

How to Speak the Language of Photographic Enlargements

Professional and Educational Insight

by:

Jerid O'Connell

on behalf of Duggal Visual Solutions

February 1, 2018

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How to Speak the Language of Photographic Enlargements for Museums

"I'm giving you a 125-megabyte RGB TIFF...How large can it be printed?"

We're happy to answer this question for you, but what if you were able to calculate the answer just as easily? Enlargements are a mainstay in photographic exhibitions and presentations. Working with the world's most prized museums, galleries and artworks, Duggal Visual Solutions is here to not only produce your grandest visions, but also educate you on how we are able to bring them to life with accuracy, clarity and image integrity. Use this guide to gain a deeper understanding of what's happening in a photographic enlargement, so you can preserve and enhance your imagery accordingly.

Part One – Image Capture **File Size and Format**

Megapixel

Megapixel is a term most often used to describe the digital capture size of a digital camera. A megapixel is made up of 1 million pixels. If your camera captures 3500 pixels wide by 2300 pixels high, you have a total of approximately 8 million pixels, or 8 megapixels. To put this into the real world, we'll add that the standard iPhone camera is 12 megapixels.

Camera	Cost	Megapixels	Size @ 300dpi
Canon EOS 70D	\$800	20	12 x 18 inches
Canon EOS-5ds	\$5000	50	19 x 29 inches
Phase One IQ1	\$45,000	100	29 x 38 inches

Apochromatic Lens

A lens in which all colors focus on the same plane, creating a sharper image without color fringing.

Megabyte

In Photoshop, the megabyte is the most common way to describe file size. This combines the size, resolution and color space into a single number. An 8x10 CMYK file at 300 dpi is 27.5 megabytes. If the file size changes to 16x20 and the resolution is changed to 150 dpi, it is the same number of pixels, so it is still 27.5 megabytes.

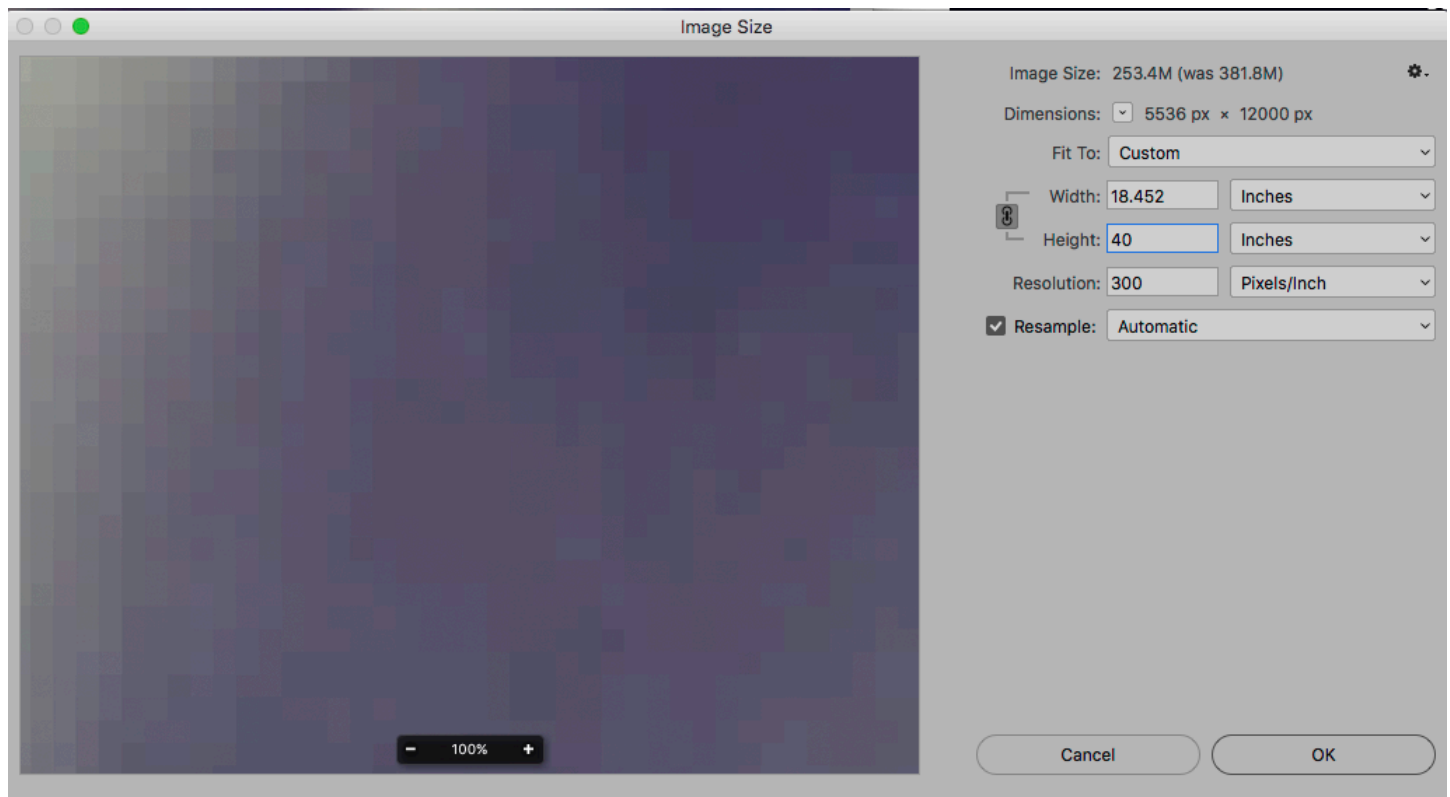
DPI

Dots Per Inch is a printing term to describe how many ink droplets are used to create a print. The more dots, the higher the image quality. Files size are sometimes described by DPI as well. This can be confusing, because you need to know the size of the file and DPI to understand how much data the file includes. It is much easier to use megabytes. For computer screen resolution, PPI, or pixels per inch, is used to describe the resolution, because the images on monitors are created with pixels instead of printed dots.

A 12 megapixel file is 36 megabytes in RGB and 10 x 13 at 300 dpi.

How We View Files to Determine Quality

- Open the file in Photoshop.
- Change the size of the file to the size of the final print.
- View at 100%.
- Note: Do not change resolution.



File Interpolation and Tricks to Help Enlargements Look Better

Using software, pixels are added to create a larger file by mathematically averaging the data between two pixels to create a third pixel. Although the file gets larger and may look better when enlarged, it has not created any new original data. After we enlarge a file, we can retouch and enhance it further.

A print from a large original file will always look better than an image that was smaller and enlarged by interpolation.

Formats for Digital Files

Vector and Bit Mapped Files

Vector files are created in programs such as Adobe Illustrator for geometric shapes such as type. They have the advantage of being able to enlarge to any size. Bit map images, such as photos, are created with pixels.

TIFF (Tagged Image File Format)

TIFF is one of the most popular file types because it is a lossless format that enables embedded profiles and multiple players.

JPEG

JPEG is the most common format used in digital cameras. Unfortunately, the compression it uses can cause loss of information and detail. The file does not have the amount of information or the ability to process as a camera RAW file. When you shoot in JPEG, the camera converts the RAW data into JPEG automatically, without any consideration for the best option.

RAW

RAW or camera RAW files contain all the information that was captured by the sensor in the camera or scanner. Unlike JPEG or TIFF files, RAW files can be “processed” multiple times to create a single file that optimizes all data. RAW files are not print ready. They must be processed and saved in another format such as TIFF before printing.

PDF

PDF, or Portable Document File, is used to create documents that do not need the software they were created in to open or view. Most browsers can open PDFs. Because PDFs can contain multiple file types, fonts and images, they are a good way to share files.

File Color Space RGB and CMYK

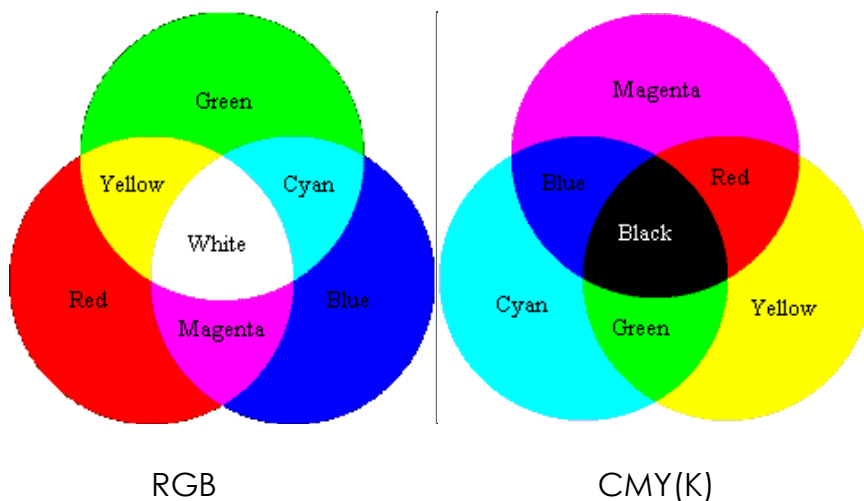
There are two separate sets of primary colors: **additive** color for mixing light and **subtracted** color for mixing inks, pigments or paints. Monitors use additive color. All prints are subtracted color. Files can be in either color space.

Many times, files are saved in RGB because it is a much larger color space allowing more information to be captured. When RGB files are printed, they are converted to additive color based on how the printer is configured. Many printers have addition inks to enhance the color range. If converted properly, the RGB file will use all the inks for a better print.

In **additive color**, the primary colors are **Red, Green and Blue (RGB)**, each representing a third of the visible color spectrum of light. When you combine equal amounts of Red, Green and Blue light together, they create white light. Changing the intensity or amount of each color creates color and lightness variations.

The **subtracted** primary colors are **Cyan, Magenta and Yellow (CMY)**. Mix equal amounts of Cyan, Magenta and Yellow pigment, and you have created Black. All other colors including Red, Green and Blue can be mixed from these three primary colors.

In printing, K or black ink is included to add extra density to the dark areas. In theory, if we could produce inks that were a pure Cyan, Magenta and Yellow, we could produce all of the visible colors with just three inks. Unfortunately, inks are not pure and contain other colors, making it impossible for them to produce clean, vibrant colors. For instance, most inks called Cyan actually have Magenta in the ink and thus do not produce a clean color such as the color of a Caribbean Sea.



CMYK and RGB Color Space for Digital Files

Adobe 1998

Adobe 1998 is a RGB color space that can reproduce approximately 50% of all visible colors, more than most printers can print. It is one of the most popular profiles because it captures such vast information and color.

SRGB

SRGB can reproduce 35% of visible colors. The gamut is very close to most monitors and displays. Images online are usually in SRGB.

SWOP

"Specifications for Web Offset Publication," or SWOP, is a specification for printing in the United States on web presses. Web presses are the presses that are used when printing millions of copies, such as newspapers or magazines. Because web printers have limited color saturation, the files also are limited in the range of colors.

GraCol

"General Requirements for Applications in Commercial Offset Lithography," or GraCol, is a specification for sheet fed printing presses. Gracol color is only slightly richer than SWOP.

Part Two - Types of Printers and Prints

Large Format Printing

Large inkjet printers can print up to 16 feet wide. Many substrates from vinyl to wallpaper can be printed onto for giant, color prints. The quality of large prints depends on the quality of the original file sent to the printer, the DPI that the printer can print and the color range of the inks that the printer uses.

Printer Epson Print Giclee

The word Giclee, which means "splash" in French, is used to describe high quality archival Ink Jet prints. Many types of "art" papers can be used, from watercolor to bright white and beyond.

Dye-Sublimation

A process that allows you to permanently print on fabrics. These large format prints can be used in lightboxes, outdoor banners, custom fabrics and more. They can be folded for easy shipping, with sizes up to 123 inches wide.

Printer Lambda / Lightjet Print C Print / Duraclear / Duratrans

Years ago, negatives were projected onto photographic paper using enlargers, and then processed in photographic chemicals to create a print. Lambda and Lightjet printers replaced the enlarger by projecting digital images using lasers onto the same photo paper. After exposing the paper, the prints are processed in photographic chemicals.

Besides traditional photographic paper C-prints, there are clear base prints called Duraclear and Duratrans that have a white transparent base. The material comes in up to 80-inch rolls.

Printer HP Indigo Digital Press

Unlike traditional presses, there are no plates or set up in an HP Indigo. This allows for cost effective short runs, and extensive personalization through variable data. The Indigo can print onto more than 3,000 different substrates including metallic, at sizes up to 20 x 29 inches.

Part Three - Installation and Lighting

Site Survey

The technician conducting the survey checks measurements and the condition of the site, specifically looking for any potential challenges such as wall surface, electrical or environmental problems.

Approximate Cost: \$350 to \$500.

Install

Depending on the complexity of the project, the cost is a minimum of \$275 for a simple project that can be completed in an hour or two. Larger projects are \$500 to \$1,000, and can be more expensive when extras, such as scaffolding, might be needed. If union workers are required, the price triples.

DYI Install

Not recommended unless it is a product that is very easy to install, such as small window clings.

Color Temperature

The color of light is measured in kelvin degrees to describe the color temperature of a light source. 5000K is close to daylight, and warmer Tungsten light is around 3200K. The lower the kelvin, the redder the light. The higher the kelvin, the bluer the light. Different color lights can drastically change how a print looks. It is very important to know the color temperature of the light that a print will be viewed with.

Metamerism

When two materials or prints appear to match under one light source but differ under another light, the phenomenon is called metamerism. This is caused when light sources are not full spectrum. Two light sources may appear similar in color when viewed, but could be missing certain parts of the color spectrum. The missing color causes the metamerism.

About Duggal Visual Solutions

Duggal Visual Solutions, Inc. was incorporated in 1963 and is an award-winning global supplier of printed visuals, custom displays and multimedia solutions. For more than 50 years, Duggal has served as a trusted advisor and partner in helping the world's leading image-makers communicate visually with their audiences and customers.

Our clientele is widely spread among top global retailers, Fortune 500 corporations, museums, galleries, non-profit organizations, photographers, visual artists and designers. Our cutting-edge production equipment, 24-hour facilities, and seasoned industry veterans combine to offer a comprehensive suite of visual solutions for projects of all sizes and parameters. From in-house design and production to shipping and installation anywhere in the world, the Duggal team is dedicated to providing the highest level of service and quality.

To learn more, visit www.duggal.com.

Authored By:

Jerid O'Connell, VP, Creative Services



Jerid has been involved with photo and print retouching for more than 30 years, starting with the legendary Frank Tartaro dye transfer lab. From there he was recruited to start fine art and high quality studios across the country, including building the largest retouching department in the US for Color Wheel. As a result, he became an influential presence in the digital imaging field working with Kodak and Quantel to create the new technologies that would become digital retouching. As a visual expert, thought leader and creative director, his work has influenced top brands and photographers, ever present in global advertising, magazines, wide format, digital and new media. His work extends to world-renowned nature photography, and features in National Geographic, which aligns with his other passion, the Connecticut Audubon, in which he serves on the board and manages restoration of the Smith Richardson Nature Preserve.