

PRINTtips

How to Build RIP-Roaring Digital Files

Your electronic document – business card, flyer, brochure, newsletter, direct mail post card – is composed of digital images that will be reproduced in print. These images are: text or type (produced by *fonts*); *line art* such as drawings or sketches (created in a drawing or paint program or captured with digital scanners); and *continuous tones* of highlights, shading and shadows (such as photographs).

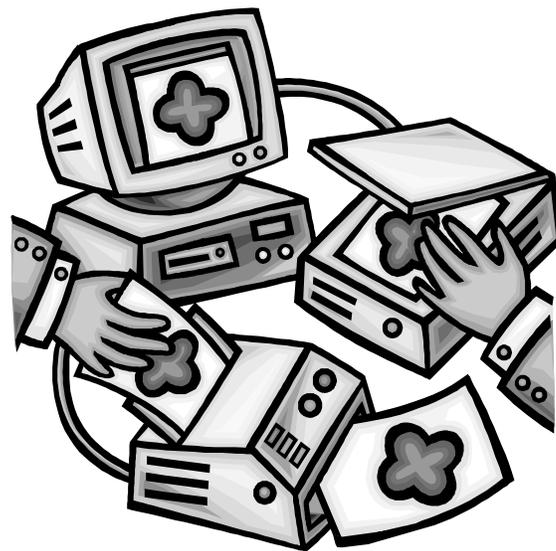
Before we can reproduce your electronic document, these images must be converted into dots that can be interpreted by a printer. The process of creating the dots is called *raster image processing*. How you treat each of these images in your document determines if and how quickly the raster image processing takes place.

In this issue we'll share some tips for constructing electronic documents that will roar through our RIP – digital files that have all the information required to make the conversion to print, but nothing extra.

What is Raster Image Processing?

In the simplest terms, raster image processing (RIP) is the conversion of

images (fonts, line art and photographs) into dots. Since dots are the only kind of information that printing presses, laser printers, digital copiers and imagesetters understand, all files must RIP before they can print to paper, lithographic film or press plate material. The number, shape, size, angle, position and alignment of the dots all work together to determine how the image



appears on the final printed or copied page. Raster image processing creates a map of dots that accurately represents the original images. Then the output device (laser printer, imagesetter or digital copier) renders or generates the dots according to the map provided by the RIP.

Logically, the more information to be processed – that is, converted from images to dots – the longer it will take to create the map of dots. The goal of every document creator should be to prepare files that will RIP in the shortest time possible. This requires an understanding of how images are captured and stored in applications programs.

Image Data Types: Raster vs. Vector

The type, line art and photographs in your electronic document are stored as one of two data types – raster or vector. Raster data images are made up of pixels and are sometimes called *bitmapped graphics*. Scanning produces raster data images as do paint programs such as Adobe Photoshop.

Vector data images are comprised of lines and curves rather than individual pixels and are sometimes called *outline graphics* or *bezier curves*. Drawing programs such as Adobe Illustrator, Aldus Freehand and Corel Draw produce vector data files. Fonts also produce vector data.

Because vector data files consist of lines and curves, they are very easy to manipulate. Imagine the outline of a rectangle. Now imagine how easy it would be to change the size or shape

of the rectangle by changing the size and shape of the outline. By contrast, imagine the same rectangle as a raster data image, composed of individual pixels. Changing its size and shape means moving individual pixels one by one – a significantly different level of effort.

Now imagine that you are going to *rasterize* (change into dots) each of the rectangles. Rasterizing the outline of the rectangle (vector file) would naturally go much faster since there is only the outline to convert to dots. The raster file would clearly take much longer since it is a “solid” rectangle with many more pixels to be converted to dots.

So why not use vector data files for all graphic images? Because vector data can only represent black or white. When you want to represent *tonal variation* – shading, highlights and shadows – then shades of gray are required in addition to black and white. Only raster data built pixel by pixel can adequately represent the *continuous tones* of a photograph, gradient screen or complex line art.

Image Capture and File Size

There are three variables that affect the file size of an image, and therefore the amount of information that must be processed during rasterization. These are the image dimension, pixel depth and resolution.

Image dimension means the size in the document (such as 3”x4” or 8”x10”).

Pixel depth means the number of bits per pixel. Line art requires only 1 *bit* (either a one or zero indicating that the pixel is either black or white) for display. Grayscale images require 8 bits per pixel to display 256 shades of gray. Process color (CMYK) images require one 8-bit grayscale file for each color or 32 bits (8 bits x 4 process colors) per pixel.

Since image dimension and pixel depth are largely determined by the design of the document, the only variable affecting file size that you can really control is file resolution. *File resolution* means the number of pixels per inch (ppi) at which the image is captured (scanned).

Pixels are the square building blocks of images. A 300 ppi scan captures 300 pixels in two directions – vertically and horizontally – with each pixel measuring 1/300th of an inch. Therefore, file resolution is not a linear function; it is square. This means that as the resolution doubles (from 300 to 600 ppi), the file size quadruples (300x300=90,000 pixels; 600x600=360,000 pixels).

For multibit continuous tone images (grayscale or color), a good rule of thumb is not to exceed a resolution greater than 1.5 to 2 times the line screen at which the image will be printed. (If you are not familiar with line screens and do not wish to specify one, then call us at <insert your shop’s phone number here>.

We will review our standards with you to help you determine the best line screen for your desired output.)

Three Tips For Better RIPs

Tip 1: Know when to use raster and vector data images for your graphics.

Raster images are composed of pixels or dots that contain a lot of information about the object being represented.

This makes the file size large and inhibits your ability to scale the image. Use raster images for photographs and complex line art.

Vector images are composed of lines and curves that outline the object being represented. This keeps the file size small and makes it easy to manipulate the image. Use vector images for logos and simple line art.

Tip 2: Scan images with the end use in mind. Control image dimension by cropping photos to the size they will appear in print prior to scanning. Remember the rule of thumb: the number of pixels per inch at the output size should be between 1.5 and 2 times the line screen. Thus, scanning for a 133-line halftone screen requires a resolution between 200 and 266 ppi. (Many people round this up to 300 ppi.)

Tip 3: RIP and print the file yourself. A file that won’t RIP to a low resolution printer will not RIP to a high resolution printer. So remember to RIP and print the file on your desktop before you bring it to us.

Always Use File Extensions

If you are sharing your graphic images with others within your office or across the Internet, it is a good practice to get in the habit of adding the proper three-character file suffix at the end of your graphics files. This will also help us identify your graphics files when we preflight your document.

Examples of file suffixes include .tif for TIFF files; .eps for EPS files; .gif for GIF files (Graphic Interchange Format) and .jpg for JPEG (Joint Photographic Expert Group) files. If you are using a PC-based computer, the extensions likely will be added automatically. If you are using a Macintosh computer and do not add these extensions, a Windows-based computer may not be able to associate the file with the appropriate application.

a vocabulary of the graphic arts

Binary numbering system:

A numbering system that uses only two digits, 0 and 1, to represent all numbers.

Bit: An acronym for *binary digit*, the smallest unit of information used by a computer. Bits have a value of either 1 or 0.

Bitmapped graphic: A graphic image constructed from individual pixels that make up half tone dots. Also known as a raster graphic.

Continuous tone: An image containing gradually changing shades of gray such as a gradation, a blend or a photograph.

Line art: Drawings, illustrations, sketches or pictures that use no tones (*i.e.*, black and white areas only with no shades of gray).

Outline graphic: A graphic image constructed from lines and curves. Also known as a vector graphic, or bezier curve.

Postscript: A page description language developed by Adobe for the creation and integration of complex text and graphics for printing. Postscript describes the page geometry and the size, shape, placement and characteristics of text and graphic elements in electronic documents.

Raster: A dot or line of dots.

Raster Image Processing:

The conversion of images into dots.

Raster Image Processor:

A device or program for converting the instructions for a page (page geometry, text, line art and continuous tone graphics) to a pattern of dots that can be used by an output device.

Resolution: The number of dots per inch (dpi) or lines per inch (lpi) at which an image is scanned or printed. Scan resolution is usually stated in dpi; printing resolution is usually stated in lpi.

Call Us For A Planning Consultation

Before you begin creating your electronic document, talk to us about file format and output. We will be glad to share our production standards with you so you will know about gripper space, bleeds, trapping, imposition and other technical layout considerations that you may not be familiar with.

Remember, a planning consultation is free. Take advantage of it! Call our customer service representatives and we'll be happy to set up an appointment.

Q.
At various times I have been told to save my graphics files as both TIFF and EPS. What is the difference and when should I use each?

A. Although there are only two types of image files (raster or bitmapped vs. vector or outline), there are many different file formats in which these two image types can be saved. The file format you select depends on the intended use for the file.

For printing (either on the press or to a digital printer), the preferred formats are TIFF (Tagged Image File Format) and EPS (Encapsulated PostScript). TIFF is the most common (and one of the most flexible) for raster graphics. Typically you will create and save TIFF files when scanning or using a digital camera or creating or editing an image in an application such as Adobe Photoshop. TIFF is also used for line art when there is a great deal of detail to be reproduced. Finally, continuous tone images are most often saved in TIFF format.

EPS is the most common format for vector files. Drawing applications such as Adobe Illustrator, Aldus Freehand and Corel Draw create EPS files. When you export an image from a drawing application, save it as EPS to make it available to page layout programs like Quark XPress and Adobe PageMaker.

Most graphics applications have a proprietary file format that may be preferable to TIFF and EPS during file creation. These file formats may be smaller and more flexible than TIFF or EPS, or may allow you to work in areas not supported by TIFF or EPS. However, when the file is finished and ready to be released to us for raster image processing, please save as TIFF or EPS. Call us prior to file submission for our preferences for your specific project.