

HOW TO CHOOSE COLORS AND IMAGE FORMATS

A Bragit production

About this guide

This guide should help you choose the right image format and color model. It is applicable regardless of the intended final software in which the image should be used, which may be Word, PowerPoint, FrameMaker, InDesign or something else. This guide can only give you the most basic guidance, since the issue is rather complex. From experience I know that most people have no idea whatsoever what image format is the most suitable one, so they simply choose JPEG, despite it is a very bad choice for many images!

1 Raster or vector image?

First you need to know if the image is a so called *raster* image or if it is a so called *vector* image.

- **Raster** images consist of pixels, like images from a digital camera. An image may have been created as a vector image, but later converted to a raster image. A raster image can not be scaled arbitrarily with good quality. Therefore, the number of pixels needed depends on how large the final print should be.

General guide on pixels: For prints, make sure you use between 120 and 400 pixels per inch—termed *ppi*. Icons and screen shots are good at 120-150 ppi. For photographic images, 200 ppi is usually okay for office and color laser printers, and also commercial printers if the image does not have very sharp details. Anything beyond 300 ppi is pretty meaningless for normal use. Anything beyond 400 ppi is a waste of file size, thereby forcing users to handle bloated slow PDF files and clogging our networks and file servers!

- **Vector** images are built from lines. These may be straight lines, polygons, or smooth curved lines. A closed area may be filled with either a solid or graduated color. Some advanced formats even support transparency. A vector image can be scaled arbitrarily to any size with perfect quality. The file size does not depend on the final print size—a one meter image occupies as many kB as a one millimeter image!

Some images can be a mixture of raster and vector, and if so, you should basically treat them as vector. An example may be text on top of a raster image.

2 Color model?

Normally, the image is already in a certain color model and you have no reason to change it. Sometimes, however, you may have a choice, and if so, you need to know what to do.

- **CMYK**—Cyan Magenta Yellow Key (meaning black). This is used in the printing industry, i.e by commercial printers (not office printers). The components (CMYK) specify how much ink or pigment to put on the paper. If you want black lines, choose grayscale black rather than K=0.
- **Spot colors**. This is also intended for commercial printers. It specifies dedicated inks or pigments to be used, such as a can of gold paint. It is extremely common for company logo colors. Generally, simulations of them print reasonably well also on regular office laser printers. *Only* vector images can specify spot colors, and usually they need to be in EPS to avoid Windows destroying them in its conversion to RGB.

- *RGB*—Red Green Blue. This is used in all other cases, including files intended for inkjet and color laser printers. The components specify how much light to illuminate a white surface. Note that even inkjet and color laser printers expect this color model when the file is sent to the printer driver, even though the actual ink or pigment in the printer is CMYK (or their own special version of ink/pigment).
- *Indexed colors*. This is RGB, but rather than 8 bit per color (i.e 24 bits total), it uses 2 to 8 bits for indexing a table of anything from 4 to 256 colors. Extremely common for images on the web.

NOTE There exist **NO** general methods to convert RGB to CMYK or back that preserves correct colors! Most people find this hard to believe, but it is theoretically impossible in the general case! Nevertheless, some programs will do conversion anyway (behind your back), and unless you have control over color management (see next section), you have no control whatsoever of the end result!

NOTE If you use Windows, it will generally convert *all* CMYK or spot colors to RGB, and the result is arbitrary! The *only* way to preserve CMYK colors are: use the EPS file format or use special graphics software that generates their own postscript (in practice this means Illustrator, InDesign, Photoshop). FrameMaker relies on Windows GDI, so if you want CMYK from FrameMaker, you either need a special plug-in, or you must use EPS.

3 *Color management?*

Sorry, understanding the basics of this requires a significant amount of theory that is too complex for most people to understand. Too bad, since inappropriate color management can easily make colors completely way off! Blue can easily look green, and green can look brownish etcetera. Nevertheless, go by the following:

- For raster images, or vector images in the RGB color model: If you have a choice, choose the color space *sRGB*, unless you know what you are doing. If it is in any other color space, convert it to sRGB, unless you know what you are doing.
- For Vector images in the CMYK color model, you should choose the color space that the printing firm uses.
- If you have a choice, choose the Perceptual rendering intent, or Relative Colorimetric.
- *Never* trust your screen, unless it is calibrated with a special hardware device!! Differences can be huge!

4 *Choose “safe” colors*

Generally, if you want your document to appear good on both screen and on paper, avoid the strongest colors, since those colors change enormously when you print them! Normally, a dark but strong saturated blue may look good on screen, but may be virtually indistinguishable from black on print. Likewise, a strong red may look like pink on print!

5 *Choose file format*

JPEG Choose this format only for raster images that look like photographic images with smooth details, i.e not so many sharp edges, and basically no (sharp) text. JPEG compresses destructively, i.e each time you save in JPEG, the image gets

worse! For a good reference format that is not destructive, choose either TIFF or 24 bit PNG. Text will generally look ugly in JPEG. Drawn illustrations of boxes plus text is a classic example for which JPEG is extremely unsuitable!

TIFF Basically, PNG 24 is better than TIFF in almost all situations, since 24 bit PNG makes for much smaller file sizes. Some people may still need TIFF, but those people will generally have the knowledge to understand why (usually because they need to preserve layers). Also, not all software can handle PNG.

PNG 24 bit Choose this format for raster images that look like drawings with sharp edges, and that has a lot of colors. If it has few colors, choose GIF instead. Also choose this format for any raster image that you want to preserve at full quality, e.g as a reference, since PNG-24 compression is not destructive.

If the image is simple, the file size can be very small. If your software only says “PNG”, it is usually 24 bit PNG. If the image will be imported into a document, or used on the internet, (i.e it is not just a reference) **make sure to save the image without transparency!** The reason is that some software can not handle the transparency correctly.

PNG 8 bit This is like PNG 24 bit but with indexed colors. It is intended as a superior alternative to GIF, but since there is a problem with FrameMaker, I do not recommend this format.

GIF This format uses indexed colors, so if there are more than 256 colors originally, you will lose information (which may or may not be okay, depending on your need). Choose this format for raster images that look like drawings with sharp edges, provided you do not need thousands of colors. Also very good for small icons etcetera. Large smooth gradients may become visibly banded. The file size is usually very small. It is okay to save with transparency.

EPS For vector images, EPS and CGM (see below), are the only generally accepted formats. EPS has a very wide support, and it is the preferred format in the printing industry. You **must** make sure it has a so called *preview!* If you have a choice, binary is usually okay.

If the image contains text, either convert it to graphic, or make sure to embed the fonts. But for the most general use, delete the text completely! Then add the corresponding text in your authoring software. The rationale for this is that the final use of the image may require the text to be in a different font, or be translated into a different language, or the image is scaled so that the text must be made larger/smaller.

A document that has imported EPS images may look ugly on screen, but after you have saved it to PDF, it will look good also on screen, and the user can easily zoom in on the image in Adobe Reader.

EPS files can be monstrously large! Sometimes, it helps saving the file in an older format—this can be chosen in e.g Adobe Illustrator. Use the following guide:

- **Version 3.** This is the oldest format, and can result in small files. Features of Illustrator later than 3 will be lost, but most simple drawings don't use those features. Most notably, it does not support transparency or compounds. It can not embed fonts, so my recommendation is to save the image without any text. If you must have text, it must be converted to outlines, unless it is Arial, Times or Courier. Graduated fillings will increase the file size enormously. Version 3 can only save colors in the CMYK model.
- **Version 8.** This is the oldest format that supports RGB colors.
- **Version 9 and 10.** Sometimes files can be smaller than CS2 or CS3 EPS, but usually, there is not much difference.
- **CS (either version 1, 2 or 3).** Preserves everything, but file sizes are like monsters!

- BMP** Please, don't *ever* use this format!
- WMF** Please, avoid this format!
- SVG** *Scalable Vector Graphics*. Very modern. You need to make sure it works with your software.
- CGM** *Computer Graphics Metafile* is an international standard for storage and exchange of 2D graphical data. Although initially a vector format, it has been extended in two upwardly compatible extensions to include raster capabilities. You need to make sure it works with your software.

6 ***Import by reference of copy?***

Generally, do *not* import by copy into the document! The reason is that once it has become an integral part of the document, the format of the original image is usually lost! Example: if you import an image into Word, you can ***not*** export the image and think you get the same thing! The fact is that Word will convert the image to its own internal format, which usually has a *much* lower quality and resolution. This also applies to PowerPoint illustrations imported into Word! You can ***not*** export or copy the image from that Word document and think you still have a proper PowerPoint illustration! It has been seriously mangled!