software applications require the document background reference to be white. Switching is a simple procedure done by opening the clam-shell and flicking a switch located on the left side of the upper part of the shell.

In terms of interfaces the KV-S3065C series comes with both a USB 2.0 and high speed SCSI interface. It also includes both a TWAIN and ISIS driver.

In terms of hardware features, the KV-S3065C series bests the leading competitors in its category in many important ways. The 300 page elevated input tray, a 10,000 page daily duty cycle, the stainless steel interior, being able to scan documents nearly 200 feet long, and 300,000 page duty cycle of the long life rollers are just a few of those features.

Image Processing

All document scanners usually come with some kind of image processing and enhancement features. The KV-S 3065C series is no exception. In this segment we look at the image processing features that come with this device.

Click the Picture to Play the Video: (not available in this version)

The KV-S3065C series comes with all the image enhancement features one typically expects these days from any scanner. The KV-S3065C series has the ability to de-skew and crop color documents. Virtually all color scanners have that capability for the black and white documents, but not for color. De-skewing and cropping in color requires a whole different image processing algorithm. The KV-S3065C series of course does both. The KV-S3065C series also has the ability to automatically detect whether a document is in color or not. This of course is an important distinction because files scanned in color are considerably larger than those scanned in black and white. Typically a logo on a business document for example will be in color. When a color scanner is set to scan in color it will treat all the content on that page as if it was color, even if color is

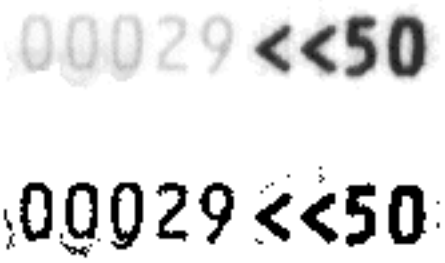
only present in the logo. That will make the scanned image file size anywhere from 8 - 16 times bigger than it would be if it were scanned in black and white. As a result the ability to detect the color elements and scan those in color while recognizing black as black is an important feature.

Multi-Stream, or the ability to scan a document simultaneously in color as well as black and white is another important feature for document management solutions, particularly those that rely on optical character recognition. While it is technically possible to OCR in color, the accuracy and speed of that process is still an issue. OCR in black and white is proven, and widely available. Multi-Stream technology allows the scanner to capture the color document in color, while simultaneously producing a black and white copy that can be sent to the OCR process.

In addition to the "standard" suite of capabilities it also comes with a significant number of Image Processing features that are only available from Panasonic.

Dynamic Threshold Technology

When you scan a document in black and white, the scanner will make an attempt to turn whatever color or shade of gray that is on the document itself into black and white. Obviously if the content is not black, the scanner must use some kind of value in order to turn what it sees into black. We have all had the experience of moving the copier contrast slider from black to white in order to try to get the best possible copy of some kind of problem document. That is one kind of thresholding, and is the kind that varies background and foreground darkness in order to make something faint show up more prominently. Clearly this is not the best way to improve image quality. For this reason a number of different "adaptive" thresholding technologies are commonly employed. For those of you that want to know why you should care about this, it is for the following reasons. If you are OCR-ing a document the darker and more well formed the characters are, the greater the realibility of the OCR result. In the example provided here, the original was obviously scanned in gray scale. The letters 00029 might as well be written in invisible ink as far as the OCR engine is concerned. Needless to say it has great difficulty in reading it, if it can see it at all. After applying the dynamic thresholding algorithm you will notice that not only the gray numbers came out better, but so did the fuzzy <<50. As a result the OCR technology can now clearly see all of the characters in this document. That is the beauty of dynamic thresholding, rather than slider settings, or applying a uniform threshold value to the entire document, dynamic thresholding only applies what is needed and only to the areas that need it, and it does so on the fly.



Multi-Color Dropout

It is interesting to note that Panasonic has made considerable investment in its image processing technology, and continues to do so while most of their competitors continue to rely on third parties to provide image enhancement capabilities that lie outside those commonly provided with either the twain or ISIS drivers. While clearly some of the features available on this device are licensed from common imaging industry sources, and

thus are available in a number of scanners, Panasonic is making quite a reputation for itself with its own image processing technologies. The most notable of which is its own Dynamic Thresholding technology and most significantly its Multi-Color Dropout technology.

Multi-color dropout is a very sophisticated and advanced image processing tool, that gives the operator or scanner administrator what we believe to be the most powerful image processing controls related to producing the clearest black and white images from color scans. In a nutshell, the Multi-Color Dropout allows the operator to select multiple color areas within a preview document, save it as a set of preferences and from then on those colors are automatically removed from all subsequent scans. This may look like a feature available on other devices, but there are some noteworthy and highly significant differences in the Panasonic technology. First of all normal (non-Panasonic) digital color drop out selects a single color, not a range within a color.

When a form or a document is printed, the color that is applied is not entirely uniform. We don't see it with the naked eye, but the scanner does. So if you select a certain shade of blue to be eliminated, only that shade is eliminated, any other shade of the same blue is not. That is why despite telling the device to remove that color, all kinds of black (the blue shades) artifacts still show up inside the black and white image that is rendered.

With Multi-Color dropout, the blue and *all related shades* that you have selected from the color scan are eliminated, producing an *extremely* clean black and white image, essential for recognition operations. A second major difference is the fact that up to three *sets* of colors can be selected for simultaneous removal, and you can even select some colors that should *remain* in the image. A third critical difference is in the amount of detail that the operator can select in the control panel in order to set the parameters for subsequent scans. Panasonic has come a long way from the clumsy interface of earlier versions of this technology, to a user control panel that is intuitive and cleanly laid out. By selecting the desired range of colors from a spectral graph the system provides, the operator has the ability to select the finest possible granularity for this type of enhancement operation. This type of set it and forget it operation provides the maximum level of control for enhancing some of the most problematic color documents we have seen.

Concluding Remarks

We thoroughly enjoyed reviewing this machine, so we will keep it short and sweet. As we said at the outset, for the money this is quite a machine, and it is no wonder it has received the kudo's that it has. A scanner with these capabilities at such a reasonable price point is a rare find indeed.