

Why does the digital world seem to be so confusing?

Bit depth, image resolution, monitor resolution, pixel dimensions, formats... it's a lot to learn, but for the most part these terms are clearly defined.

Unfortunately, other words in the digital vocabulary lack the same clarity. Consider the terms dpi (short for dots-per-inch) and ppi (short for pixels-per-inch). Quite often, they are used interchangeably, as if they were the same, causing even more confusion. In reality, they're quite different.

Consider the pixel, it's square; the dot on the other hand is round. The pixel, or picture element, exists only on the monitor. The dot, exists only on the printed page. Manufacturers of scanners tend to use the dot-per-inch method of resolution measurement. Technically, this is inaccurate. That's because scanners work just like digital cameras, converting light and color values to numbers (digital information), and then mapping that information to a raster. A raster is an invisible grid that pixels fit into to create the image. To examine your scan you will undoubtedly view it on a monitor (measured in pixels) or edit it in a program like Photoshop, which also happens to measure image size in pixels. Unless a scan is going directly to the printer, your image has been converted to pixels. Square pixels, not round dots.

It's no wonder people are confused. When it comes to scanners, think of dots as pixels and you'll be OK. When you see scanner resolution specifications touting maximum optical resolution of 1200 dpi they actually mean ppi. Really... they do. In fact, one manufacturer of popular film scanners sees no difference between the two. In the digital glossary that ships with one of their best scanners they actually list dpi and ppi as being synonymous.

DPI-Dots-(pixels)-per-inch.

Where are the dots? Well, they do exist. However we won't be seeing them until we output to our printer. Printer manufacturers use the dots per inch method of resolution measurement because inkjet printers spray tiny dots of ink that combine to form the full color image. Technically, the term dots is correct here. The problem that arises is the conversion from pixels to dots.

I recently received an e-mail from a digital student who asked, I would like to scan 8"x10" prints for restoration purposes. I want to print the retouched digital files on my

720 dpi inkjet printer. Should I scan my prints at 100% with a resolution of 720 dpi. The simple answer is No.

That's because, generally, the maximum resolution file you want to print on any inkjet printer should not exceed 300 ppi. That's a good rule of thumb for most photo-quality output.

The reality is that every printer has an optimum input resolution. That means that a digital image file you want printed should be saved at a resolution that produces the best possible output. By knowing your printer's optimum input resolution, you can use that number as a target when you are preparing an image for print output. Before you send a digital file to be printed, you should make sure that the image resolution has been adjusted to that optimum input value. I recommend that you find out what the optimum resolution is for your equipment. Here's how I did it:

I bought an Epson Stylus 740 inkjet printer. The maximum output resolution of the Stylus is 720 dpi and it produces excellent photo-realistic prints from my Photoshop files. Because I knew that inkjet printers usually produce good results with an input resolution of 300 ppi, I was optimizing my files for 8"x10" and 5"x7" printed output @ 300 ppi. The results were actually very good.

But I wanted to know more. What was the best resolution possible for this printer? Was 300 ppi the optimum input resolution? Should it be higher? Should it be lower? I needed to know. So I started by reading the manual and to my surprise there was nothing about optimum resolution. I thought that was a little strange, so I reached for the Technical Help phone number Epson provided with the printer.

I'm sorry...this phone number is no longer in service.

I was starting to get frustrated. What's left? The Epson Web site. After an hour there, I had learned many new things about Epson products but I learned absolutely nothing about optimum image resolution for my printer. It wasn't until I attended a large photography convention that I was able to corner an Epson expert in person and ask my question.

What is the optimum input resolution for the Epson Stylus 740?, I pleaded.

240 ppi, she replied confidently.

Finally, I had my answer. Easier said than done.

The 240 ppi number makes perfect sense. That's because inkjet printers can produce very small dots of ink on a page. So small, in fact, that you could fit three to four dots of ink within the space of one pixel. If you consider that the Epson 740 can print three dots of ink per pixel and multiply that by the 240 pixels-per-inch optimum resolution you get 720 dots of ink per inch.

Three dots-per-pixel x 240 pixels per inch = 720 dots-per-inch.

You can see how this can be confusing. The logical assumption for the student was to match the dpi of his printer with the dpi of his scanner. The result being a bloated file that would take longer to print because the software driver has to process the extra information and essentially throw away pixels through interpolation.

But why does it matter? you ask. Well, by making my target resolution 240 ppi instead of 300 ppi, I instantly had the ability to reproduce my images to larger dimensions. Plus by outputting smaller optimized files, the printing process became more efficient. Now my printer prints more pages per minute (PPM) and no quality was sacrificed. Every pixel that I sent to the printer was utilized without interpolation. That's the way I like it. Efficient.

It's like the octane level of the gasoline for your car. If your car runs perfectly on a low octane gas, it doesn't make sense to use the high octane fuel that costs more and gives you no benefit. By running your printer at the most efficient input resolution you'll get the best quality prints.

It's a shame manufacturers don't make these figures more accessible. Perhaps they'd be able to reduce their Tech Help queries and even improve customer satisfaction. If making a print is easier to do, chances are consumers will make more prints, which sells more ink and more printers and more paper.

We think you should e-mail your printer manufacturer and request the optimum input resolution number for your machine. Remember the number they quote should be in pixels-per-inch. Make sure to include the make and model of your printer as well as the type of paper you intend to print on. Maybe if enough people ask, they'd consider including this vital piece of information in their documentation.