

# *Solvent Printing Solved*

## *How Quicker Drying Inks Are Making Same-Day Lamination Possible*



## Contents

■ Executive Summary	3
■ Part I: Solvent Printing and Lamination Basics	4
Solvent Printing	4
Lamination	5
■ Part II: Same-Day Lamination	6
Off-Gassing	7
Lamination and Off-Gassing	7
Same-Day Lamination with Solvent Inks	8
■ Part III: Considerations	9
■ Part IV: A Revolutionary Technology	10
■ About Epson	12
■ References	12





## Part I: Solvent Printing and Lamination Basics

Laminating solvent prints is both a cost-effective and flexible solution, appropriate for either indoor or outdoor applications. Uncoated self-adhesive vinyl is the most frequently used media in solvent printing, and vehicle wraps — where the vinyl needs to be cut and stretched around awkward shapes — is one of its most common applications. PSPs laminate solvent prints for added durability and to achieve a wide range of visual effects.

### Four Primary Components Of Solvent Inks

- Pigments
- Resins
- Additives
- Solvents



“  
*Solvents help keep a printing ink in liquid form and enable the pigments to penetrate its surface.*  
”

#### ■ Solvent printing

Inks are liquids that color media, or substrates, to produce text or an image. Inks used for printing are complex mixtures, but they have four primary components: pigments, resins, additives and solvents.<sup>1</sup> Pigments are the coloring agents, and resins help bind the ink together and help it adhere to the media. Additives serve a variety of functions, such as moistening the substrate or speeding up drying.<sup>2</sup>

Solvents help keep a printing ink in liquid form and enable the pigments to penetrate its surface. Once a printer has transferred ink to a substrate, a low level of heat is applied. Then the solvents start to separate from the other parts of the ink. Over time, the solvents evaporate, allowing the left behind pigments to bind to the media.<sup>3</sup> Print operators can then handle the dry print without the risk of smudging or otherwise harming the ink.



Although water-based printing inks contain solvents (primarily water), the term solvent inks generally refers to printing inks containing mostly chemical solvents. Solvent inks have many advantages, including:

- high durability
- waterproof
- scratch resistance
- compatibility with a wide range of media, including the uncoated vinyls used to produce banners, vehicle wraps, adhesive decals, and other applications that require a flexible substrate<sup>4</sup>
- comparatively low cost<sup>5</sup>

To meet the needs of their customers, many PSPs use high-volume solvent printers to create signs, vehicle wraps, and other graphics that are used outdoors or exposed to environmental hazards, such as abrasion and cleaners. Solvent prints are also an ideal solution for wall graphics, floor graphics, point-of-purchase displays, trade show graphics, and other applications that need to be durable for more than two or three years.

#### ■ **Lamination**

Although ink technologies now offer more durable finishes, lamination remains an important step in the graphics production process. Lamination helps prolong

«

*Many PSPs use high-volume solvent printers to create signs, vehicle wraps, and other graphics that are used outdoors or exposed to environmental hazards.*

»



*Although ink technologies now offer more durable finishes, lamination remains an important step in the graphics production process.*



*Film laminates can improve visual qualities, such as improving image sharpness, increasing color saturation, and heightening the contrast between colors.*



the life of inks and media, giving a print an essential layer of protection. Laminated graphics also save customers money because they resist damage, enabling customers to avoid replacement costs, and the right laminate can improve the appearance and quality of a graphic.

When using solvent ink, PSPs have several good reasons to laminate media:

- to protect the print from chemicals, abrasive cleaners, detergents, dirt, rubbing, scuffs, scratches, and other environmental hazards
- to provide a defense against graffiti and other intentional damage
- to give the print added protection from UV damage

Lamination also adds a little extra thickness, which makes the print easier to work with during installation and removal.<sup>6</sup>

PSPs use two different types of laminates: adhesive-back film and liquids (clear coats). Signmakers generally use film because it is quicker and easier to apply to the print. Film does an outstanding job of protecting printed media that have smoother surfaces, such as paper, vinyl, backlit film, and banner materials.<sup>7</sup> Liquid laminates generally work best for protecting prints on textured surfaces, such as canvas.





«

*Giving solvent prints the time to off-gas is ideal, but rush jobs, space issues, and workflow demands sometimes lead PSPs to laminate prints before they have completely cured.*

»

Graphics professionals can choose between two different types of film laminates: calendered or cast. Calendered films are generally applied on flat surfaces or surfaces with slight curves. Cast films are more expensive than calendered films. They are also more flexible, so they are the best choice when an installation requires molding the print around curved surfaces, such as a vehicle wrap.<sup>8</sup>

Film laminates are ideal for pressure-sensitive media, such as vehicle wraps, decals, and stickers. They also provide textural qualities, such as gloss, luster, matte, and other specialty finishes. Film laminates can improve visual qualities, such as improving image sharpness, increasing color saturation, and heightening the contrast between colors. By laminating their output, PSPs can provide their customers quality graphics with a professional finish.

## Part II: Same-day Lamination

Although solvent inks are the ideal solution for many types of print jobs, the technology comes with one inconvenience for sign and graphics businesses. Traditionally, ink and media manufacturers have recommended PSPs allow solvent prints to dry between 24 and 48 hours to allow time for the solvents to evaporate. However, a new ink technology allows much faster curing times, allowing graphics providers to laminate solvent prints the same day they come off the printer.



### ■ Off-gassing

The solvents in solvent inks penetrate the surface of the media, softening it. The solvents then carry the pigments into the media, allowing the pigments to penetrate the surface of the media. Once the ink has been transferred to the media, the solvents start evaporating, leaving behind the pigments and other ink components. Solvent inks require off-gassing (also known as out-gassing), which is the process of allowing the solvents in the ink to disperse into the air.

PSPs typically allow media printed with solvent inks to cure. They either spin out the rolls and allow them sit on the floor for at least 24 hours, or they stand the rolls in large boxes and position fans to blow air across the prints. Because solvent gases are heavier than air, standing a loosely rolled print on its end (preferably elevated off the floor) or hanging it up allows the gases to fall away from the print. Then the solvents start to separate from the other parts of the ink. Over time, the solvents evaporate, allowing the left behind pigments to bind into the media.<sup>3</sup> Print operators can then handle the dry print without the risk of smudging or otherwise harming the ink.





## ■ Lamination and off-gassing

“  
Same-day lamination of solvent prints also speeds up workflow, providing PSPs more opportunities to take on additional jobs and increase their revenue.”

Giving solvent prints the time to off-gas is ideal, but rush jobs, space issues, and workflow demands sometimes lead PSPs to laminate prints before they have completely cured. When a print is laminated before it has out-gassed, the lamination film traps the remaining solvent between the media and the laminate. The solvents will continue to off-gas, and the gases will react with either with the laminate or the film’s adhesives, partially breaking them down. Prints not off-gassed will feel tacky or soft.

Laminating before off-gassing has completed can lead to several undesirable effects. It may:

- result in laminate-media adhesion issues, producing areas where the film lifts away from the media or where bubbles appear between the film and the media
- produce discoloration, often cloudiness
- cause the laminate’s adhesive to become more aggressive
- create a greater risk of the graphic failing

A graphic that is laminated too soon is often softer. This makes the film more prone to unwanted stretching or distortion when an installer is mounting the graphic. This results in making it much harder to install, for example, by making it trickier to align panels in a multipanel graphic. Aggressive adhesive also makes it more difficult to reposition a laminated graphic.

Laminating prints that have not been sufficiently off-gassed has several business impacts:

- outputting a print that is more difficult to manipulate, increasing installation time and costs
- increasing the risk of having to reprint a job because of obvious lamination issues, which raises materials and labor costs and produces delays in delivering work to clients
- producing a sign, vehicle wrap or other graphic that may have a much shorter life, increasing the risk of having to shoulder the costs of a replacement due to the flaws
- increasing the risk of voiding media warranties, which exclude coverage for off-gassing issues

Fortunately, PSPs can now avoid these issues by adopting a new solvent ink technology.

#### ■ Same-day lamination with solvent inks

A revolutionary solvent ink minimizes the business impacts of off-gassing. Epson's newly formulated UltraChrome GS3 inks off-gas in 6 hours, rather than the usual 24 to 48 hours.<sup>9</sup>

These inks provide at least a 75 percent reduction in off-gassing delays. This substantial decrease in wait time makes same-day lamination of solvent prints possible, while avoiding the usual risks of graphic failure due to incomplete off-gassing. UltraChrome GS3 inks also deliver all of the benefits of solvent inks — including outstanding print quality, durability, and superior media compatibility.



«

*Epson's newly formulated  
UltraChrome GS3 inks off-gas in 6  
hours, rather than the usual  
24 to 48 hours.*

»



«

*Get the job done —  
on time and with photographic  
quality that exceeds customer  
expectations*

»

Same-day lamination of solvent prints provides a range of business benefits for signmakers and other PSPs:

- enables them to meet quick-turnaround deadlines
- increases productivity by speeding up workflow
- reduces the space needed for drying prints
- reduces clutter
- achieves superior image quality (compared to other solvent ink technologies)
- avoids lamination issues, such as tackiness and softness, making it easier for installers to mount films
- provides flexibility to reprint a job when necessary or to adapt to other business issues that may arise
- saves money; fewer reprints means lower materials and labor costs

Getting print jobs completed on time is essential for signmakers and other graphics businesses. The quicker PSPs can laminate prints, the sooner can they can send them out for installation. Same-day lamination of solvent prints also speeds up workflow, providing PSPs more opportunities to take on additional jobs and increase their revenue.

## Part III: Considerations

Signmakers and graphics companies use solvent printing because of its speed, economy, and high-quality output. The time needed to deliver a graphics job is often critical, so PSPs need to choose the solvent printing technology that allows them to print and finish on time — and deliver the fast, superior results that customers want.

When evaluating which solvent printing technology is the right solution for you, keep the following considerations in mind:

- *image quality*: Consider your image quality requirements and be sure the solution you choose can deliver. Request print samples from your vendor and examine sharpness, grain, and banding.
- *color gamut*: Look for inks that provide wide color gamut and higher potential for accuracy, density, and brightness that avoid your ink colors from looking flat.
- *printer capabilities*: Seek out solvent printers with quick and accurate feeding, as well as fast print heads that avoid banding issues.
- *reliability*: Ensure longevity with equipment rated for long duty cycles.
- *maintenance*: Ask your provider about maintenance schedules, as many advanced printers are designed to require less maintenance than previous technologies.
- *media warranties*: Consider off-gassing times when researching ink technologies. Most media warranties are voided if a graphics failure is attributed to off-gassing or lamination issues due to inadequate off-gassing.





SureColor S Series Printers	SureColor S40600	SureColor S60600	SureColor S80600
Sellable-quality banner output	215 sq. ft. per hour	550 sq. ft. per hour	340 sq. ft. per hour
Adhesive vinyl output	170 sq. ft. per hour	310 sq. ft. per hour	195 sq. ft. per hour
Printhead	PrecisionCore TFP	Dual-array PrecisionCore TFP	Dual-array PrecisionCore TFP
Ink technology	Epson UltraChrome GS3	Epson UltraChrome GS3	Epson UltraChrome GS3
Base colors	C, M, Y, K	C, M, Y, K + C, M, Y, K	C, M, Y, K, LC, LM, LK, O, R
Optional colors	None	None	W, MS
Primary application	Entry level	High output	Outstanding quality
Same-day lamination	Yes	Yes	Yes

## Part IV: A Revolutionary Technology

These new inks are available in nine colors: cyan, magenta, yellow, black, light cyan, light magenta, light black, orange, and red. The unique red solvent ink provides noticeable color gamut improvements, producing outstanding red shades for signage and other applications. One printer model also offers optional white and metallic silver inks.

Along with Epson's new generation of roll-to-roll solvent printers, the UltraChrome GS3 inks enable PSPs of any size to get the job done — on time and with photographic quality that exceeds customer expectations. These inks are compatible with a wide range of media, including reflective film, cast PVC, PVC banners, canvas, and textiles. They're ideal for signs, vehicle wraps, window and floor graphics, exhibition displays, posters, POS materials, wallpaper, photo canvases, decals, magnets, and many other applications.

Epson's new quicker-drying solvent inks and roll-to-roll solvent printers have revolutionized solvent printing. To learn more about same-day lamination with solvent printing — and to explore the advantages of Epson's UltraChrome GS3 inks and SureColor S-Series printers — visit Epson online at [www.epson.com/sseries](http://www.epson.com/sseries)

## About Epson

Seiko Epson Corporation is a global imaging and innovation leader that is dedicated to exceeding the vision of customers worldwide through its compact, energy-saving, high-precision technologies, with a product lineup ranging from printers and 3LCD projectors for business and the home, to electronic and crystal devices. Led by the Japan-based Seiko Epson Corporation, the Epson Group comprises over 67,000 employees in 108 companies around the world, and is proud of its ongoing contributions to the global environment and the communities in which it operates.

## References

1. Joy Kunjappu, "Ink Chemistry." Available: [www.chemistryworld.com/news/ink-chemistry/1013163.article](http://www.chemistryworld.com/news/ink-chemistry/1013163.article).
2. New Zealand Institute of Chemistry. Printing Ink Technology and Manufacture. Available: [nzic.org.nz/ChemProcesses/polymers/10E.pdf](http://nzic.org.nz/ChemProcesses/polymers/10E.pdf).
3. New Zealand Institute of Chemistry. Printing Ink Technology and Manufacture. Available: [nzic.org.nz/ChemProcesses/polymers/10E.pdf](http://nzic.org.nz/ChemProcesses/polymers/10E.pdf).
4. Silversheen Inks & Coatings. Basics about Inkjet Ink. Available: [www.silversheen.com/pdf/Basics%20Inkjet%20Inks.pdf](http://www.silversheen.com/pdf/Basics%20Inkjet%20Inks.pdf).
5. Hudson Display Services, "Ink Types Used in Wide Format." Available: [www.hudsondisplayservices.co.uk/inks](http://www.hudsondisplayservices.co.uk/inks).
6. Cassandra Balentine, "Durability and Effect: Overlaminates Provide Protection." Available: [www.digitaloutput.net/durability-and-effect/](http://www.digitaloutput.net/durability-and-effect/).
7. Sign & Digital Graphics, "Lamination Film Review." Available: [sdgmag.com/tips/lamination-film-review](http://sdgmag.com/tips/lamination-film-review).
8. Sign & Digital Graphics, "Understanding Laminating Films." Available: [sdgmag.com/tips/understanding-laminating-film](http://sdgmag.com/tips/understanding-laminating-film).
9. Results are based on Epson and Avery internal lamination testing at 6 hours after printing. Results may vary based on environmental conditions, media type used, ink density, and other factors.

EPSON is a registered trademark and EPSON Exceed Your Vision is a registered logomark of Seiko Epson Corporation. WorkForce is a registered trademark of Epson America, Inc. All other product and brand names are trademarks and/or registered trademarks of their respective companies. Epson disclaims any and all rights in these marks. Copyright 2017 Epson America, Inc.



■ **Another innovation from Epson Business Solutions.**  
Find out more at [Epson.com/ForBusiness](http://Epson.com/ForBusiness)

■ **To learn more about Epson Solvent Printers, visit [Epson.com/sseries](http://Epson.com/sseries)**

**Epson America, Inc.**

3840 Kilroy Airport Way, Long Beach, CA 90806