

INFORMATION ONLY

IMAGE RESOLUTION

COLOR SPACES: RGB AND CMYK

FILE TYPES AND WHEN TO USE

Image Resolution

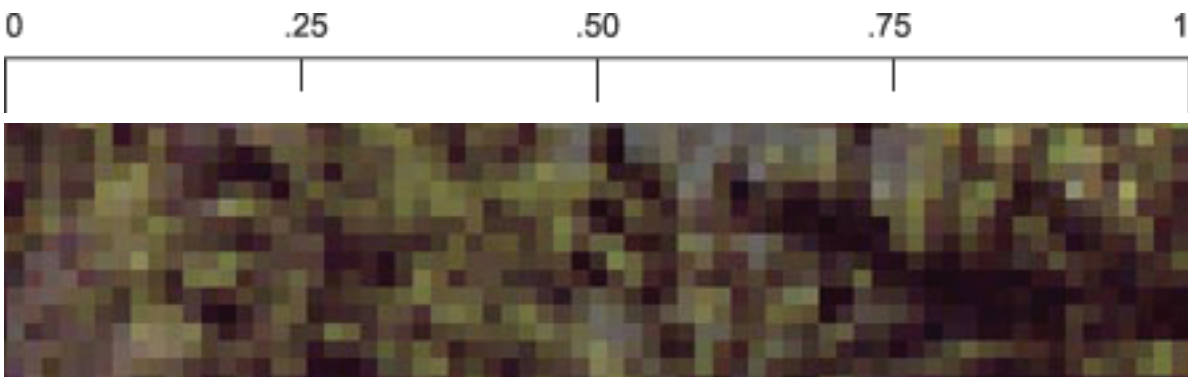
Finding Happiness at 300 dots-per-inch

Rules to remember

- Text should be 400dpi at the final size in the layout.
- Images should be 300dpi at the final size in the layout.
- Resolution and size (dimensions) are inversely proportional to each other. So, if you enlarge an image, you lower its resolution. If you reduce an image, you increase its resolution.
- How an image is originally acquired will determine its resolution, and thus the size it can print at for clear and crisp printing.
- Low resolution images print with jagged edges and appear fuzzy.

Proper Resolution is Important for Good Printing!

Resolution is the measurement of the number of squares of color information in an inch.



The human eye cannot detect the squares of color if there are 300 or more in an inch. For clear and crisp printing, images at their final size in the layout should be at 300dpi (dots per inch = squares of color in an inch) or 400dpi if the images include text.

Resolution	Resolution
= 400 dpi	= 72 dpi
(Crisp)	(Fuzzy)

Resolution and size of an image are in inverse proportion to each other. An image 2 inches x 2 inches in size at 300dpi increased in the layout to 4 inches x 4 inches has a new resolution of 150dpi.



Resolution = 300dpi
Will print well



Zoom of 300dpi image
Will print well



Resolution = 72dpi
Will not print well



Zoom of 72dpi image
This is what the whole thing will print like.
-Ugly

Upsampling

Upsampling is when a low resolution image is saved to a higher resolution with no changes in dimensions. This process adds more pixels squares in an inch (dpi), but creates blurry images, ugly blocks of color, and high contrast in images. Upsampling will not produce clear and crisp printing results on a printing press.



72 dpi image Upsampled to 300dpi
This will not print well on press.

How the original image is acquired will determine its resolution.

Images from the Internet

Jpeg and Gif files are Internet images, saved with a compression process designed to remove color and visual quality to achieve small file sizes. Internet images are usually saved at a resolution of 72 dpi for quick screen loads and will not print clear and crisp on a printing press.

Physical dimensions of an image and resolution are in direct proportion to each other. Shrinking the physical dimensions of an Internet image by 4x will achieve decent printing results. (72dpi x 4 = 288dpi)

How to calculate the size you must reduce (shrink) an Internet image to get it to print well:

Reduce the size to 24% of its original size. (Because 72dpi is 24% of the 300dpi resolution you want)

Example:

Internet Image that is 3 inches x 3 inches, at 72dpi

You want to shrink it enough to get it to 300dpi for crisp printing

$$72/300 = 0.24$$

$$3 \text{ inches} \times 0.24 = 0.72 \text{ inches}$$

Zoom into your images to see the quality. Be aware of your design, purpose of your printing, and the needs of your customers before using images from the Internet.

Images from your Scanner

Know the image size required for your layout before you scan. Guess larger if uncertain. If the photo is larger than the layout size, simply scan at 300dpi. If the photo is smaller than the layout size, adjust your scanner settings.

Adjust the scanner resolution setting

- Adjust the scan percentage size
- How to calculate the resolution you must scan a photo:

Increase the scanning resolution above 300dpi by the same percentage you will be enlarging the original photo.

Example:

Photo size = 2 x 3 inches

Image layout size = 5 x 7 inches

$5/2 = 2.5$ (you will be enlarging the photo 2.5 times, or 250%)

Scan photo at 2.5x 300dpi, or 750dpi

If you need to enlarge anything larger than 300% it is best to contact your local service provider for a professional scan.

Images from your Digital Camera

Before taking a picture, determine the quality of an image and how it can be used in a layout. Use the highest quality setting available on the camera. The pixel dimensions of an image identify the resolution. Dividing the pixel width and height by 300 determines the dpi. Divide by 400 for images with text.

For example:

Digital Camera Image (with no text) = 1200 pixels x 1600 pixels

$1200/300 = 4$ inches $1600/300 = 5.33$ inches

Layout size for image = 4 inches x 5.33 inches

The image can print at this size or smaller for clear and crisp printing.

Digital cameras use the RGB color space. When RGB is converted to CMYK, images tend to darken. Brighten and sharpen your image for clearer printing. Convert the image to the CMYK color space, if possible. Professionals frequently use Adobe Photoshop for this task. [Click here for instructions on doing RGB-CMYK conversions in a variety of programs.](#)

Images from stock photography companies

Know the image size required for your layout before you purchase stock photography online. Please read their information prior to purchase as it will determine, price, color, file size, copyrights, resolution and quality. Each image should be at a resolution of 300dpi for the final size in your layout. Reminder: get the image in CMYK color mode (rather than RGB) if possible. If you get it in RGB, [Click here for instructions on doing RGB-CMYK conversions in a variety of programs.](#) Here are some guidelines for you to follow:

2 inches x 2 inches @ 300dpi = 600 pixels x 600 pixels = 1.38 MB

4 inches x 4 inches @ 300dpi = 1200 pixels x 1200 pixels = 5.5 MB

8.5 inches x 11 inches @ 300dpi = 2550 pixels x 3300 pixels = 32.2 MB

Images from a friend or a Client

How your friend originally acquired the image will determine resolution and printing clarity. Ask your friend where the image came from and refer to the options listed above.

Preferred File Formats

Photographic images can be saved in different file formats. The format of choice is one that does not lose color quality, contrast or file size. TIF or EPS files are examples of lossless file formats. They are designed to print clear and crisp at a resolution of 300dpi at their final size in the layout. JPEG/JPG or GIF files are examples of lossy file formats. They were originally designed for easy file transmission and internet use, not for printing.

When a lossy file format is saved over and over again, the jagged edges are exaggerated. The process creates extra pixel garbage that you do not want printed. Therefore, if you start with a JPEG file that then needs edits, save it as an EPS or TIF file. This way, additional information will not get lost and the quality of the original JPEG image will be maintained.



Extra Pixel Garbage



Original Quality Maintained

Important Information About RGB and CMYK

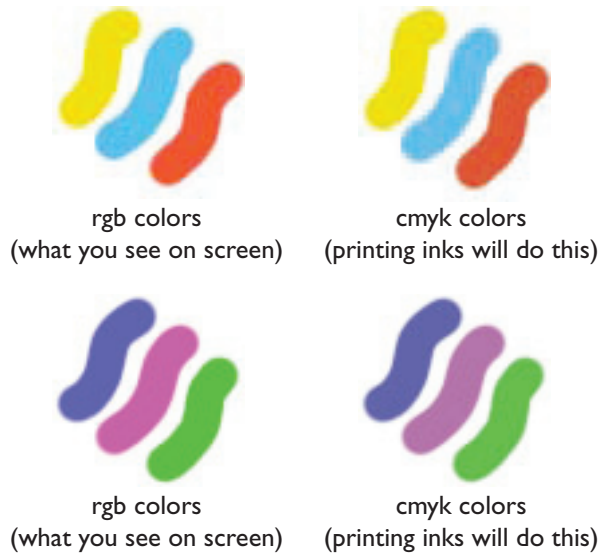
Many graphics software programs give you the choice to work in either RGB or CMYK. These are called “color spaces”. Scanners and digital cameras create images using combinations of just three colors: Red, Green and Blue (called “RGB”). These are the primary colors of light, which computers use to display images on your screen. Printing presses print full color pictures using a different set of colors, the primary colors of pigment: Cyan (blue), Magenta (red), Yellow and Black (called “CMYK”). This is “4-color process” or “full-color” printing that comprises the majority of magazines and marketing materials you see every day. At some stage your RGB file must be translated to CMYK in order to print it on a printing press.

It’s Best If You do the RGB-to-CMYK Conversion of Your Images before creating your layout.

You will have more control over the appearance of your printed piece if you convert all of the images from RGB to CMYK before sending them to a printer. When we receive RGB images, we do a standard-value conversion to CMYK, which may not be perfectly to your liking. Even though monitors always use RGB to display colors, the colors you see on your monitor will more closely match the final printed piece if you are viewing them in the CMYK color space.

Be aware that it is possible to see colors in RGB that you can't make with CMYK. They are said to be "out of the CMYK color gamut". What happens is that the RGB-to-CMYK translator just gets as close as possible to the appearance of the original and that's as good as it can be. It's something that everyone in the industry puts up with. So it's best to select any colors you use for fonts or other design elements in your layout using CMYK definitions instead of RGB. That way, you will have a better idea of how they will appear in your printed piece. Here's a common example: many programs translate the 100% Blue in RGB into a somewhat purple-looking color in CMYK. We recommend a CMYK value of 100-65-0-0 to get a nice clean blue. Working in the CMYK color space allows you to select the CMYK recipe, or "screen build", that gives you the results you want.

Here are some examples of how various RGB colors convert to CMYK:



You most likely won't notice this kind of color shift in a color photograph accept in the blues. It is more likely to happen if you pick a very rich, vibrant color for a background or some other element of your layout. It probably won't look bad, it just won't look exactly the same. But it may not be noticeable at all either. RGB produce more vibrant blues that are outside of the CMYK gamut and cannot be printed in CMYK alone.

Available for purchase are color guides with over 3,000 process colors with their CMYK screen percentages.

Visit CreativePro at: http://www.pantone.com/shop/creativepro/creativepro_ss.asp?ProductID=23026&affiliate=creativepro or CDW at <http://www.cdw.com/shop/products/default.asp?EDC=212012> for details.

About Process colors (CMYK)

A process color is printed using a combination of four standard process inks: cyan, magenta, yellow, and black (CMYK). Use process colors when a job requires so many colors that using individual spot inks would be expensive or impractical, as when printing color photographs. Keep the following guidelines in mind when specifying a process color:

- For best results in a high-quality printed document, specify process colors using CMYK values printed in process color reference charts, such as those available from a commercial printer.
- The final color values of a process color are its values in CMYK, so if you specify a process color using RGB or LAB, those color values will be converted to CMYK when you print color separations. These conversions work differently when you turn on color management; they are affected by the profiles you specify.
- Don't specify a process color based on how it looks on your monitor, unless you are sure you have set up a color management system properly, and you understand its limitations for previewing color.
- Avoid using process colors in documents intended for online viewing only, because CMYK has a smaller color gamut than that of a typical monitor.

Converting to CMYK Color Space

Here is a list of several common programs with instructions on how to make sure you are working in the CMYK color space. If your program or version is not listed here, don't worry. Most of these instructions will apply to all versions of a program.

Microsoft Publisher 2000:

Microsoft Publisher defaults to RGB. It is easy to convert everything to a CMYK color space or to start a new document using the CMYK color space.

Use the following menu options: Tools/Commercial Printing Tools/ Color Printing and select Process colors (CMYK). Please note that all images incorporated into a layout need to be linked and not embedded in order to maintain the CMYK color space within the image. Using the following menu options does this: Tools/Commercial Printing Tools/Graphics Manager and highlight the embedded image. Click Link and click Browse to locate the original file and link to it. You will then need to send both the images and the layout file to us for printing.

Adobe Photoshop 6 through CS2

If the file already exists select the following menu options: Image/Mode/CMYK When starting a new file select CMYK for the mode before clicking OK.

Corel Draw 9

Select each object you want to convert. Select the Fill tool and click Fill Color Dialog. Make sure the Color model is CMYK. For each object with an outline: Select the Outline tool and click the Outline Color Dialog. Make sure the Color model is CMYK.

Adobe Illustrator 9 through CS2

Use the following menu options. For an existing file select Edit/Select All and then Filter/Colors/Convert to CMYK. For a new file, select File/New and select CMYK color for the Color Mode.

Quark Express 4.1 through 6.5

Use the following menu options: Edit/Edit Colors/Show Colors in Use/Highlight Color and click Edit. Change model to CMYK and deselect Spot color.

Adobe InDesign 1.5.2 through CS2

Use the following menu options: Window/Swatches and Window/Color. Double click color in Swatches Change color mode to CMYK and color type to Process. Any colors created in the document that are not in the Swatches palette, need to be changed to the CMYK color space. Select each object you want to convert and make sure the Color palette reflects the CMYK percentages. Click top right arrow in the palette to change to CMYK if necessary.

Adobe Pagemaker 6.5

Use the following menu options: Window/Show Colors. Double click "colors" in palette and select Model to be CMYK and Type to be Process. Please be advised that Pagemaker does not successfully represent CMYK color on the monitor.

The following programs do not have the capability to convert to CMYK.

Adobe Photoshop LE
 Adobe PhotoDeluxe
 Microsoft Word
 Microsoft Excel Microsoft Powerpoint
 Microsoft Works
 Microsoft PhotoDraw
 Picture It Publishing

Common File Formats and when best to use

TIFF (.tif) files

TIFF is a flexible bitmap image format supported by virtually all painting, image-editing, and page-layout applications. Also, virtually all desktop scanners can produce TIFF images.

The TIFF format supports CMYK, RGB, grayscale, Lab, indexed-color, and bitmap files with alpha and spot-color channels. You can select an alpha channel when you place a TIFF file. Spot-color channels appear in InDesign as spot colors in the Swatches palette.

You can use an image-editing program such as Photoshop to create a clipping path to create a transparent background for a TIFF image. InDesign supports clipping paths in TIFF images and recognizes encoded OPI comments.

Encapsulated PostScript (.eps) files

The Encapsulated PostScript (EPS) file format is used to transfer PostScript language artwork between applications, and is supported

by most illustration and page-layout programs. Typically, EPS files represent single illustrations or tables that are placed into your layout, but an EPS file can also represent a complete page.

Because they are based on the PostScript language, EPS files can contain both vector and bitmap graphics. Since PostScript cannot normally be displayed on-screen, InDesign creates a bitmap preview for an EPS file for on-screen display. If you print a page with an EPS file to a non-PostScript printer, only this screen-resolution preview will be printed. InDesign recognizes clipping paths in Photoshop-created EPS files.

When you import an EPS file, any spot colors it contains are added to the Swatches palette in InDesign. EPS allows for prepress-quality resolution, precision, and color. This format includes all of the color and image data required to color-separate DCS images embedded in the EPS graphic. EPS isn't ideal for online publishing in HTML, but it works well for online publishing in PDF.

EPS files can contain Open Prepress Interface (OPI) comments, which let you use fast, low-resolution versions (proxies) of images for positioning on a page. For final output, either InDesign or your prepress service provider can automatically replace the proxies with high-resolution versions.

Adobe Acrobat (PDF) files

The Adobe Acrobat Portable Document Format (PDF) is standard for the electronic distribution and viewing of complete documents. It preserves the layout, typography, bitmap images, transparency, and vector graphics files created in a great number of different applications. PDF can preserve color quality and layout precision for prepress work while compressing pages sufficiently for online distribution and viewing. PDF files can be viewed using the free Adobe Reader®. For all of these reasons, PDF is a common format on the World Wide Web.

Based on the industry-standard Adobe PostScript® 3™ page-description language for professional printing, PDF pages are similar to PostScript pages, but can also contain multimedia elements and features for searching and navigating electronic documents. For example, PDF files can contain movies, sound, hypertext links, and electronic tables of contents. However, InDesign doesn't import included movies, sound, links, or buttons when you place a PDF file.

You can place a PDF page as a single graphic in InDesign using the Place command. If the PDF file contains multiple pages, you can designate which pages you want to place and place the pages one after another. You can also copy and paste PDF content. InDesign recognizes top-level layers and layer sets in layered PDF files and lets you control their visibility.

JPEG (.jpg) files

The Joint Photographic Experts Group (JPEG) format is commonly used to display photographs and other continuous-tone images in HTML files over the web and in other online media. The JPEG format supports CMYK, RGB, and grayscale color modes. Unlike GIF, JPEG retains all of the color information in an RGB image.

JPEG uses an adjustable, lossy compression scheme that effectively reduces file size by identifying and discarding extra data not essential to the display of the image. A higher level of compression results in lower image quality; a lower level of compression results in better image quality, but a larger file size. In most cases, compressing an image using the Maximum quality option produces a result that is indistinguishable from the original. Opening a JPEG image automatically decompresses it.

Note: JPEG encoding, which can be performed on an EPS or DCS file in an image-editing application such as Adobe Photoshop, does not create a JPEG file. Instead, it compresses the file using the JPEG compression scheme explained above.

JPEG works well for photographs, but solid-color JPEG images (images that contain large expanses of one color) tend to lose sharpness. InDesign recognizes and supports clipping paths in JPEG files created in Adobe Photoshop. JPEG can be used for both online and commercially printed documents; work with your prepress service provider to preserve JPEG quality in printing.

Graphics Interchange Format (.gif) files

Graphics Interchange Format (GIF) is a standard for displaying graphics on the World Wide Web and other online services. Because it compresses image data without losing detail, its compression method is called lossless. Such compression works well with graphics that use a limited number of solid colors such as logos and charts; however, GIF cannot display more than 256 colors. For this reason it is less effective for displaying photographs online (use JPEG instead) and is not recommended for commercial printing. If an imported GIF file contains transparency, the graphic interacts only where the background is transparent.

Desktop Color Separations (.dcs) files

Desktop Color Separations (DCS), developed by Quark, is a version of the standard EPS format. The DCS 2.0 format supports multichannel CMYK files with multiple spot channels. (These spot channels appear as spot colors in InDesign's Swatches palette.) The DCS 1.0 format supports CMYK files without spot channels. InDesign recognizes clipping paths in Photoshop-created DCS 1.0 and DCS 2.0 files.

DCS files are intended to be used in a pre-separated, host-based workflow. In most cases, color separations files associated with a DCS image are excluded when you export or print a composite to a PDF, EPS, or PostScript file. (The sole exception is made for 8-bit DCS files that were created in Photoshop and that do not contain vector graphics.)

Windows Metafile Format (.wmf) and Encoded Metafile Format (.emf) files

Windows Metafile Format (WMF) and Windows Enhanced MetafileFormat (EMF) are native Windows formats used primarily for vector graphics, such as clip art, shared between Windows applications. Metafiles may contain raster image information; InDesign recognizes the vector information and provides limited support for raster operations. Color support is limited to 16-bit RGB, and neither format supports color separations. Metafile formats are not an ideal choice for commercially printed or online documents; they provide acceptable quality only when printed on low-resolution or non-PostScript printers from a Windows desktop.

Macintosh PICT (.pict) files

The Macintosh PICT (or Picture) format is widely used for Mac OS graphics and page-layout applications, and for transferring files between applications. The PICT format is especially effective in compressing images that contain large areas of solid color. InDesign for both Windows and Mac OS imports PICT files created from Mac OS screenshots and a variety of other applications, including clip art collections.

InDesign supports RGB PICT images with variable resolutions and embedded QuickTime images. PICT graphics do not support color separations, are device-dependent, and are not recommended for high-resolution commercial printing. The PICT format can provide acceptable quality only when printed on low-resolution or non-PostScript printers.

PCX (.pcx) files

The PCX format is commonly used in Windows systems. Most Windows software supports version 5 of the PCX format.

The PCX format supports RGB, indexed-color, grayscale, and bitmap color modes, as well as the RLE compression method, which is lossless. It does not support alpha channels. Images can have a bit depth of 1, 4, 8, or 24 bits. However, PCX is not ideal for commercially printed or online documents. PCX graphics can provide acceptable quality only when printed on low-resolution or non-PostScript printers.

Portable Network Graphics (.png) files

The Portable Network Graphics (PNG) format uses adjustable, lossless compression to display 24-bit photographs or solid-color images on the World Wide Web and in other online media. PNG was developed as a patent-free alternative to the GIF file format. It supports transparency in an alpha channel or a designated color. PNG is best used for online documents, although its color support makes it better for printed documents than GIF. However, color PNG graphics placed in an InDesign document are RGB bitmap images, so they print only as composites, not on color separations.

These are ofcourse just a few of the many types of files in existance.

To search a database of file types and their uses visit:

http://www.openoffice.org/dev_docs/source/file_extensions.html

<http://www.pbdr.com/ostips/assicex.htm>

<http://www.filext.com/>