File Formats:

Different file types and when to use them.

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DESCRIPTION:

All electronic art images are divided into one of two core types, raster images (also known as 'bitmaps') and vector images. In a nutshell, raster images are composed of an array of dots and vectors are images composed of connected points, lines and curves. These two formats are quite different from one another, yet they contrast and complement one another when used appropriately for the desired final output method.

Common vector formats include PDF (Adobe Acrobat-Portable Document Format), EPS (Encapsulated PostScript), WMF (Windows Metafile), AI (Adobe Illustrator), CDR (CorelDraw), DXF (AutoCAD), SVG (Scalable Vector Graphics) and PLT (Hewlett Packard Graphics Language Plot File). Common raster file formats include JPG (Joint Photographic Experts Group), TIF (Tagged Image Format), PNG (Portable Network Graphics), PSD (Photoshop Document) and BMP (Bitmap).

Images downloaded from the web, including JPEG, PNG and GIF files, are almost always low-resolution raster images. For this reason, web graphics are rarely a good choice for imprinting and editing. Production-ready clip art is an essential tool for creating high quality imprints.

Definition Of Terms

Raster Images

A raster image is a collection of dots called pixels. Each pixel is a tiny colored square. When an image is scanned, the image is converted to a collection of pixels called a raster image. Scanned graphics and web graphics (JPEG and PNG files) are the most common forms of raster images.

Resolution

The resolution of a raster image or scanned image is expressed in terms of the pixels per inch or ppi, sometimes also expressed as dots per inch (dpi). A printer or scanner's resolution is also measured in dots per inch. Typical desktop laser printers print at 300 - 600 dpi. Image setters are capable of printing over 2,500 dpi. Printers with higher resolutions are capable of producing smoother and cleaner output. The output quality of a printing device is dependent upon the resolution (ppi) of a bitmap or scan. A 300 ppi raster image will output at the same quality on a 300 dpi laser printer as on a 2,500 dpi image setter.

Take a 300 ppi bitmap and increase the size in a graphics program, and presto - you have created a bad case of the "jaggies". The only thing that happened is that the tiny pixels got bigger and created jagged edges on your image. Decrease the size of your image and the squares get smaller. The image retains its original edge definition without producing "jaggies". In other words, raster images do not scale up very well. The quality of an imprint produced from a raster image is dependent upon the resolution (ppi) of the raster image, the capabilities of the printing technology and whether or not the image has been scaled up.

Color

With any scanned color image, a large number of colors will be required to render a raster image reproduction of the original source artwork accurately. If scanned at 24-bit color depth (16 million colors), most human eyes could not tell the difference between the original image and the scanned raster image. Now if you scan the same image using a palette of 256 colors, it would be impossible to accurately reproduce the original colors because you have fewer colors to choose from. To get around this, scanners use a process called dithering to approximate colors that don't occur in the current color palette.

Dithering produces a distinct dotted pattern that approximates the original color in the image. Dithering will deteriorate the quality of the scanned raster image. Now take all this complexity of colors and try to change colors, and you can see the biggest disadvantage of editing and manipulating raster images. In order to change colors in a raster image you must be able to isolate a specific color or range of colors and tell your software to change the color. This can be quite a challenge for even experienced Corel PhotoPAINT or Adobe Photoshop users.

File Size

In order to accurately reproduce a raster image file, your graphics software must keep track of a large amount of information, including the exact location and color of each pixel in the collection of pixels. This results in huge file sizes for raster graphics. Higher resolutions (dpi) and greater color depths, produce bigger file sizes. A typical 2" by 3" 150 ppi black and white raster image will be less than 70k (.07 megabytes) in file size. The same file saved as a 300 ppi 24-bit (millions of colors) raster image might be 100 times larger (over 7 megabytes). When creating and scanning raster images, file size becomes a real issue, as big files tend to make your computer processor and hard drive work overtime. Transferring larger files (50mb and over) over the Internet requires a high speed Internet connection on both ends for timely uploads and downloads.

Vector Images

A vector image is a collection of connected point, lines and curves that produce objects. When creating a vector image in a vector illustration program, nodes or drawing points are inserted and lines and curves connect nodes together. This is the same principle as "connect the dots". Each point, line and curve is defined in the drawing by the graphics software by a mathematical description. Every aspect of a vector object is defined by math including node position, node location, line etc.. Text objects are created by connecting nodes, lines and curves. Every letter in a font starts out as a vector object. Vector images are object-oriented while raster images are pixel oriented. A vector object will have a "wireframe" underneath the colors in the object. In a vector object, colors are like clothes over the top of a skeleton. CorelDRAW and Illustrator create text and objects using vectors that can be easily manipulated.

Resolution

Vector images are defined by math, not pixels. They can be scaled up or down without any loss of quality. When an illustration (drawing) program sizes a vector image up or down, it simply multiplies the mathematical description of the object by a scaling factor. For example a 1" square object would need to be multiplied by a factor of 2 in order to double in size. The math is simply recalculated to produce an object twice the size of the original. Because vector images scale up or down without the loss of image quality, they can be output at any resolution that a printer is capable of producing. Unlike raster images, quality is not limited by pixels per inch or scanning resolution. This is a big reason that vector graphics are so popular for clip art.

Color

Since vector images are composed of objects not pixels, you can change the color of individual objects without worrying about individual pixels. Coloring vector objects is similar to coloring with crayons in a coloring book. A drawing program will enable a user to click inside an object and define its color. A drawing program will also enable a user to define the color and width of lines. Coloring vector images is much easier than coloring bitmaps. Vector artworkalso allows for the use of spot colors like the Pantone matching System and specialty fills used for contour cutting or the use of specialty inks.

File Size

Vector images do not need to keep track of each individual pixel in an image, only mathematical descriptions. For this reason vector files are very small in file size. Vector files are composed of long mathematical descriptions dictating every aspect of the graphic. A 2-inch by 4-inch vector based logo will be the same file size as a 2-foot by 4-foot logo. The file size is the same because the only difference in file is one number defining the size of the file. A raster image file would need to keep track of a lot of additional pixels as the file increases in size. Most vector-based logos are going to be under 100k (.10 megabytes). For this reason, vector files are ideally suited for transfer over the Internet.

File Formats

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EXAMPLE:

The difference between vector and rastor as seen in the graphic below: