

Are nozzle count specifications comparable among all ink jet brands?

Some ink jet manufacturers claim the use of more nozzles on the print heads directly relates to better print quality or printing speeds. In reality, nozzle count comparisons are meaningless between Epson and these brands because Epson uses Micro Piezo technology and other ink jet printers use thermal ink jet technology.

Did You Know?

The number of nozzles on the print mostly impacts print speed, not print quality. Print speed is chiefly a function of how quickly the print head nozzles can fire ink droplets and the width of the print head, which reflects how much area can be covered on a single pass of the head.

With thermal ink jet technology, extremely high nozzle counts are necessary to achieve fast print speeds. Not all nozzles can be fired at once, or used frequently, since the heat used in the process can damage the print head nozzles with constant use. Additionally, nozzle firings must be alternated because of the need for a cooling process after ink is ejected from a nozzle.

With Epson's Micro Piezo technology, the same speeds can be achieved with fewer nozzles, because the technology uses a mechanical method that propels ink droplets out of the nozzles. The nozzles are more stable and durable, and can therefore be used more frequently. Because heat is not used in the process, Epson print heads run at room temperature, so there's no need to slow down nozzle firings to allow cooling between droplets.

Additionally, due to Epson's Micro Piezo technology, different sized droplets can be created by modifying the highly accurate pulsation of the piezo mechanism. This is called Variable Droplet technology, first developed by Epson and now used in all Epson ink jet printers. The ability to create different size droplets optimizes speed and quality and allows for more levels of color expression per pixel.

Other brands of thermal ink jet printers have also implemented variable droplet modes, but to a lesser degree. On consumer-class thermal printers, the size of the ink droplet depends on the diameter size of the nozzle. Therefore, two different sized droplets must be created by two different sized nozzles. To produce variable droplets, thermal printers need 6 to 8 times more nozzles than Epson ink jet printers with a Micro Piezo print head.

Other advantages of Epson's Micro Piezo technology are:

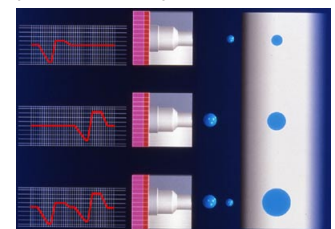
- ▼ *Greater control over the size and shape of ink droplets:* Because no heat is involved, ink is ejected without unwanted ink sprays; unlike thermal technology, heated ink does not dry and become "caked" around the nozzles.
- ▼ *Smaller ink droplet sizes:* Because Micro Piezo uses a piezo crystal that makes tiny fluctuations to propel ink out of the nozzle, the volume of ink ejected can be smaller.
- ▼ *Time savings:* Ink does not have to be heated or cooled between each cycle.
- ▼ *Greater ink flexibility:* Because ink is not subjected to heating and cooling, Epson has more flexibility in ink formulations. Epson offers a variety of inks, including 4-Color and 6-Color Photo Inks, which are dye-based solutions, and DuraBrite™, UltraChrome™, and Archival inks, which are pigment-based solutions. Each of these solutions uses the Micro Piezo printing process.
- ▼ *Permanent print head:* Because thermal heads are subjected to constant heating and cooling, they must be replaced regularly (usually as part of the ink cartridge). Epson print heads, on the other hand, are permanent, and are designed to last the life of the printer.

Notable Quotes

"Thermal heads need cooling down time after each firing which limits the degree to which speed can be increased. Another approach to increasing printing speed is to increase the number of ink nozzles but that too has its limits for thermal inkjet printers since the same problem of energy generation and cooling remain." (*Industrial Technology*, "Colour Printer Head Technology," June 1996)

Other information in this brief gathered from PC Tech Guide, Ink Jet Printers, www.pctechguide.com/13inkjets.htm.

With Micro Piezo, different size ink droplets are created by varying the pulsation of the piezo mechanism.



Consumer-class thermal printers require two different size nozzles to produce different size ink droplets.

