

# FLAT-OUT GREAT Backlit

Ten things to know about flatbed printers and creating backlit displays.



A backlit such as this one that must look crisp when lit at night and unlit in daylight can be created on a white-ink capable flatbed printer by printing colors followed by a layer of white followed by colors. In daylight the eye sees only the white and outer layer of color. At night the inner color layer brings the added density needed for a good backlit image.

## Prints BY DAVE KING



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**W**hen discussing *backlit* displays, we need to first understand that the various applications—airports, malls, parking garages, corporate buildings, outdoor displays—each require different materials and methods to create the display.

There are a number of very important questions that anyone looking at producing backlit graphics should be familiar with—no matter what printer they're using. Some are less crucial than others when using a flatbed printer, but let's go through each question and see how they apply to flatbed displays.

### Questions

Before creating any backlit display, it's a very good idea to first obtain answers to the following questions:

1. Will this display be used inside or outside?
2. If inside, will it be in direct sunlight?
3. If outside, how long is this display expected to last?
4. How durable is this display expected to be?
5. Is this display in an area where people can touch it?
6. How good must the quality be due to the viewing distance of the display?
7. What kind of color density is expected from the display?
8. How often is this display expected to be replaced?
9. Does the display holding the graphic have a back diffuser panel for light?
10. What is the print-buyer's budget for the display?

## ANSWERS

(1 & 2) These questions are more important if using a water-based printer. UV-curable (and solvent-based) inkjet inks are designed to be used in both indoor and outdoor applications. The advantage of the UV-curing flatbed printer is that UV-curable inks adhere well to the Duratrans that is often used in airport backlights, and can easily handle direct sunlight. Printing direct to Duratrans can be done with any UV-curing flatbed, but flatbeds that offer white-ink hold a special place in my heart for backlit applications. I'll tell you why further down.

(3) When it comes to outdoor applications, knowing the expected life of the display is crucial. It is not reasonable to expect an outdoor flatbed print (or other digital print) to last for 10 or more years, but two or three years is reasonable.

(4 & 5) Durability is based on the material and the surface of the printed graphic. If the graphic has to be durable enough to withstand people touching it and possibly being hit by rocks and other items, then print to the second service of the clear material and then back up the print with a white ink/film/paint. Then, consider the material; in almost all cases, sign-grade Lexan with a UV inhibitor shields against the sun's UV rays (see #8 for more details on second-surface printing).

(6) Backlit quality is a huge issue for most clients. Notice that many backlit displays seen in airports, malls and restaurants are 4000 dpi prints imaged onto polyester film using an image setter such as the Durst Lambda or Océ LightJet, and mounted to Duratrans. You generally don't see backlit flatbed prints in up-close viewing, high-traffic areas because the print quality isn't up to that of an image setter. However, resolutions on UV-curing flatbeds are continuously improving. For many backlit applications, however,

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Typically backlits placed in high-traffic areas are made using an image setter for their extremely high resolution capabilities. As UV-curing printers improve in image quality, this will likely change.



Where close viewing is not needed, and in situations where panel sizes exceed 50", UV-curing flatbeds are an ideal backlit printing solution.



White ink can be made to act in much the same way as a diffuser panel, but is much less expensive to use. In addition, control over the amount of white used in different parts of the image can create unique special effects.

**One disadvantage of using Duratrans for backlits is that images larger than 50" can only be created by butt-seaming two or more panels together, resulting in a less-than-desirable appearance that is difficult to switch out.**



**TYPICAL COSTS**

Materials	Cost per Sq/Ft
CMYK UV-curable ink	16 - 30 cents
White UV-curable ink	18 - 40 cents
Clear PETG	\$1.50 - \$4
Clear sign-grade Lexan	\$3 - \$6
White diffuser substrate	\$2 - \$5
White diffuser film	60 cents - \$1.20
White film (cheap)	20 cents
Duratrans	\$1.75
10-mil polyester	25 cents

flatbeds are a great printing solution.

(7) Color density is important with backlit prints since colors tend to look less brilliant when light passes through an image than when light is reflected from it. Printing double-sided can increase the color density of a flatbed backlit print, but it can be tricky to get perfect registration. Gandinnovations has devised a unique solution to the problem. Their High Definition (HD) Backlit Camera option for the Jeti UV-curing flatbeds uses an electronically-enhanced camera and video-capture board to target the front of the image. Upon “flipping” the image for back side printing, the software adjusts the dot placement to align the front and back image exactly. This ensures a perfect

match for double-sided backlit images. Nice!

(8) The frequency-of-replacement question can be huge. Some backlit displays are not so easy to change out. For example, larger Duratrans displays are often butt-seamed to create a display larger than 50” which makes them difficult and expensive to change out. Typically, backlits in airports, malls and restaurants are being changed out more than twice a year. Keep this in mind when working with clients.

(9) A diffuser is a white piece of film/substrate that is translucent and is put between the image and the light bulbs. Its purpose is to stop the image from having “hot spots” of brighter light so the graphic

has a consistent light on all parts of the display.

In many cases the diffuser is a sheet of PETG or Plexiglas for indoor displays or white Lexan for outdoor. Sliding in a piece of film or a piece of clear PETG/Plexi/Lexan with the film attached to the second surface of the substrate will diffuse the backlit. Duratrans is already white, so it acts as its own diffuser. However, if the bulbs are too close to the film, even Duratrans cannot diffuse the light sufficiently. Here’s where white printing flatbeds come in very handy.

The white ink in a UV-curing flatbed printer can do a great job of diffusing light. In my opinion, white ink is the only way to go for backlit prints on a flatbed printer. For one thing, the cost of a good light-diffusing film is more than 60 cents a square foot and the cost of solid substrate indoor diffuser panels can be more than \$3 a square foot. White ink costs less than 20 cents a square foot.

In addition, a printer’s ability to control the amount of white ink being laid down makes it possible to create special-effect backlit displays by placing more or less white ink in certain areas—like black areas where light shouldn’t come through. Laying down 100 percent white behind the black makes the black totally light proof—*black*, but backing off density on the rest of the display allows light to pass through. People who can’t print white ink can’t do any of these neat tricks.

(10) The final part is money, both for the shop and the client. If the shop’s only solution is a flatbed without white ink, then charge more for the display taking into consideration the cost for the white diffuser film. Using white vinyl is a bad idea, because that will create a darker display, and if the client ever has someone else do it properly, you could lose this client.

Adding it all up, a printer that prints UV-curable inks and white ink is a winning combination. I had a flatbed printer that printed white and I made a lot of money using white ink on backlit displays. So my message is that “flat out” the backlit market for flatbed printers is huge!

**TYPICAL SELL PRICES**

Backlit type	Sell Price per Sq/Ft
Easily changeable backlits (Duratrans)	\$6 - \$18
Short-term outdoor displays (vinyl)	\$8 - \$15
Indoor/Outdoor short-term flatbed (10-mil poly)	\$2 - \$15
Indoor flatbed prints (PETG)	\$3 - \$14
Outdoor flatbed prints (sign-grade Lexan)	\$8 - \$30

**FLATBED PRINTERS WITH WHITE INK CAPABILITY**

Company	Printer	Web Site
Afga	Anapurna series	www.agfa.com
Dilli Precision (Neo Digital)	NeoPlus UVP-1606W, 2506W	www.uv-printer.com
Durst	Rho series	www.durstus.com
DuPont	Cromaprint UV series	www2.dupont.com
EFI/VUTEK	PressVu UV 200/600 W+	www.efi-vutek.com
Gandinnovations	Jeti 3150 UV	www.gandinnovations.com
Inca Digital (Fujifilm Sericol)	Spyder 320+W	www.incadigital.com
L&P Digital	Virtu series	www.lp-digital.com
Lüscher (Kiwo)	JetPrint	www.kiwo.com
Mimaki USA	UV series and JF-1631	www.mimakiusa.com
NUR America	Tempo series	www.nur.com
Skyjet America	Multi-Flat	www.skyjetamerica.com
Teckwin	TeckSmart UV 1600	www.teckwin.com