

PPI, DPI and LPI Differences

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Many people unknowingly confuse:

- PIXELS per inch (PPI) for
- DOTS per inch (DPI) or even
- LINES per inch (LPI)

PIXELS per inch (PPI) exclusively refers the computer's digital image representation. It could be how an image is comprised (in Photoshop, on the web or displayed on a monitor), but no matter how it is depicted, it is always digital (electronic, computer, binary, etc.) and in any form, it is something you can NOT touch! (You can not pick-up a pixel with your fingers or serve a cup of pixels for breakfast.)

The resolution of digital images are defined as "PPI" (with a "P"). There is no such thing as a digital image having a "DPI" resolution!

DOTS per inch (DPI) are physical (tangible) marks on a media (as paper) and are the direct results of a laser or inkjet printer. You can TOUCH a DOT (image on paper). You can NOT TOUCH a PIXEL (which is buzzing around inside the computer and bouncing off your computer screen)!

LINES per inch (LPI) is the term for resolution inherent in the offset (commercial and high volume) printing industry. This term may make more sense if you can recall some of the etchings, wood cuts and other line art images from earlier printing presses (17th through early 20th century), you probably remember seeing that the images were actually comprised of a lot of black lines against a light/white background. Also, these lines could vary in size, thickness and direction.

The more lines that could be fitted within an inch, the more detailed appearing the image. Most press runs use between 65 lpi and 200 lpi, depending on the coarseness of the paper (i.e. porous newspaper is 65 lpi to 85 lpi, while gloss enamel can be 133 lpi 155 lpi or higher).

One of the big differences between a desktop printer's DPI and an offset press's LPI is that the dots (from DPI) are ALWAYS the same round size, while an offset press's LPI relies on varying the size of each impression, as well as using non circular impressions laid down in specific directions (or degrees).

Nowadays, in the commercial printing field, the division between each is becoming more and more blurred (no pun intended), as commercial digital presses use dots so small, that when clumped together, give the same appearance as a nonconcentric LPI impression.

Printing from a computer relies on two distinct and mutually exclusive entities: The computer, which uses binary data to represent, among other things, words and images; Then the printer which converts electronic data into a physical product which are marks on paper (often in the form of an image).

The computer, as it sends digital data out, could care less where the data is going, just as long as it transfers. (Of course we humans DO care where the data is sent: monitors, modems, printers, etc.).

By the same token, a hardware printer could care less what information it receives, as long as long as it can convert the information into some type of mark, using ink dots on paper to illustrate an image (probably several hundred dots per inch of paper).

(The results are dots on paper are tangible - they can be touched! But you can not touch or pick-up any of the electronic, binary "pixels" as they stream from the computer to the printer.)

The quality of the digital image and the quality of the physical out put are both exclusively independent of each other and mutually interdependent in optimizing the final result.

Since inkjet printers produce a stochastic image (random dot pattern), Epson recommends a file output size of 1/3 the printer's resolution (i.e. Printer @ 720 dpi = 240 ppi, Printer @ 1440 dpi = 480 ppi). - Any more clogs the system and degrades the image. — Any less is insufficient data.

Also bear in mind, because inkjet (and most other color desktop printers) rely on creating a “stochastic” or random image pattern (representing each pixel with multiple clumps of ink), images produced by these printers are not conducive to being reproduced on a press or photocopy machine. (A laser printer can produce a structured dot pattern resulting in reasonably good press or photocopy quality.)

Further, marketing statements as 720x1440 (or any A x B reference) tend to be misleading. The only number of true relevance is the first, lower number. The second is a synthetic interpolation used primarily by the marketing folks to try and impress us mortals and sell their product.

Finally, using the appropriate and accurate terms when referring to various resolutions promotes effective communication. (Conversely, improper use of these terms merely advertises our ignorance.)