

Preparing Images for Print

In order to produce high-quality images, it is important to understand how the pixel data of images is measured and displayed. **Pixel dimensions** : the number of pixels along the height and width of a bitmap image. The display size of an image on-screen is determined by the pixel dimensions of the image plus the size and setting of the monitor.

For example, a 15-inch monitor typically displays 800 pixels horizontally and 600 vertically. An image with dimensions of 800 by 600 pixels would fill this small screen. On a larger monitor with an 800 x 600 pixel setting, the same image (with 800 x 600 pixel dimensions) would still fill the screen, but each pixel would appear larger. Changing the setting of this larger monitor to 1024 x 768 pixels would display the image at a smaller size, occupying only part of the screen.

When preparing an image for online display (for example, a Web page that will be viewed on a variety of monitors), pixel dimensions become especially important. Because your image may be viewed on a 15-inch monitor, you may want to limit the size of your image to 800 x 600 pixels to allow room for the Web browser window controls.

How large an image appears on-screen depends on a combination of factors – the pixel dimensions of the image, the monitor size, and the monitor resolution setting.

Image resolution: The number of pixels displayed per unit of printed length in an image, usually measured in pixels per inch (ppi). In PhotoShop, you can change the resolution of an image: in ImageReady, the resolution of an image is always 72 ppi. This is because the ImageReady application is tailored to creating images for online media, not print media.

In PhotoShop, image resolution and pixel dimensions are interdependent. The amount of detail in an image depends on its pixel dimensions, while the image resolution controls how much space the pixels are printed over. For example, you can modify an image's resolution without changing the actual pixel data in the image – all you change is the printed size of the image. However, if you want to maintain the same output dimensions, changing the image's resolution requires a change in the total number of pixels.

When printed, an image with a high resolution contains more, and therefore smaller, pixels than an image with a low resolution. For example, a 1 inch x 1 inch image with a resolution of 72 ppi contains a total of 5,184 pixels (72 pixels wide x 72 pixels high = 5,184). The same 1 inch x 1 inch image with a resolution of 300ppi contains a total of 90,000 pixels. Higher resolution images usually reproduce more detail and subtler color transitions than lower resolution images. However, increasing the resolution of a low resolution image only spreads the original pixel information across a greater number of pixels, it rarely improves image quality.

Using too low a resolution for a printed image results in pixelation – output with large, coarse looking pixels. Using too high a resolution (pixels smaller than the output device can produce) increases the file size and slows the printing of the image. Furthermore, the device will be unable to reproduce the extra detail provided by the higher resolution image.

Monitor resolution: The number of pixels or dots displayed per unit of length on the monitor, usually measured in dots per inch (dpi). Monitor resolution depends on the size of the monitor plus its pixel setting. Most new monitors have a resolution of about 96 dpi, while older MAC OS monitors have a resolution of 72 dpi.

Understanding monitor resolution helps explain why the display size of an image on screen differs from its printed size. Image pixels are translated directly into the monitor pixels. This means that when the image resolution is higher than the monitor resolution, the image appears larger on screen than its specified print dimensions. For example, when you display a 1 x 1 inch, 144 ppi image on a 72 dpi monitor, it appears in a 2x2 inch area on the screen. Because the monitor can display only 72 pixels per inch, it needs 2 inches to display the 144 pixels that make up one edge of the image.

Printer resolution: The number of ink dots per inch (dpi) produced by all laser printers, including imagesetters. Most desktop laser printers have a resolution of 600 dpi and imagesetters have a resolution of 1200 dpi or higher. To determine the appropriate resolution of your image when printing to any laser printer, but especially to imagesetters, check your "Screen frequency" below.

Ink jet printers produce a spray of ink, not actual dots. However, most ink jet printers have an approximate resolution of 300 to 600 dpi and produce good results when printing images up to 150 ppi.

Screen frequency: The number of printer dots or halftone cells per inch used to print grayscale images or color separations. Also known as screen ruling or line screen. Screen frequency is measured in lines per inch (lpi) or lines or cells per inch in a halftone screen.

The relationship between image resolution and screen frequency determines the quality of the detail in the printed image. To produce a halftone image of the highest quality, you generally use an image resolution that is from 1.5 to at most 2 times the screen frequency. With some images and output devices, a lower resolution can produce good results. To determine your printer's screen frequency, check your printer documentation or consult your service provider.

Some imagesetters and 600 dpi laser printers use screening technologies other than halftoning. If you are printing an image on a non-halftone printer, consult your printer documentation or service provider for the recommended image resolutions.

- A . 65 lpi: Coarse screen typically used to print newsletters and grocery coupons.
- B. 85 lpi: Average screen, typically used to print newspapers.
- C. 133 lpi: High quality screen typically used to print 4/color magazines.
- D. 177 lpi: Very fine screen, typically used for annual reports and images in art books.

File size: The digital size of an image, measured in kilobytes (K), megabytes (MB), or gigabytes (GB). File size is proportional to the pixel dimensions of the image. Images with more pixels may produce more detail at a given printed size, but they require more disk space to store and may be slower to edit and print. For instance, a 1 x 1 inch, 200 ppi image contains 4 times as many pixels as a 1 x 1 inch, 100 ppi image and so has 4 times the file size. Image resolution thus becomes a compromise between image quality (capturing all the data you need) and file size.

Another factor that affects file size is file format – due to varying compression methods used by GIF, JPEG and PNG file formats, file sizes can vary considerably for the same pixel dimensions. Similarly, color bit-depth and the number of layers and channels in an image affect file size.