

**Justifying
the purchase
of a UV-curable
flatbed printer.**

Flat-out Getting to the Profits

BY DAVE
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Editor's note: This story is based on one shop's needs and one shop's return on investment (ROI) formula. Digital Graphics acknowledges that every shop is different, and there are many valid ways to calculate return on investment.

Flatbed imaging is nothing new. Much of today's screen printing is done on flatbed equipment. However, where screen printers burn an image into a mesh screen and then run ink through the screen onto a substrate, digital inkjet systems spray color directly from a nozzle to the printing surface. Successful screen printers can image onto just about any substrate, with any color (including white, gold and silver). In addition they can do thousands of images in a run with very accurate color. The disadvantage to screen printing is that the setup time and materials needed is too much to justify short runs. That's why screen printers are so interested in the new digital flatbed systems — less setup time/expense makes for more cost-effective short-run jobs.

But why would digital printers want to get a flatbed printer?

Great question. And the answer is *money!* Let's be serious, we are in this business to make money and anytime you can offer something your competitors cannot, this gives you more market share. The flatbed market, in some cases, offers digital printers possibilities they don't currently have. In *my* case it appeared that flatbeds offered so few features I cannot currently achieve, that I had to wonder *Why I would even consider this option?* Let's look at the features of flatbed technology and see if you can justify a new printer.

Some of today's flatbed machines use water-based inks, some employ solvent-based inks and some use UV-curable inks. For this article I will be concentrating on

flatbeds using UV-curable inks. However, after reading this you will see how other flatbed printers fit into the story as well.

UV-CURABLE INKS

Let's start with ink. UV-curable inks will stick to just about any surface and, in most cases, print a really fantastic image. I'm talking about surfaces like uncoated Sintra, DiBond, FoamCore, Gator, fabric, vinyl, wooden doors, steel plates, pottery, carpet, sign foam, plaster, Plexiglas, cardboard, fiberglass, hardwood floors, conference tables and probably even Astroturf.

Not all materials have the same adhesion properties, but in most of the cases I tested, the results were outstanding. Why? UV-cur-



UV-curable flatbed printers represent a considerable investment, but if you look at exactly how they might be used in your shop, you may be surprised at the potential for profit. (Image courtesy of Design Force)



This 144" x 30" bus king was printed directly onto .040 polystyrene and mounted to the side of an RV, using a UV-curable flatbed. A close up from one foot away shows that the print quality is quite remarkable.

use the printer. I realize this is a tough question to answer, especially with a new technology.

In our case we need to print on every size of rigid substrate that we offer today: standard 4' x 8' sheets, 5' x 10' DiBond, 144" x 30" bus kings, all the way to the 100" x 100' rolls of 3/16" Lexan for outdoor backlit signs. Along with the rigid substrates, I would like to

print onto rolls of fabric, .020 polystyrene, and carpet.

As I learned, some flatbed printers can also do roll-to-roll, while others cannot; some can handle 144" x 60" sheets, while others cannot; and some can print onto materials up to two-inches thick while others cannot. Each of these features can be an advantage if you need them. Something to think about when reviewing the different machines.

able inks are thick and heavy — so thick and heavy that they can cover up most of the surfaces they are printing onto.

However, UV-curable ink is not cheap. You're looking at roughly \$200/liter. And since I pay about \$40/liter for solvent ink I think this is expensive. On the other hand, dye-sub ink runs about \$200 to \$650/liter, so the UV-curable inks appear to be a great value.

Just so you know, I don't believe that UV-curable ink is the answer to *all* printing needs. In general, these inks are not designed to go onto cast vinyl that will be installed over rivets, compound curves and or otherwise stretched during installation. From what I've seen, the cured inks tend to be relatively stiff and can crack if stretched. However, stay tuned as technical hurdles are often quickly overcome.

UV-CURING TECHNOLOGY

Now on to the technology. UV-curable flatbed printers work by applying UV-curable ink to the surface using a piezo inkjet printhead. Then, less than half a second later, a UV light hits the ink and instantly cures it to the surface. The UV lights are attached to the moving printhead so the curing follows each pass. I learned with test prints that in some cases inks don't completely cure for about 24 hours. Inks can sometimes be initially scratched off a surface like DiBond, but after a day will not come off no matter what you do to it.

I looked at several models of UV-curable printers from several manufacturers. In some models the printheads travel back and forth across the bed as the material is fed through the printer on rollers — other printers move the whole bed back and forth as the printheads move slowly across the width of the substrate. Before deciding which system you might be interested in, it's a good idea to analyze how you intend to



The image on the left was printed directly onto high-quality DiBond with a UV-curable flatbed printer while the image on the right was printed with a Lambda and mounted to Gator board. The photo was taken from approximately two feet away.

PRINT QUALITY

Print quality is a huge issue for me, because, like most of you, I sell the *quality*. When I look at print quality from a flatbed printer I analyze how wide the color gamut is, I look at the ink gloss, I examine high contrast areas — like type and four-color lines on white background — and I look at what it costs to get the best quality print on any particular machine.

I have the Pantone chart that I like, plus four images that are very good for color gamut. I ask the manufacturers of the printers to print these images on a standard substrate like FoamCore, and then I compare them. You would be amazed at the differences between the manufacturers' inks. Then I look at the glossiness of the ink, the four-color black, the reds, blues and greens, and I examine how the yellow looks at 100 percent. When my customers see glossy ink they think *quality* and this is important for my image.

One of the things I look for is small type face. How small can the printer produce type before I can't read it? How many one-point lines can I put next to each other before they become a sea of spots? How clean is a four-color black vs. a one-color black? Does the manufacturer support four-color black, or is the black they make so good you don't need four-color black? In most cases a one-color black will always produce a cleaner letter than a four-color black.

And finally, what price do I pay for the printer's highest quality? Or, do I get the same quality all the time? I found that most manufacturers have multiple modes for their printer. In the highest-quality mode, sometimes the price paid in lost speed was high — some printers performed at only 30 percent of the print speeds claimed in the brochure when producing in high-quality mode. Which brings us to the issue of speed.

Speed is a great feature to throw around but let's take a very efficient shop like mine. I have a Durst Lambda photo imager that will produce output at about one foot per minute. In an hour I can have about 25 30" x 40" prints on a roll. To cut the prints, cut the boards, mount the prints, laminate, trim and pack them would take my guys about two and a half hours. This is as fast as it gets, so if you can run at this speed, great!

When it comes to the flatbed printers the speed is not as relative to this example because if you have a full system (flatbed printer with an automated cutter) the machines do all the work (with no mounting or laminating). This same job on a 600 dpi flatbed printer with an I-Cut automated cutter would take about an hour and a half, and for most jobs you would have a hard time telling the prints apart.

RETURN ON INVESTMENT

Now we get to the nitty gritty. My numbers tell me these printers might pay for themselves remarkably fast. And I believe that *your* numbers plugged into my formula will also show you that you can profit from a flatbed.

It's true that you only need one operator to run a complete flatbed system. I consider a *complete system* to be a printer and a cutter working together. A single operator could load the images into the printer's computer, load the substrate into the printer, start printing the job, then load up the image into the cutter's computer, load the printed board onto the cutter and start cutting. Some flatbeds have a sheet-feeder attachment so you could load a pile of sheets into the hopper. Then the operator would just keep the flow going until the shift is over and another operator takes over.

If you have one operator running your whole system, but it takes three to print,

laminate, cut, and mount the old way, you could conceivably lose two production people at an estimated cost savings of about \$60,000 per year.

Now, let's compare material costs associated with conventional printmaking processes with those of a flatbed machine by looking at a real-world example. Say a bank has placed an order and needs the following items: 25 30" x 40" prints mounted to Sintra, 100 bus tails (70" x 21" on PS), and 50 bus queens (108" x 30" on PS), 200 bus interiors (28" x 11" on .020 card stock) and 50 22" x 28" on .040 card stock.

Now this is a very typical job for us but requires many different processes and people to make it all happen. The "INDOOR" part of the job, printed on our Lambda photo imager, totals about 247 linear feet (850 square feet), and the "OUTDOOR" parts, printed with a NUR Fresco solvent printer, totals 418 linear feet (2,145 square feet).

Take a look at the chart to the right showing the costs associated with this job. It compares how much it would cost me to do it versus how much it would cost using a flatbed. Costs of the various rigid substrates used are not included because both jobs require the same substrates (the mounting substrates used with my existing equipment would be direct-printed substrates in the flatbed job).

Costs for me to do this job with my existing equipment are listed under the *Dave's Costs* column. Costs to produce the same job with a flatbed are under the *Flatbed Costs* column. Fill in the blanks in the *Your Costs* column to arrive at a meaningful real-world comparison for your shop. Costs per square foot for flatbeds are averaged from several manufacturers' printers and a number of different printing materials. Dave's Costs for this job were derived using

Flatbed ROI

This close-up of the same images shows how the flatbed stacks up against the Lambda with black and white images, intricate textures and bold colors.



The image on the left was printed directly onto FoamCore using a UV-curable flatbed printer. The image on the right was produced using a Lambda image setter. You may want to note that the quality of the flatbed print on both FoamCore and DiBond are remarkably similar.

I was so pleased with the quality of small print from UV-curable flatbed printers that I wanted to show you the results. Here is an extreme close-up of company logos ranging in size from 1 1/8 x 3/8" to 3/4" x 3/4" with extremely small font sizes.

KEY FLATBED CONSIDERATIONS

When you consider the options available today on these flatbed printers you must look at all the options. Here is a list of some key items to examine when considering the purchase of a new UV-curing flatbed printer.

Head Warranty - Are the printheads covered if I purchase ink from the manufacturer? If not, how much are new printheads, and how many square feet are they expected to print before failing?

UV Curing Lamps - How long do they last? How much do they cost to replace? You should add this cost into your square footage cost of printing.

Sheet feeder or substrate feeder - Does the system have a feeder system, or can you get one? How much volume do you expect to run?

RIP & Cut Files - Does the printer's RIP create the cut file for the images so you don't have to? How does it handle jobs that are longer than the cut bed?

Overprint - Does the printer overprint/full-bleed the image on the substrate? If so, how, and does it require special hardware? Is the hardware included? What price do you pay for overprinting (new belts or clogging the feed system)?

Roll Feed - Does the printer support roll-fed material — both on feed and take-up reels? Does it have slitters to cut the rolls as they come off?

Guides - Does the printer have a guide system to help move long sheets of material through without walking?

Head Height - How thick can the substrate be? Do the heads adjust automatically or do you have to do it by eyesight?

Outfeed - Can the system feed the sheets out after being printed so they can go to the cutting table automatically?

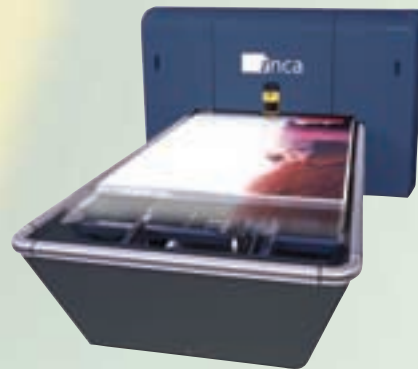
Service - Is the service local to you? If not, how far away are they and what is the policy for repairs both in and out of warranty?

Flatbed ROI

In my flatbed investigations I looked at several different models of UV-curable printers from different manufacturers. Each machine had its advantages and drawbacks. Here are the printers I looked at:



Durst - Rho 160



Inca Digital - Eagle-44



Scitex - Veejet



NUR - Tempo

	Dave's Costs	Your Costs	Flatbed Costs
INDOOR Prints			
Aqueous Ink	N/A	\$ _____ /sq ft	\$.20/sq ft
Kodak Gloss Paper	\$1.30/lf	\$ _____ /lf	N/A
Seal Print Mount Plus	\$1.50/lf	\$ _____ /lf	N/A
Seal Luster Laminate	\$1.70/lf	\$ _____ /lf	N/A
Sub Total	\$4.90/lf	\$ _____ /lf	\$.20/sq ft
Total Footage (70+112+65)	247 lf	247 lf	850 sq ft
Total Cost	\$1,210	\$ _____	\$170
OUTDOOR Prints			
Solvent Ink	\$.15/sq ft	\$ _____ /sq ft	\$.20/sq ft
Avery SX Vinyl	\$1.50/lf	\$ _____ /lf	N/A
Total Footage	418 lf	_____ lf	2,145 sq ft
Total Cost	\$950	\$ _____	\$429
Labor Costs For Mounting			
Indoor (15 man hours)	\$225	\$ _____	\$00.00
Outdoor (10 man hours)	\$200	\$ _____	\$00.00
Total Cost for this Job	\$2,585	\$ _____	\$599
Savings with Flatbed	\$1,986	\$ _____	

a Durst Lambda for the indoor section and a NUR Fresco for the outdoor section.

Some of the above calculations were made behind the scenes, because with some items — like paper, laminate and adhesive — you pay by the linear foot, where ink is paid for by the square foot. You need to use your own numbers and consider what jobs can be switched over to a new flatbed. If you are considering purchasing a new printing system, then look more closely at this solution.

My shop could do this bank job in one day and have time to spare. But let's say I did a job like this every day. Assuming I cut my staff by two people (I would not need the people to mount or cut boards, saving about \$240 per day), what would this do for my bottom line?

So, I guess if the printer costs less than \$1,763,280 I'm all set! Just so you know, this is for one shift.

Okay, there is no question that these numbers are almost hard to believe, but I suggest you *try them for yourself*. What you will come out with is that *no*, you can't switch *all* your work over to a new flatbed printer — and *yes*, you still have to make the payments on your existing equipment — and *no*, not all your customers will want

Cost Savings	Per Day	Week	Month	Year	3 Years
Materials	\$1,986	\$9,930	\$43,030	\$516,360	\$1,549,080
Labor	\$240	\$1,200	\$5,200	\$62,400	\$187,200
Grand Total	\$2,226	\$11,130	\$48,230	\$578,760	\$1,736,280

VUTEk - PressVu
UV 180/600



Zünd - UVjet
215-C

3M - Scotchprint
2500UV



I also considered some flatbed units that do not use UV-curable systems. These flatbed options include:

- Encad - NovaJet 880**
(pigment-based inks)
- Mimaki - JF-1218**
(pigment-based inks)
- Océ - Arizona T220**
(solvent-based inks)
- Roland - FlatJet**
(in development, pigment-based inks)



Without an automated cutter in your shop, like this Zünd I-cut machine, labor-saving justification for a flatbed printer would be, in my opinion, extremely difficult.

this new printing technology — and *yes*, you will drop your price on the new printing technology to get the *bids* that are out there — and *no*, your finishing staff will not be happy to read this article and then find out you are looking at a new flatbed.

Nothing is what it seems until you get into it, but I believe this new technology is the future. If I could start over today I would purchase one flatbed 600 dpi printer with an I-Cut cutting system — and hire a

large sales staff. The rest would be history! Run the numbers yourself, and when you are all done, *cut them in half*. Then look at the bottom line again. This number is your pre-approval number, so you will know about how much you can spend on a new flatbed printer.

Good luck, and see you on the show floor!

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