





Introduction

With the increased awareness of the advantages of color printing in offices around the world comes the daunting challenge of deciding which color printing technology is best. Laser technology has long been associated with fast, easy, high quality black and white office printing. Applying laser technology to color printing, however, adds a surprising level of complexity in both printer design and operation. In fact, it is not laser but another printer technology that comes closest to fulfilling the need for fast, reliable, high-quality color that is simple to operate in any office environment.

Tektronix' breakthrough high-performance solid ink technology offers a number of advantages over color laser technology. This technology has been designed for color printing from the beginning and is not merely an adaptation of a monochrome process. It provides high print quality while addressing the real-world needs of busy office workgroups who want to add color to their existing black and white printing resources.

The productivity advantages of high-performance solid ink include:

- → Fast color throughput
- → Simplicity and reliability
- \rightarrow Ease of use

This white paper presents an overview of how Tektronix' new high-performance solid ink technology compares with color laser technology and how it achieves such a significant performance and productivity advantage for office workgroup applications.



Fast Color Throughput

Throughput can be defined as the time it takes to complete a print job as measured from the pressing of the print button on the computer screen to the moment the finished job arrives in the output bin. The top speed of the printer engine itself is only one of several factors that determine a printer's overall throughput. High-performance solid ink excels in overall color throughput in three ways:

- → Fast color print engine speed
- → Fast first-page-out time
- -> Fast overhead transparency printing

Fast color print engine speed

Color laser technology is essentially a monochrome print technology that has been adapted to print with cyan, magenta, and yellow toners as well as black. In many ways, it is like putting the complexity of four printers into one box. There is also a monochrome speed bias in the typical color laser design. In fact, most color laser printers can only print color pages at one fourth the speed of black and white pages.

High-performance solid ink has been designed from the ground up as a color-optimized printer. It can print any combination of the four primary colors in any amount of page coverage at the same high speed. Tektronix has used this new technology in printers that are rated at up to 10 color pages per minute. In the Tektronix labs, the technology has been demonstrated at speeds of up to 100 ppm.



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Fast first-page-out time

The combination of the color-optimized architecture and the fast color print engine speed leads to what is perhaps the most important advantage of all for typical office color printing: fast first-page-out time. Since most print jobs are only one to five pages long and only one copy of the document is printed, the time it takes to print the first page can be the



most critical factor in total color printing throughput.

On the first page of a print job (which is often the only page) a color laser must synchronize its imaging components and paper path. This adds considerable overhead to the printing time. Also, most color lasers must warm up their fuser roller for 30 seconds or more before

printing can begin. In fact, color lasers typically achieve their rated speed only on multiple copies of the same image. This is because they must have more than one sheet of paper in the paper path to achieve optimum timing.

Tektronix' high-performance solid ink printers have a very short paper path and can start a printing without any special synchronization. As for a warm up period, these printers do not have a fuser roller but they do need to melt the solid ink at the beginning of the working day. This is accomplished by smart software that tracks the printer's usage and warms up the ink just before the first page of the day is due to arrive. All of this adds up to a first-page-out time for solid ink that is the same as the rated engine speed plus whatever processing time the print file requires. With no mechanical overhead, no per-job warm-up time, and a fast processor, Tektronix' high-performance solid ink printers have first-page-out times over twice as fast as the typical color laser.

Fast Overhead Transparency Printing

One of the most important color printing applications is printing on overhead transparencies. For many technologies, including both color laser and color inkjet, it is one of the most difficult applications.

High-performance solid ink printers are simply the fastest technology available for highquality color printing on transparency film. There are two modes available: Fast Color mode prints transparencies at 5 pages per minute and Standard prints the highest-quality, fully saturated color transparencies at about 2.5 ppm. This compares to the typical color laser printer which, in most cases, can manage only about one transparency per minute.



Simplicity and Reliability

High-performance solid ink offers much of the simplicity of inkjet printers but with greater duty cycles and better performance than color lasers. Solid ink printers are sophisticated machines with precisely engineered mechanics, ink formulations and software. But when it comes to reliability, much of the solid ink architecture's advanced design is best shown by its utter simplicity. Today's color laser printers, on the other hand, weigh about 30% more on average than solid ink printers and have almost *three times* as many parts.

Most monochrome lasers have a simple all-in-one cartridge that is designed to image black and white pages quickly and keep printer maintenance as simple as possible. The typical

color laser, however, is a far more complex machine. Instead of a single cartridge, color laser printers typically include photoconductors, transfer rollers, fuser rollers, fuser oilers, waste toner bottles and four toner cartridges.

All of these color laser components have a certain life expectancy that is tied to either the number of pages printed or the particular primary colors used. This requires frequent



maintenance and user interventions. It also means that adding even a little color to an otherwise black and white page can double or even triple the cost of that page.

Another advantage of the solid ink architecture is the simplicity of the imaging process itself. First, a wide variety of media can be easily and reliably fed through the simple C-shaped paper path. Heavier stock and certain common envelope types can be fed through the almost straight manual feed path.



Second, solid ink has the most consistent color quality from page-to-page regardless of the type of media used. This is due to the advanced wide-format printhead, high-speed drum transfer and the patented instantdrying ink formulations that maintain color integrity on plain paper as well as special stocks.

Finally, all of these attributes contribute to an exceedingly simple automatic duplex (two-sided) printing capability. After printing the first side of the sheet the paper is re-fed from the exit rollers back into the printer through a very short duplex path. It then quickly passes through the high-speed imaging process a second time and is delivered to the output bin.



Ease of use

For a printer to be truly productive in a busy office it must be easy to set up, easy to use and easy to share. The "hidden" costs of printer downtime, user frustrations, and delayed print jobs can be enormous. For example, purchasing a low-cost but under-powered or hard-to-share color inkjet printer can be far more costly in the long run than investing in the right tool for the job. Likewise, the complexity of using and maintaining a color laser can have significant productivity costs from the very beginning.

No where are the differences in solid ink and color laser design more apparent than in the experience of day-to-day printer use. The simplicity of the solid ink system allows for a

compact, easy access design and requires only two kinds of simple, long-life consumables.

Typical color laser printers have anywhere from five to 12 separate consumables while Tektronix high-performance solid ink printers have only two. The number of user interventions and the skill level required to maintain a solid ink printer is but a fraction of that required by even the simplest of color lasers.

Loading the clean, environmentally friendly ColorStix ink sticks into a solid ink printer is as easy as putting staples in a stapler. Even a child could easily match the solid ink colors and shapes to the appropriate slot and drop them in. And this simple task can be done at any time there is no need to wait until the ink runs out. By simply "topping-off" the ink before a big job—or whenever convenient—users can be assured that their print jobs will be completed without interruption.

The only other solid ink consumable is a long-life maintenance roller that supplies the oil for the imaging drum. The environmentally friendly replacement rollers last for 30,000 pages and can be installed in less than a minute.

Another ease-of-use issue is how the printer fits into the office environment. The overall size, desktop footprint, and accessibility of a color



printer will often determine if it can be placed in the location that is most convenient for the whole office. The compact design of solid ink printers are considerably smaller than typical color laser printers. Also unlike color lasers, the space needed around a solid ink printer is less because all user access is from the front or top of the printer.



Summary

Starting with high color print quality—equivalent to color lasers—high-performance solid ink technology goes on to provide several important workgroup productivity advantages:

Faster color throughput

→ Accomplished through the technology's faster color print engine speeds, faster first-page-out times, and high-speed transparency printing.

Simpler, more reliable design

→ Using fewer mechanical parts and requiring no special per-job synchronization or warm up. The color-optimized architecture provides a very short and streamlined paper path even for automatic two-sided printing.

Easier day-to-day operation and maintenance

→ With only two kinds of consumables and a simple ink loading method that allows for uninterrupted printing. The compact size and easy access design allow easy placement and sharing.

High-performance solid ink is the only technology that has been truly optimized for color printing in the typical office environment. Although monochrome laser remains the best technology for strictly black and white printing, when it is adapted to color imaging—as in today's color laser printers—it cannot begin to approach the level of speed, simple reliability, and ease of use that is the hallmark of Tektronix' high-performance solid ink technology.

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