Myth-Busting in the Flatbed World

Limitations and breakthroughs of today's UV-curing flatbeds.

BY DAVE KING

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Everybody knows that you can print onto anything with a UV-curing flatbed, right? It's common knowledge that color profiles aren't necessary, because UV-curing inks print the same on all materials, right? And, boy oh boy, these printers are *fast*, right? Well, as the saying goes, *'it ain't necessarily so.'* When UV-curing flatbed inkjet printers first came on the scene a few years ago, these and other misleading concepts regarding UV-curing inkjets spread through the wide-format printing community. However, my experience hasn't borne them out. Let's address each of these myths, and I'll share what my own experience has been.

PRINTS ON EVERYTHING?

First, there's the *prints on everything* myth. Yes, I guess people could say it's true. UV-curing flatbed printers can print onto everything. However, the question is, do the inks actually *stick*? Will the media warp or burn? Let's look at the UV-cure process and then at some of the issues involved with the UV-curing flatbed inkjet printing process.

The scanning printheads in a UV-curing flatbed lay ink down on the media, and the attached UV lamps (usually mercury arc lamps) quickly expose the inks to high levels of ultra-violet (UV) light. The light triggers a chemical reaction and the inks go from liquid to solid in about 1/4 of a second. When considering how long it takes most inks to dry, one has to wonder about the levels of energy required to make these inks cure and stay in place. Who cares, *right*?

When working with flatbeds, good color management pays in a big way. Here is a proof printed on the Durst Lambda, sitting along side a Sintra print. I think the colors match up very well.

I really like the new, brighter Sintra board that Alcan is releasing. Here you can see the difference between the new board and the old. Printing with a brighter white really makes colors pop.

HOT ISSUES

Well, the problem stems from the fact that UV-curing lamps on most of today's scanning-head UV-curing flatbed printers, in addition to providing UV light waves, also emit high levels of hot infrared (IR) light waves. It's the heat from the IR light waves that causes most of the problems. The more UV energy needed to cure the inks, the more intense the light must be. The more intense the light, the more IR heat is produced. It's all devilishly interconnected. A 1,000-watt UV lamp can put out enough IR heat to melt glass!

Too much heat can cause boards to warp and/or become burnt or discolored. To prevent boards from burning or warping under the high heat, users could reduce the energy level of the lamp, but then they risk having an incomplete cure (not enough UV energy). An incomplete cure can cause the ink to fail on the media, by cracking, scratching easily or just flaking off. It can be a frustrating dynamic.

A good example is 1 mm Sintra. When running this media at full speed and full light intensity, there is a good chance that the material will warp (at least it does in my machine). Trying to create a double-sided print on a warped piece of Sintra might put print shop owners in a world of hurt because of the resulting head-strikes. Of course, they could print the same image on adhesive-backed vinyl on the same UV-curing machine (if the UV-curing

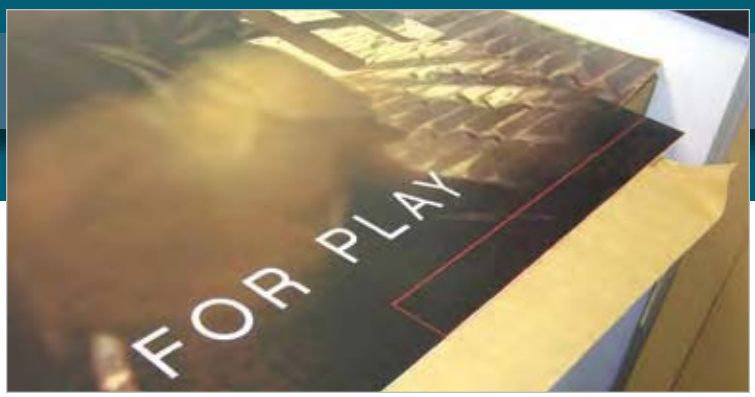
printer can handle rolled materials) and mount it to the Sintra — but then why bother with a flatbed printer? And don't try to apply that vinyl print to a curved surface, or a surface with rivets, or the ink could fail or crack. For me, these are serious issues.

I highly recommend that anyone with a UV-curing printer check with their ink manufacturer to learn the proper light and heat specifications required by the ink to properly cure for various applications. Each machine is different, and each ink formula is different. So, what works for me may not work for anyone else.

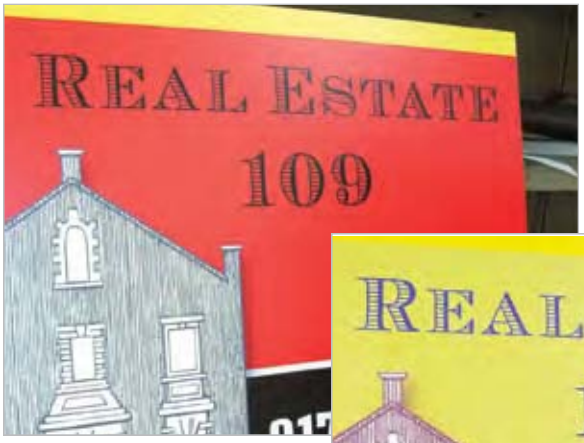
The manufacturers of these UV-cure inks are starting to realize that they need two types of ink — one geared for hard surfaces and one for soft surfaces. The problem is that flatbed printers are not (yet) designed for a quick change of ink sets. That's why we're starting to see dedicated roll-to-roll UV-curing inkjets from manufacturers like NUR and Durst.

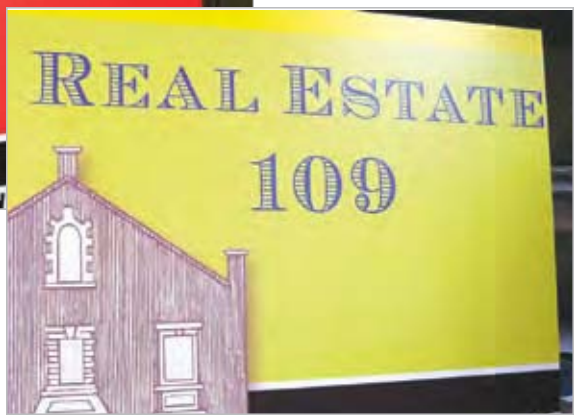
Here at Castle, we set up our printers for the materials we want to print onto. We use two solvent printers for most soft outdoor materials like vinyl and banner material. We have another printer set up to print dye-sublimated fabric applications. We use our Durst Lambda image setter for most high-res indoor graphics, and we use our UV-curing Solar flatbed to print only to hard boards.

And don't get me wrong. I love my flatbed printer. I love the fact that I can print with white and make good money with it. But we need to be realistic here. Flatbed inkjets are still in their relative infancy and will undoubtedly get better and better. Perhaps one day they will come out with UV-curing lamps that don't emit so much heat — perhaps an LED-based system. Who knows. In the meantime, the bottom line is that no single printer can do everything.



Here you can see how a good bright white substrate really makes text jump out. This print was done on polystyrene 060.





Here you can see that in the second print (right) for some reason, the magenta stopped firing and the print was ruined. This problem wasted a good $18 piece of Dibond

PLAYING NICE

After discussing some of the sticking points and limitations of today's UV-curing flatbed printers, let's look at some of the breakthroughs in this field. I'm referring to how some of the substrate manufacturers are "playing nice" with the flatbed printers, optimizing their media to work better with UV-curing systems. For example, Kommerling makes a bright white PVC sheet, Kömabrite*dp*, designed especially for flatbed printing — a great product. And now I'm told that Alcan Composites has started up production of its new Sintra White product, designed for direct printing with a UV-curing flatbed.

Next, I hear rumors that the people at Coroplast Inc. are making a printable version of Coroplast so UV-curing flatbed printers can print to it successfully. Other rigid substrate companies, like GE Structured Plastics, are working on a printable Lexan that has a consistent dyne level so the ink adhesive would be great.

Then, on the vinyl side, Avery Dennison offers a 60″-wide cast vinyl film that works great with flatbed inks, and many films from Oracal are compatible with UV-cure printers. Other companies are working on changing their products to support these new machines and printing processes. This is a good thing.

In my shop, we have found a lithographic-printable 10-mil Mylar (polyester) film from DuPont that is a home run with our UV-curing printer. This material doesn't warp under high energy and can take a lot of surface tension — the ink sticks better than a Sharpie marker. Maybe some of the rigid substrate manufactures could start coating their products with this printable polyester (they might become more successful in the flatbed printing market).

COLOR PROFILES NOT NEEDED?

When flatbeds first hit the scene, I was told by people selling UV-curing flatbed printers, "You don't need to do color management," because the UV-cure inks are solid and print the same color, regardless of the substrate. Looking back, I think to myself, *Hah!* What a *joke!*

I can't believe anyone tried to tell me that. It was just *way out there*. Substrates have a *huge* influence on the color of the graphics. I hope that myth no longer exists. Believe me, making a good ICC profile for all the substrates a shop works with, regardless of what kind of printer they're using, is a necessity. We use the X-Rite Pulse color measuring system and the Onyx ProductionHouse RIP to make color profiles and run our flatbed printer; and we produce fantastic graphics with white ink.

We have more than 20 profiles that cover every substrate we print to with our flatbed. The color control on UV-curing printers can be difficult because the cure lights and the curing rates also affect the color. To complicate matters, as some cure lamps get older, they tend to lose a little more of their UV curing power, forcing users to run them with more energy to get an effective cure. And as stated, more light intensity means more IR heat energy. Essentially, color management becomes a moving target. This requires keeping an eye on the output every single day, and always assuming that the printer will eventually mess with the color. Check output regularly!

SPEED BUMPS

Finally, let's look at the myth of speed with regard to flatbeds. Again, I think it's just a joke the way manufacturers say their printers can print *up to* 400 square feet per hour, when the image produced at that speed would be useless to anyone printing graphics for a living. We need to know how fast a printer can go when it's producing images we can actually *sell*. And with regard to flatbed printers, I want to know how many boards I can print in an hour, not how many square feet. Okay, to be fair, I recently have seen some of the flatbed manufactures list printer speeds based on a 4′ x 8′ rigid board. That's the ticket!

Here we see that for some reason the heads stopped firing part way through a job leaving a huge band. This wasted a half-sheet of 6-mil Sintra and cost me about $40 dollars.

It's common for us to run Pantone charts on our flatbed media to see how the media will react with the ink We make our own color profiles using an X-Rite Pulse color measuring tool and Onyx ProductionHouse RIP. Having good profiles is a *must*

Here we were printing an undercoat of white followed by green on a black paper-based substrate. However, we must have ran the lights too hot because, the board got burned a bit just above and below the green letters (a bit hard to see in this image).

Meanwhile, printer makers are telling me their flatbed prints in square feet per hour. I believe it would be more useful if printer speeds were listed in inches per minute rather than square feet per hour. However, everyone needs to calculate this for themself. Once the realistic *sellable quality* speed of a printer (in square feet per hour) has been determined, take that number and divide it by the width of the printer (in feet). Then divide that figure by 60 to get inches per minute.

For example, if the printer is 80″ wide and running at 200 square feet per hour (of sellable quality), then here is the formula to get inches per minute:

80/12= 6.5′ (printer width)
200/6.5 = 31′ (linear feet per hour)
31/60 minutes = 6 inches per minute

So, let's say a printer is running at six inches a minute. When printing 4′ x 8′ boards — assuming that the printer is 80″ wide — it would take 16 minutes per board, about 3.5 boards per hour. Now that tells me something about what I can do with that printer. That's information I can use.

One last thing. I want to strongly suggest running tests with the materials you intend to print with before purchasing a UV-curing flatbed printer. I would suggest testing these common materials (which I have found to be challenging):

- Sintra 1 mm - printing double-sided
- Sintra 3mm - printing single-sided
- Polystyrene 040 - printing double-sided
- Fome-Cor 3/16″ - printing double-sided
- PETG 1/8″ - printing single-sided with white and double strike
- Black White Gator 1/2″ - printing white with double strike
- Lexan Sign Grade 3/16″
- Coroplast