REAL WORLD

Print Production with Adobe® Creative Cloud®

INDUSTRIAL-STRENGTH PRODUCTION TECHNIQUES

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Preparing Raster Images

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Whether you acquire an image from a scanner, a digital camera, a royalty-free CD with 1,000,000 images, or a stock photography vendor, it's made out of pixels. *Pixel* is shorthand for *picture element*, the smallest unit of information in a digitized image. Even though pictures on your monitor look like smooth transitions of color, zoom in sufficiently and you'll see all the little square pixels that actually make up the image (**Figure 4.1**). While pixels make it possible to do much of what we do in the graphic arts, they're also the cause of some important limitations.

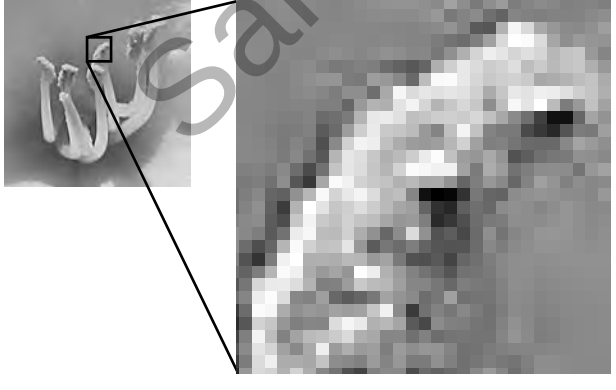


Figure 4.1 *Images are made of pixels. Think of them as tiny mosaic tiles.*

Ancient Times: B.P. (Before Pixels)

In the olden days of graphic arts, enormous cameras were used to photograph artwork such as drawings, reflective photographic prints, transparencies, and painted illustrations. Highly skilled specialists commandeered these monstrosities, some of which occupied entire rooms (the cameras, not the specialists). The use of colored filters, masking, and exposure methods to produce *color separations* (a separate piece of film for each printing ink) was rather arcane and required years of apprenticeship and study to perfect. And since every step required the use of specialized film, there were a lot of trips to a darkroom to develop the results in chemical baths. It all seemed very high-tech at the time (well, compared to cave paintings), but the process was quite time-consuming.

All About Pixels

Film has given way to pixels, and we have gone from dog-eared color photographic prints and moldy 35mm slides to storing our family photos on piles of CDs, and now into the nebulous world of cloud storage. What was once the province of the darkroom became a daylight venture, and the tools of the craftsmen became available to anyone brave enough to wade in.

Scanners

While early scanners still required highly skilled graphic arts professionals to operate them, they greatly sped up the process of capturing artwork for color separations. Early analog models used photomultiplier tubes and a daunting array of knobs and buttons to perform the same job that had been done by the huge cameras. The first scanners were petite only by comparison to their gigantic camera ancestors: Many could easily dwarf a Volkswagen. It was necessary to mount artwork on a heavy, clear plastic drum and then painstakingly ensure that there was no dust or a trapped air bubble to mar the scan. Scanner operators came from the ranks of color-separation cameramen, and their years of finely honed instincts for camera separations translated well to the newer methods. Thus began the move to digital capture and storage of image information, resulting in our devotion to the pixel and the advent of digital retouching.

In the mid-1990s, improvements in the capabilities and simplicity of flatbed scanners, coupled with the widespread usage of Adobe Photoshop, led to a major change in the way color separations were performed. It was no longer necessary to mount artwork on cylindrical drums, and the numerous knobs were replaced with onscreen buttons and dialog boxes. The digital imaging revolution was underway. Suddenly, people who weren't sure what color separation meant were making color separations.

As flatbed scanners have become more automated and less expensive, it's relatively easy even for novices to make a decent scan. But the more you know about what constitutes a good image, the better the chance you can create a great image from the pixels generated by your scanner.

Digital Cameras

Today's scanners capture transparencies, negative film, paintings, and illustrations and express them as pixels. High-end digital cameras now rival—or exceed—the ability of film-based cameras to capture photographic detail. The image captured by the camera is a digital original, so there's no need to scan a print. Of course, the better the camera and the photographer, the better the image. The rapid evolution of digital image capture is such that today's cellphones take pictures with more inherent information than the earliest digital cameras.

While conventional camera film—such as 35mm transparencies—must be scanned to be used on your computer, digital camera images can be downloaded directly to the computer and used immediately. Digital photography also cuts out the middleman. Unlike film images, digital images don't have any grain, although an image photographed in low lighting conditions may tax the resolving capabilities of a digital camera's sensor, resulting in unwanted digital noise.

Consumer point-and-shoot cameras deliver captured images as JPEG, a compressed format. There are degrees of compression, from gentle to aggressive, and you may never notice any visible artifacts betraying the compression. But higher level "prosumer" cameras and professional digital cameras can deliver images in the Camera Raw format, which is subjected to minimal processing by the camera. While you cannot place a Raw file directly into Illustrator or InDesign, Raw images can be opened directly in Photoshop and saved in another format, such as Photoshop PSD.

TIP While you can't place a Camera Raw file directly into Illustrator or InDesign, there is a workaround. In the Camera Raw module within Photoshop, hold down Shift as you click Open (the Open Image button changes to an Open Object button): this will open the image as a Smart Object in Photoshop. Save the image as a PSD, and you can then place it in Illustrator or InDesign while retaining the secret Camera Raw editing ability. Back in Photoshop, just double-click the Smart Object to edit in Camera Raw.

Raw files can be color corrected in the Photoshop Camera Raw environment without losing additional information. For example, an image shot under daylight conditions but with the camera's white balance set to fluorescent lighting can be corrected with one click in the Camera Raw environment without the loss of information that would be incurred by using a Levels or Curves correction in Photoshop.

If you are a point-and-shoot photographer who just wants to capture moments from a quick vacation, you may consider Raw files to be overkill. But for professional photographers, Camera Raw is a powerful and flexible format, often enabling the recovery or enhancement of details and tones that would be lost in a JPEG file.

Imaging Software

Once you have captured pixels, it's likely that you'll feel compelled to modify them. The industry standard imaging application is Adobe Photoshop, and for good reason. Photoshop provides controls for color correction that enable a knowledgeable user to achieve results equal to those of a knob-twisting scanner operator. Its tools surpass the capabilities of the original, million-dollar dedicated systems. If you're just beginning to learn Photoshop, you won't lack for educational resources. You could probably build an addition to your house from the books devoted to exploring Photoshop. You can add Chapter 10, "Photoshop Production Tips," to the pile.

Photoshop is arguably the most versatile and widely accepted application for image manipulation, but there are other applications that perform useful imaging functions as well.

Adobe Photoshop Elements® (Mac/PC) might be regarded as "Photoshop Lite," but it still packs a hefty arsenal of retouching and color-correction tools. The product is geared toward enthusiasts and lacks support for CMYK images.

Adobe Lightroom™ (Mac/PC) is engineered for use by photographers and provides sophisticated tools for organizing and color correcting images.

Apple iPhoto® (Mac only) is geared toward hobbyists, with organizational tools and limited color-correction capabilities. However, it offers no support for CMYK images.

Aperture (Mac only) is targeted to photographers and includes support for Camera Raw files. It provides organizational tools as well as color-correction controls but provides no support for CMYK images.

These are not the only solutions that exist for manipulating images. There are painting programs, such as Painter™ and Paint Shop Pro® (both from Corel®), which let you easily make images resemble watercolors or oil paintings. Imaging tools for consumer and hobbyist photographers increase on a daily basis. However, most of these programs don't offer support for CMYK images, so they're not the best tools if you're preparing images for print.

Let's face it—if you're designing for print, you can't live without Photoshop. When the name of a product becomes a verb—"Please Photoshop that out"—it's a sure sign that the product has become the industry standard.

Resolution and Image Fidelity

The resolution of an image is generally measured in pixels per inch (ppi) unless you speak metric, in which case it's expressed in pixels per millimeter. Determining the proper resolution for Web images is simple: 72 ppi at final size. But there are strongly held (and hotly debated) beliefs regarding the appropriate image resolution for printing. Some hold that 150 percent of the final screen ruling value is sufficient, and some believe twice the final ruling is preferable, largely because it's easier to calculate the resolution. For example, an image that will be printed at 150 line screen should have a resolution of 300 ppi. In the past, when typical hard drives held 80 MB, networks were glacially slow, and RIPs choked on 15 MB PostScript files, it was important to trim off every little bit of fat, so we agonized over resolution. But now, with hard drives measured in hundreds of gigabytes, and RIPs with much more robust digestive tracts, we can afford the luxury of a few extra pixels. That said, there's rarely an advantage to exceeding 300 ppi, except in some cases for higher line screens such as 175 lpi printing. So put away the calculator. For most circumstances, 300 ppi at final size is adequate and provides a bit of elbow room if you have to slightly reduce or enlarge an image.

But you do have some leeway, depending on the nature of the image and how it will be used. For example, a gauzy, soft-focus shot of a sunset that will be used as a ghosted background accent in a magazine can be used at 200 ppi with no problem. A highly detailed close-up image of an important

piece of antique jewelry in a 175 lpi art book should be at 300–350 ppi. At the other end of the spectrum, an image for use in an 85 lpi newspaper can be 130–170 ppi, because much of the information in a 300 ppi image would be lost when printed in the coarse newspaper screen ruling. Consider the determination of appropriate resolution to be an equation based on image content and the final printing line screen rather than an absolute number.

Scaling Up

When enlarging or reducing an image, don't be afraid to *slightly* reduce or enlarge an image. But be aware that when an image is scanned or captured by a digital camera, it contains a fixed number of pixels. When you enlarge an image, you're attempting to generate missing information in a process called interpolation; the result is never as good as a proper-sized original scan. And the more drastic the transformation, the less satisfying the outcome (**Figure 4.2**).

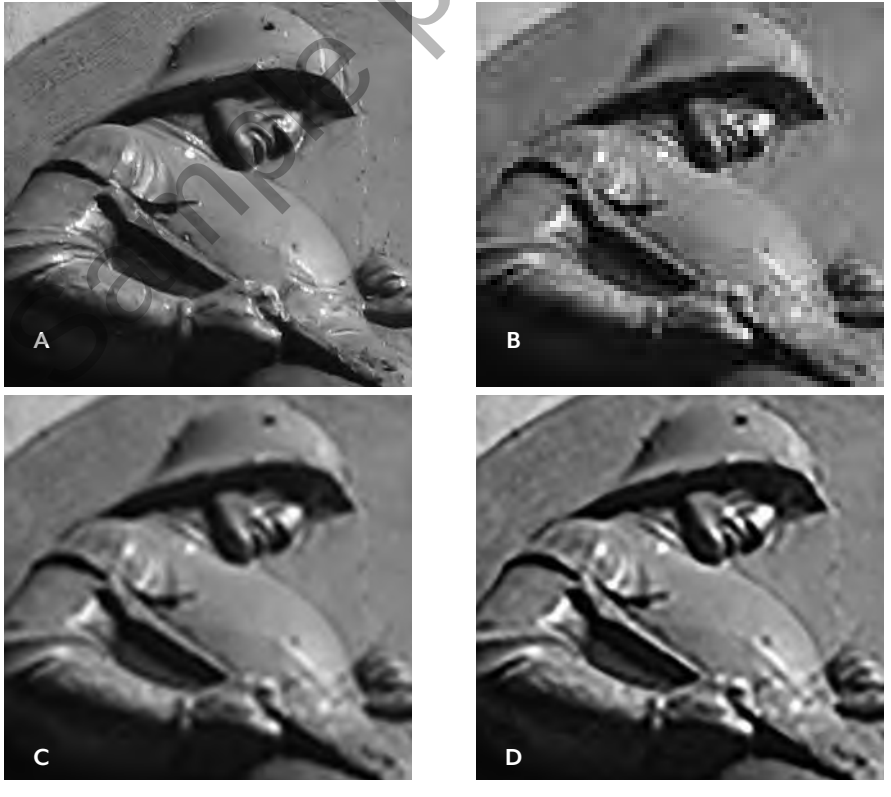


Figure 4.2 *You can't truly make something from nothing. Notice the loss of detail in the scaled-up version (D) versus the original (A).*

Because of the limitations imposed by resolution, it's helpful if you can anticipate how the image will be used and control photography or scanning accordingly. For typical image content, you can probably scale up to 120–125 percent. If the image is background content without much detail, such as a soft-focus landscape, you have more leeway and can probably get away with scaling up to 150–200 percent. Conversely, if you need to maintain very small details, you may be limited to a maximum of 120 percent.

Photoshop CC introduced a new method that does a better job of scaling up images and upsampling them to higher resolutions—Preserve Details. While the results won't be equal to a higher resolution original image, it's a definite improvement over earlier methods (**Figure 4.3**).

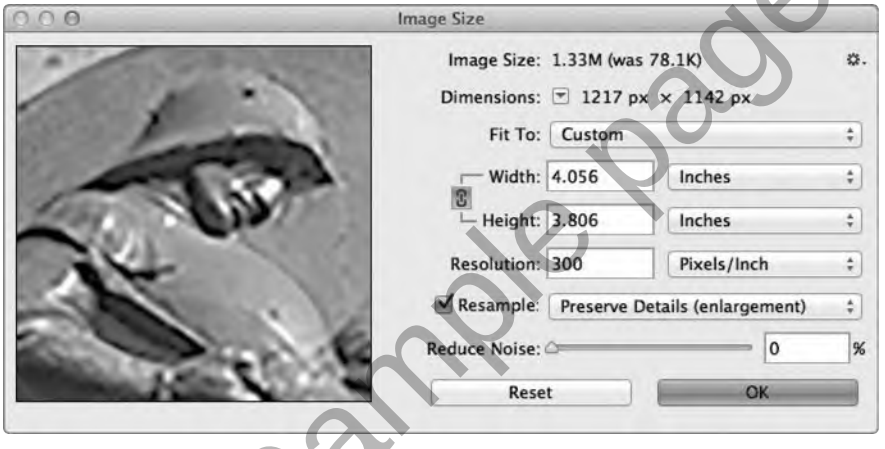


Figure 4.3 *If you have to scale up an image, or artificially increase its resolution, be sure to choose the Preserve Details option in the Photoshop CC Image Size dialog box. Tip: If you select "Automatic," Photoshop CC chooses the best method for resampling.*

Scaling Down

Scaling down an image also involves interpolation. While the loss of data may not be quite so obvious when you reduce the size of an image, there can be some softening of detail. For best results, choose the Automatic option in the Image Size dialog box in Photoshop CC; it applies some sharpening to camouflage the reduction in detail. While it's acceptable to scale images in InDesign, if you find it necessary to scale an image below 75 percent of its original size in your page layout, consider scaling it down in Photoshop CC instead, because InDesign can't sharpen image content.

Scanning Artwork

If you are incorporating flat artwork such as pen-and-ink drawings or paintings in your design, you have several choices for digitizing the artwork. If you have a good flatbed scanner, you may be able to capture the artwork without any special handling. To provide some flexibility in later usages of the scanned image, consider performing two scans at 100 percent: one at 300 ppi, and one at 600 ppi if your scanner supports it. Then, you have two robust images that can be resized for a wider range of uses.

If your flatbed scanner isn't up to the task, ask if your print service provider performs scanning. Many printers have high-end scanners capable of capturing and enlarging artwork. If you have transparencies or negative film that must be scanned, the printer's professional scanners can capture detail and perform enlargements with higher-quality results than are possible with consumer-level scanners.

Some materials, such as textured paper, dimensional paint (such as heavy acrylic or oil paint), metal, or transparent substrates, don't scan well. The scanner's illumination bounces off metallic components and often appears black in the scanned image. Because of the even, frontal lighting of the scanner, texture is subdued or lost. And you can't very well pin a statue under the lid of your scanner. If you have to capture a challenging art piece, the best solution might be to hire a photographer who specializes in capturing fine art pieces and has experience lighting and photographing such projects.

Cropping and Transforming Images

It would be great if you could anticipate the exact size, crop, and angle at which you'll want to use an image in your page layout. But it may be difficult to see that far down the line at the moment you're pressing the button on your camera, or slipping a print under the lid of your flatbed scanner. Oh, and watch out for that little gust of wind that comes along just as you're putting the scanner lid down…

Cropping

Should you crop your images? Maybe. If you're certain about future image use, feel free to crop. Leave a reasonable rind around the image area you intend to use to provide some elbow room when you place the image in the final page, so you have room to reposition the image, or to provide bleed for the page. However, if you think there's even a remote chance that you'll want to use more of the image in the near future—maybe you're not sure if you might want to show a row of four buildings instead of just the one in the middle—then it's worth keeping the whole shebang. While you may be reluctant to store an entire image just to keep the part with the 2-inch golf ball that you're sure you will silhouette, give yourself a safety net and at least keep an uncropped backup copy of the image. Hard drive space is plentiful and you can always crop it later. It's hard to recover that extra person you lopped off last week who turns out to be the CEO of the company.

Rotating Images

Almost any transformation, whether resizing or rotating, causes interpolation of pixel information. The only safe rotations are 90-degree increments—anything else will result in softening of detail (see **Figure 4.4**). Think of those rows and columns of pixels, much like the grid of a needlepoint pattern. Imagine what a challenge it would be to redraw that pattern at a 42-degree angle. It should give you a little sympathy for the math Photoshop has to do.

Figure 4.4 *Repeated rotations of an image can result in cumulative erosion of detail (original image on the left, rotated image on the right). The exaggerated sharpening in the image on the right is a result of Photoshop's attempt to compensate for softening of detail.*

All these cautions about transformations such as scaling and rotating are not intended to strike terror in your heart. Don't be afraid to enlarge, reduce, or rotate if you need to. Just be prepared for the slight but unavoidable loss of detail and the degradation of the image's appearance. Try to resize in even increments, and beware of oddball rotations such as 1.25 degrees in the interest of maintaining as much information as possible.

Successive transformations—scaling and then rotating, for example—are particularly destructive. Let your conscience be your guide. How important is the detail in the image? If it's a key product shot, it's worth rescanning (if possible). If it's a less important image, such as a ghosted background or a decorative bit, you needn't feel quite so guilty about the transformation.

Where to Transform: Image Editor vs. Page-Layout Application

If you are going to transform images, does it matter where the transformation takes place? If you use Photoshop to scale an image, is the result superior to the outcome of scaling within your page-layout application?

The answer is an unqualified, "It depends."

If you perform your scaling and rotation in Photoshop or another image-editing application, and then place the resulting image in a page layout at 100 percent with no rotation, you do have a pretty good idea of how the image will look when it's printed.

If, however, you induce the scaling or rotation in a page layout, you've only *requested* those transformations—you haven't actually *performed* the transformations. They don't really take place until the job is processed by a RIP. This puts you at the mercy of that RIP's implementation of scaling and rotation algorithms. If you generate and submit PDFs, the rotations or distortions within that PDF are still pending, and they are implemented only when the PDF is processed by a RIP. In other words, the original image information is contained in the PDF, unchanged, but earmarked for its ultimate transformation in the RIP.

Be comforted by the fact that late-model RIPs can chew a lot more information in a shorter time than they used to. Rotating a few images here and there won't prevent the processing of your job. However, despite the improvements in RIP technology, it is still possible (although rare) to build a job that can't be processed by a RIP. (Please don't take that remark as a personal challenge.)

Keep in mind, too, that if you've rotated an image in Photoshop and then subsequently applied additional scaling or rotation in a page layout, you've transformed it twice. It's not the end of the world, but you may see some slight softening of detail in the finished piece.

Appropriate Image Formats for Print

How you should save your raster images is governed largely by how you intend to use them. Often, you will be placing images into InDesign or Illustrator, so you're limited to the formats supported by those applications. The application may be willing to let you place a wide variety of file formats, but that doesn't necessarily serve as an endorsement of file format wonderfulness. In the olden days, the most commonly used image formats were TIFF and EPS. However, native Photoshop files (PSD) and Photoshop PDF files are much more flexible, and both formats are supported by InDesign and Illustrator. So, there's not much reason to use other formats unless you're handing off your images to users of other applications, such as Microsoft PowerPoint or Word.

NOTE When you receive a JPEG image, it's a good idea to immediately resave it as a PSD or TIFF to avoid further erosion to image content. Repeatedly opening, modifying, and resaving a JPEG can result in compromised quality if aggressive compression is used.

TIFF

If you need to blindly send an image out into the world, TIFF (tagged image file format) is one of the most widely supported image file formats. It's happy being imported into Illustrator, InDesign, Microsoft Word, and even some text editors—almost any application that accepts images. The TIFF image format supports multiple layers as well as RGB and CMYK color spaces, and even allows an image to contain spot-color channels (although some applications, such as Word, do not support such nontraditional contents in a TIFF).

Photoshop EPS

Some equate the acronym EPS (Encapsulated PostScript) with vector artwork, but the *encapsulated* part of the format's name gives a hint about the flexibility of the format. It's a *container* for artwork, and it can transport vector art, raster images, or a combination of raster and vector content. EPS is, as the name implies, PostScript in a bag (see the sidebar, "EPS: Raster or Vector?"). The historic reasons for saving an image as a Photoshop EPS were to preserve

the special function of a PostScript-based vector clipping path used to silhouette an image or to preserve an image set up to image as a duotone. If you're using InDesign and Illustrator, that's no longer necessary.

EPS: Raster or Vector?

It may be a bit confusing that there are raster-based EPSs (saved from an image-editing program such as Photoshop) and vector-based EPSs (saved from a vector drawing program such as Adobe Illustrator or Adobe [formerly Macromedia] FreeHand). The uninitiated sometimes think that saving an image as an EPS magically vectorizes it. Not so. Think of the EPS format as a type of container. The pixels within an EPS are no different from those in their TIFF brethren. They're just contained and presented in a different way.

As applications and RIPs have progressed, you're no longer required to save such images as Photoshop EPS. Pixel for pixel, a Photoshop native PSD is a smaller file than an equivalent EPS and offers support for clipping paths as well as duotone definitions.

This doesn't mean you need to hunt down your legacy Photoshop EPS files and resave them as PSD (unless you're terribly bored). Just know that unless you need to accommodate someone else's requirements, there's no advantage to saving as Photoshop EPS now.

Photoshop Native (PSD)

TRANSPARENCY TIP: Although Illustrator and InDesign accept and correctly handle *opacity* settings in a placed native Photoshop file, they do not correctly handle *blending modes* in a Photoshop file. There are some workarounds for InDesign, detailed in Chapter 12, "InDesign Production Tips."

In ancient times, the native PSD (Photoshop document) format was used solely for working files in Photoshop. Copies of those working files were flattened and saved in TIFF or EPS formats for placement in a page-layout program. While PageMaker allowed placement of native Photoshop files (yes, really—although it did not honor transparency), QuarkXPress required TIFF or EPS instead. Old habits die hard, and TIFF and EPS have long been the standard of the industry. Not that there's anything truly wrong with that.

However, Illustrator and InDesign can take advantage of the layers and transparency in Photoshop native files, eliminating the need to go back through two generations of an image to make corrections to an original file. Today,

there's no need to maintain two separate images: the working image and the finished file are now the same file.

Photoshop PDF

A Photoshop PDF (Portable Document Format) contains the same pixels as a garden-variety PSD, but those pixels are encased in a PDF wrapper—it's like the chocolate-covered cherry of file formats. A Photoshop PDF comes in handy on special occasions, because it can contain vector and type elements without rasterizing the vector content, and it allows nondestructive round-trip editing in Photoshop.

A Photoshop EPS can contain vectors and text, but the vector content will be converted to pixels if the file is reopened in Photoshop, losing the crisp vector edge—so you lose the ability to edit text or vector content. A native Photoshop PSD can contain vector components, but page-layout programs rasterize the content. However, Photoshop PDFs preserve vector content when placed in other applications (see **Table 4.1** for a feature comparison of common image formats).

Table 4.1 *Image format features*

Supported Feature	TIFF	EPS	PSD	JPEG	PDF
RGB color space	X	X	X	X	X
CMYK color space	X	X	X	X	X
Grayscale	X	X	X	X	X
ICC profiles	X	X	X	X	X
Clipping paths	X	X	X	X	X
Layers	X	—	X	—	X
Alpha channels	X	—	X	—	X
Spot color channels	X	1	X	—	X
Duotones	—	X	X	—	X
Bitmap (bi-level content)	X	X	X	—	X
Vector data	—	2	3	—	X
Transparency	X	—	X	—	X

[1] If saved as DCS 2.0 (a variant of the EPS format)
[2] EPSs cannot be reopened in Photoshop with vector content intact
[3] Page-layout applications rasterize vector content in PSDs

Moving to Native PSD and PDF

Is there any compelling reason to continue using old-fashioned TIFFs and EPSs? It may seem adventurous to use such new-fangled files, but workflow is changing. The demarcation between photo-compositing and page layout is blurring, and designers demand more power and flexibility from software. RIPs are more robust than ever, networks are faster, and hard drives are huge. It's still important to know the imaging challenges posed by using native files (such as transparency), and it's wise to communicate with your printer before you embark on the all-native path. You're still at the mercy of the equipment and processes used by the printer, and if they're lagging a bit behind the latest software and hardware developments, you may be limited by their capabilities.

Bitmap Images

Also called "line art images," bitmap images contain only black and white pixels, with no intermediate shades of gray. If you need to scan a signature to add to an editorial page or scan a pen and ink sketch, a bitmap scan can provide a sharp, clean image. Because of the compact nature of bitmap scans, they can be very high resolution (usually 600–1200 ppi) but still produce small file sizes (**Figure 4.5**).

Figure 4.5 *This 1200 ppi bitmap scan prints nearly as sharply as vector art. It weighs in at less than 1 MB; a grayscale image of this size and resolution would be nearly 10 MB. Magnified to 300 percent, it may look a bit rough, but at 100 percent it's crisp and clean.*

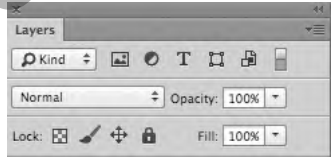
Special Case: Screen Captures

If you're creating software documentation for print, or you want to show an image of a Web page in your project, you may need to include screen captures of software interface components such as menus or panels in your page layouts. Screen captures are easy to make using a system utility or dedicated screen-capture software, but they require some special handling to print clearly. When they're part of software documentation or instructional materials, it's important that the details are as sharply rendered as possible.

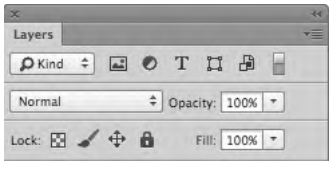
You should understand this about screen captures: Whether you take them by using your system's built-in screen-capture functionality or a third-party screen-capture application, you are merely intercepting *information* that eventually becomes pixels on your monitor. Regardless of your current monitor resolution, there is a one-to-one relationship between the fixed number of pixels that an application (and your system) uses to render panels and menus and the number of pixels you see on your screen, even if you use a zoom utility. Of course, the size of the overall image you see is a function of your current monitor resolution, but the *pixel dimensions* of panels, menus, and tools will be identical, regardless of resolution. (**Figure 4.6**)

An application panel that measures 244 pixels by 117 pixels appears larger when your screen resolution is set to 800 by 600, and it's almost unreadably small when your monitor is set to 1920 by 1200. However, the panel is made of exactly the same number of pixels in both instances. So it doesn't matter what resolution your monitor is using, or how large the panels may appear onscreen, or whether you use a utility to zoom in. The captured image of a panel or menu will be the same in terms of pixel dimensions, regardless of the monitor resolution setting, and the resulting image will be 72 ppi.

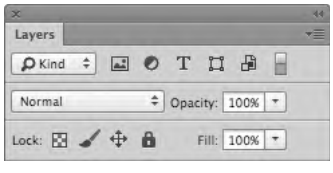
Monitor Resolution
1920x1200
244 x 117 pixels, 72 ppi



Monitor Resolution
1360x768
244 x 117 pixels, 72 ppi



Monitor Resolution
800x600
244 x 117 pixels, 72 ppi



Monitor Resolution
1920x1200, zoomed using OS X
Accessibility Zoom feature
244 x 117 pixels, 72 ppi

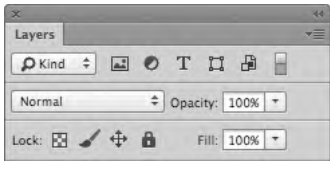


Figure 4.6 *The resolution setting of your monitor has no effect on the number of pixels used by panels and menus. Although this panel was captured at three different monitor resolutions, the three captures are identical, each consisting of exactly the same number of pixels.*

TIP Do an experiment: In the software of your choice, open a panel and position it in the middle of the screen. Take screen shots at two different resolutions. Make a loose selection of the panel in one image, copy it, and place it into the other image. You'll see that they're identical in pixel count. The overall images will be different sizes because of the different monitor resolutions, but the number of pixels used by interface components such as panels, menus, and tools will be identical.

Since it's been drilled into you that 300 ppi is the Holy Grail of image resolution, it's tempting to try to improve screen captures by increasing the resolution. Unfortunately, this usually makes them look worse by softening small details during interpolation.

If you plan to use a screen capture at 100 percent enlargement, just leave it at 72 ppi (go ahead and freak out). Yes, the print service provider's prepress department will raise a flag, but the examples below show why screen captures are not improved by increasing their resolution.

As you can see in **Figure 4.7**, the original 72 ppi screen capture seems a bit coarse, but it's readable. Increasing the resolution to 300 ppi in Photoshop may sound like a good idea, but the interpolation will soften detail in the image.

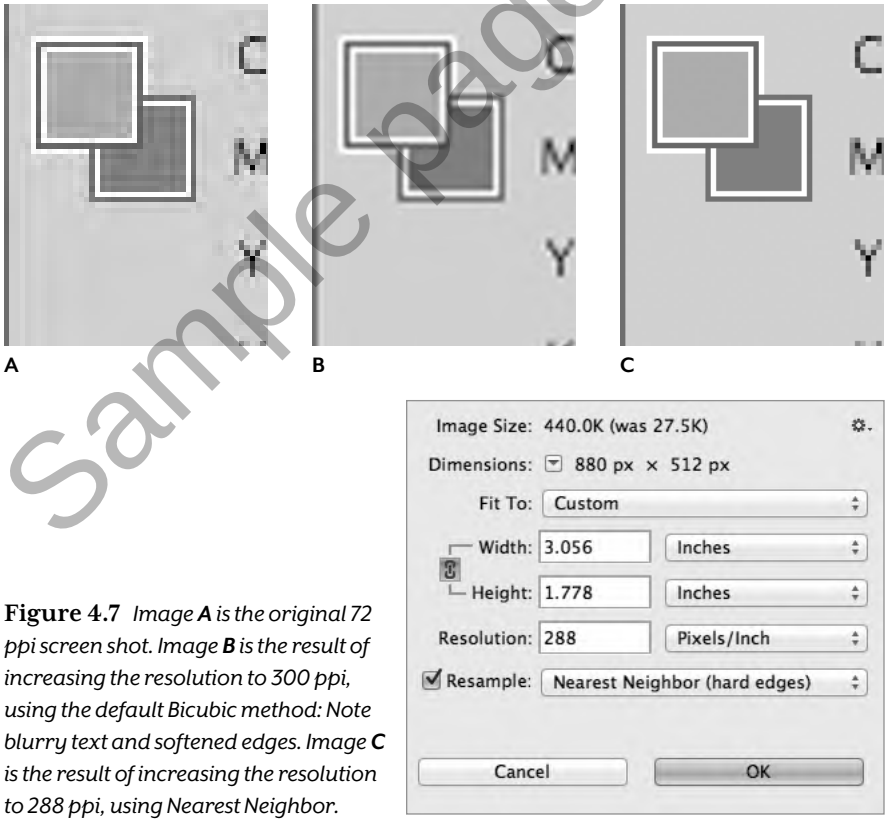


Figure 4.7 *Image **A** is the original 72 ppi screen shot. Image **B** is the result of increasing the resolution to 300 ppi, using the default Bicubic method: Note blurry text and softened edges. Image **C** is the result of increasing the resolution to 288 ppi, using Nearest Neighbor.*

If you do feel compelled to increase the resolution of a screen capture, choose *Image > Image Size* in Photoshop, and then set the resolution to an even multiple of the original resolution; for example, resample a 72 ppi screen shot to 288 ppi. In that same dialog box, set the Resample Image option to Nearest Neighbor. This avoids interpolation by simply repeating pixels rather than attempting to create pixels. It's not an appropriate approach when scaling images of a photographic nature, but it's a helpful solution for screen captures, because of their special nature.

Converting Screen Captures to CMYK

Because screen captures are generated as RGB images, they must usually be converted to CMYK for print. When performing that conversion, a special approach is recommended to maintain the best rendering of black type. The default conversion of RGB to CMYK in Photoshop will render black as a four-color mix (**Figure 4.8**), with the possibility that slight misregistration on press will turn tiny details to mush.

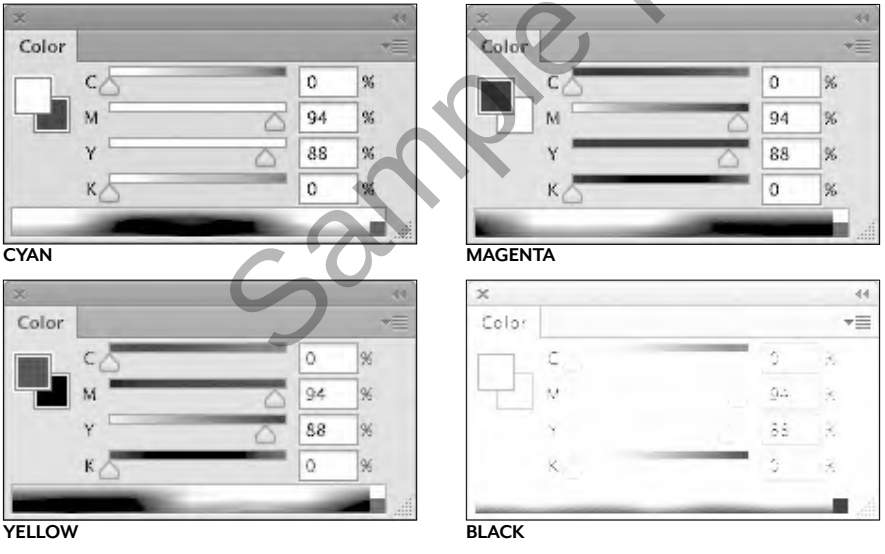


Figure 4.8 *A conventional conversion from RGB to CMYK produces four-color equivalents of the gray and black parts of a screen capture. Press misregistration will turn text and other black or gray elements to an out-of-focus rainbow. Festive, but hard to read.*

To simplify printing of screen captures, use a color-separation recipe that ensures that all neutral black or gray areas of the image will print only in black ink during the RGB-to-CMYK conversion. Neutral areas in an RGB image are those areas in which the RGB values are equal; for example, R128–G128–B128 would constitute a midtone gray.

To create this custom screen-capture conversion recipe in Photoshop, choose *Edit > Color Settings* to access the color-separation controls. Under Working Spaces, choose *Custom* for the CMYK setting (**Figure 4.9**).

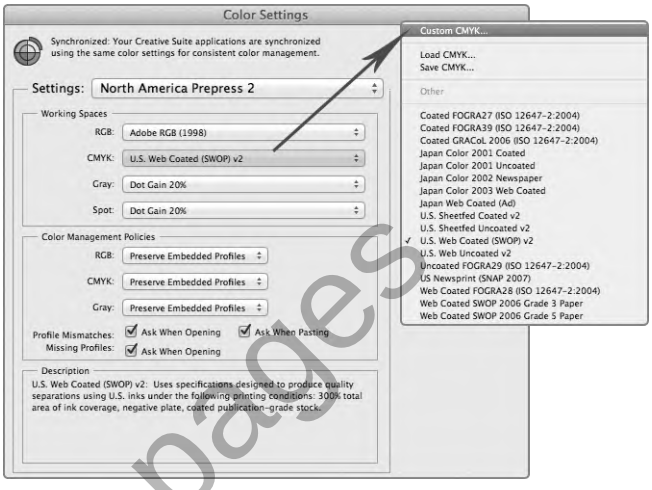


Figure 4.9 *In the Color Settings dialog box, select Custom CMYK from the CMYK menu.*

In the Custom CMYK dialog box, select *Maximum Black Generation* (**Figure 4.10**). The curve you see may seem odd, but it merely indicates that all equivalent RGB values are being replaced with black. The appearance of color elements won't be compromised.

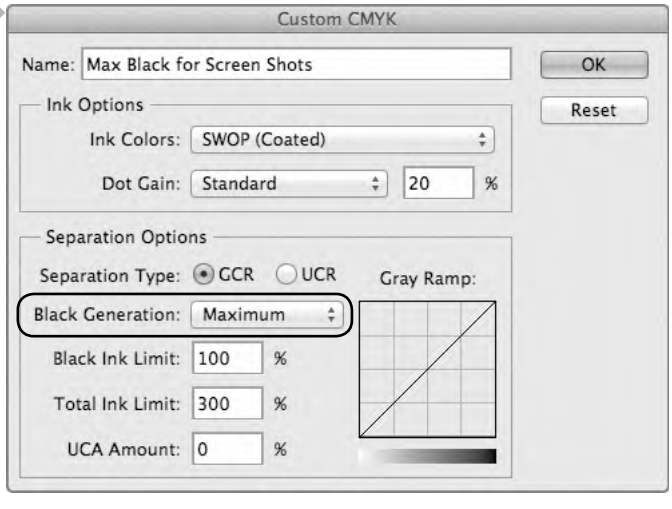


Figure 4.10 *In the Custom CMYK dialog box, select the Maximum Black Generation setting. This consolidates all gray-equivalent values to the black channel, minimizing issues with registration.*

Color elements will be composed of four colors in the final CMYK image. But black and gray elements will be rendered only in black (**Figure 4.11**). While this may look odd, it results in cleaner printing of the screen capture, because there aren't four colors piling up in most of the image.

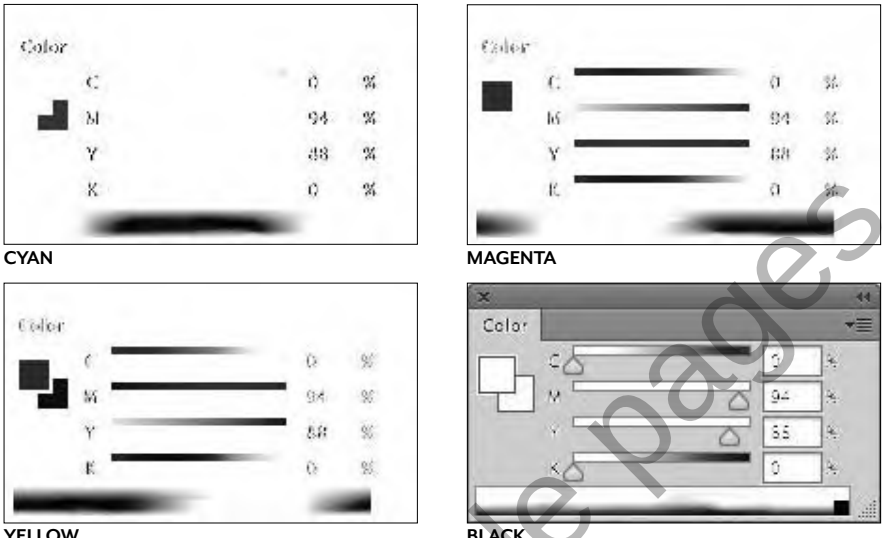


Figure 4.11 *All the color components appear on the cyan, magenta, and yellow plates. Black and gray areas appear only on the black plate. This special treatment ensures that screen shots print cleanly.*

RGB vs. CMYK

Since the dawn of desktop publishing, it's been unquestioned that Thou Shalt Convert to CMYK. Those who submitted RGB files were considered uninformed, even uncivilized.

The rules are changing, though, because of the increased use of digital printing. Although these devices may use inks or toners named *cyan*, *magenta*, *yellow*, and *black*, those inks and toners have a different pigment makeup than the namesake inks used on offset presses, and they have a wider color gamut than offset inks. Inkjet devices such as large-format printers utilize additional inks such as light cyan, pink, light yellow, orange, and green, further extending the range of colors that they can print.

This seems like a good time to open a can of multicolored worms. After you've been told by printers for years that you should convert your images to CMYK before submitting, I'm now going to tell you that you might not have to do so. That's because many digital devices happily digest RGB and can provide more vibrant output by rendering RGB content.

When you convert to CMYK, ranges of colors outside the CMYK gamut are remapped to fall within the CMYK printable gamut, and some of your most vibrant colors are lost forever.

If you happen to have some very colorful RGB images (tropical birds would do the trick), try this little experiment:

1. Open the RGB image in Photoshop, and maybe make it even more vibrant by using Hue/Saturation or Vibrance. Get carried away; this is for science, after all, not for art.
2. Choose *Edit > Color Settings*. At the top of the dialog box, choose *North America Prepress 2* from the menu and click OK.
3. Choose *View > Proof Colors*. The difference in appearance may not be huge, but try toggling Proof Colors on and off quickly by using the keyboard shortcut (PC: Ctrl-Y; Mac: Cmd-Y) and watch for differences in bright blues and greens. Neon greens provide a particularly noticeable difference.
4. Choose *View > Gamut Warning*. The gray areas are areas whose current RGB color will be remapped (and probably become duller) when converted to CMYK, because of the smaller color gamut of CMYK.

This gives you an idea of the color range that you'll lose when you convert to CMYK—and much of that color range can be imaged on many digital devices. Of course, ask the print service provider before you submit your work to ensure that you're sending what they want. Just don't be surprised if they say "RGB is OK."

RGB as a Working Format

Because the RGB gamut is larger than that of CMYK, it's often preferable to perform color corrections and compositing with RGB files, converting to CMYK (if necessary) as late in the process as possible. If you are participating in a fully color-managed workflow, you will keep your images as RGB with ICC profiles. The International Color Consortium (ICC) was formed by a group of graphic arts industry vendors, with the goal of promoting the use and standardization of color management tools. ICC profiles are methods of describing the characteristics of devices such as scanners, presses, and printers for optimal results. Conversion will not take place until the job is imaged. Much of today's software offers sophisticated support of color