

# PRINTING AND FINISHING

Covering the latest in digital printing, media, ink and finishing for banners, backlits, graphics, wraps and more



Stoplight prints double-sided used for window graphics and wall posters.

## Substrates for Your Flatbed Printer

BY DAVID KING

What substrates work the best?



300 Clip boards made of .060 Polystyrene and metal clips riveted onto the board.



Dave King is “Commander of Results” at MarketKing, a marketing agency that offers the Print Shop Makeover. This is an onsite program

designed to teach business owners about digital printing from pricing, to the best methods for manufacturing, all the way to marketing and sales. For more information, e-mail him at [david@themarketking.com](mailto:david@themarketking.com).

**S**O YOU HAVE GONE to the shows, spent time researching the best flatbed printer, and now you are about to purchase your new printer or you already have one in your shop. Great! Now, what are the best substrates to print on and which will allow you to offer solutions that were too expensive or too difficult to use with your other printer(s)? Great question. Let’s see if I can help you make more money with your flatbed printer. I am assuming that you have a digital die cutter (DDC) with your printer, and if not, then you might want to consider this investment as I will be discussing how to finish the substrates, and the DDC is a very important part of the process.

OK, I guess this article is about the boards, but we must also talk a little about things like ink adhesion, dyne levels, surface tension, heat, speed, double-sided printing, XY cutting, custom cutting, advanced cutting, cutting speed and options for cutting. I do not want this to turn into a full blown flatbed printing article, but I will tell you that all the materials I am about to talk about I have—and do—print on a regular basis.

Let’s review the rules for printing on substrates on a flatbed printer. You might be under the impression that your flatbed printer will print on everything, and I am sure the sales person told you this

## Restaurant & Retail Banners

information; well guess what the answer to this is: yes and no! Yes, a flatbed printer will print ink on anything that it can get between the bed and the heads, but no, the ink does not stick to everything. Let me give you a quick review of the printer's functions that could and will affect the print quality on the substrates.

**Ink Adhesion**—The major issue with flatbed printers today is the ability of the ink to adhere to the surface of the media. Screen printers have dealt with this issue for years, but for some reason us digital printers are too proud to ask the screen printers what they use and what they have problems with. I can assure you that if a screen printer has problems with a material, you are not going to get your flatbed ink to stick to this material. I find the manufacturers of the materials do not understand that us flatbed people want to print on anything that works. Watch out, test everything, and do not take any substrate at face value.

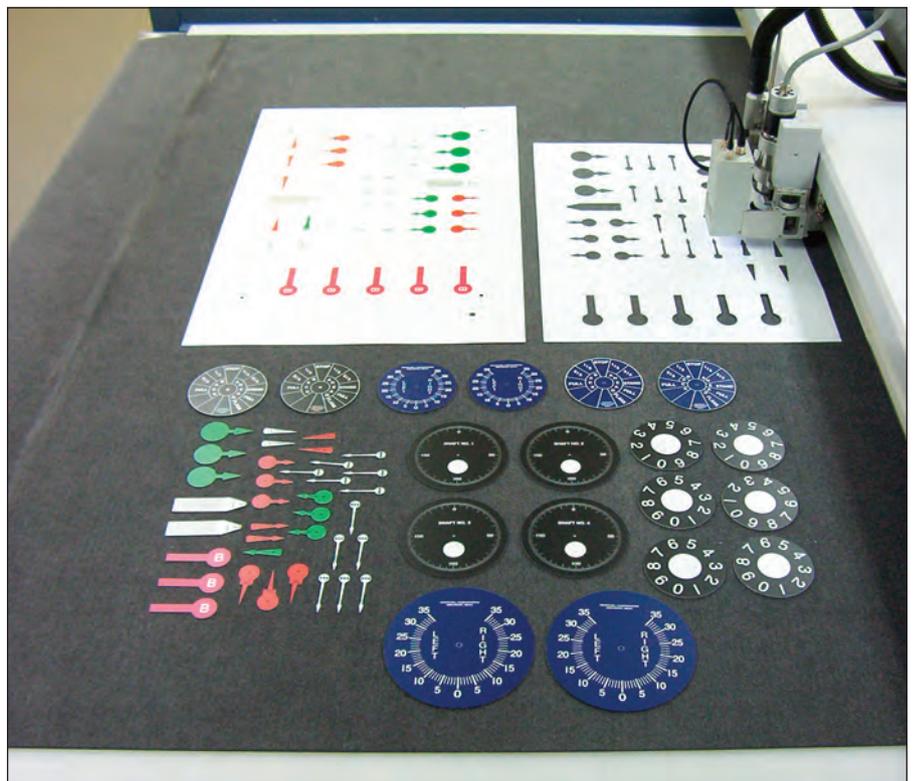
**Dyne Level**—The dyne level is the degree of smoothness of a material. The higher the dyne level, the smoother the material, and, in most cases, the more difficult it is to get the ink to adhere to the surface.

**Surface Tension**—This refers to the amount of tension the surface of the material can take before it changes (distortion, warping, crazing, discoloring, burning, etc.).

**Heat**—Boy, did this one get me in the beginning. Most UV printers have a special lightbulb (most have two) on the head that emits UV light, but it also emits IR light (or heat as you need to understand it), and the IR light/heat is what does the damage. Each printer has a special way to deal with the IR heat. Some use an IR reflective shield (a piece of glass that bounces some of the IR light back at the unit and then fans rush the heat out of the box), while others have a cooling system in front of the lights to collect the heat and let the UV light pass through with less of the heat. The light



Printing on a bamboo board.



Polystyrene .040 for hands and dials on an old ship.



POP displays that hung from the ceiling, double-sided printed on 3 mil Sintra.



Name badge for a printer. Done on Dibond.



Single-sided PVC print used for trade show graphics.

**Substrates for Your Flatbed Printer** CONTINUED

manufacturers are making great inroads for lights that emit more UV and less IR.

Speed—The faster the head moves, the less UV & IR light hits the material, and as a result, more light power is needed to create enough UV light to cure the ink. If you do not cure the ink properly, the image will fail. If you slow down the printer to help the heat, you then lose production.

Double-Sided Printing—Almost all the product we use can print single-sided with no problem, but when we flip the board over to print on the back side, this is where we see the heat problems as a number of the boards will warp with the first side heat. Second-sided printing also requires great accuracy and very square/straight boards, because if you have a board that is off by one-tenth of an inch, over the length of the board you could be out one whole inch at the end of the board, and the prints will not line up. In addition, with double-sided printing you cannot see if your prints are aligned (unless you are printing on clear material) so you would have to print both sides of the board and then cut it to see if it worked. It's very time consuming if you make a mistake here.

Cutting—Regardless of the digital die cutter you have (Zund or Kongsberg) they support both a drop blade for cutting thin material plus scoring, and a router for thick material (plus other tools based on your needs). The harder the material, the slower you must run the blade, and the thicker the material also affects the cutting time. I have done jobs on Dibond that took eight minutes to print the whole sheet, but took more than 50 minutes to cut. The cutting I break down to three choices; XY cutting, where the DDC cuts the board as a square/rectangle; Custom Cutting, where the DDC cuts the image to a custom shape but no inside cutting; and Advanced Cutting, where the image is very difficult to cut and/or it has inside cuts that cause the DDC to slow down for the cutting. As the levels go up, so does the price.

You now have enough information to be dangerous, now let's review Dave's top 10 products for making money and working with a flatbed printer. The list below is in order of my favorite and most profitable products.



Dibond sign for a store display.



Fome-Cor signs for a one day event.

1. Dibond—No question here this is a top money maker and a super performer. Dibond comes in 4'x8' and 5'x10' sheets and in many colors. We do jobs for printer vendors that want a label for their printer all the way to outdoor signs and displays. Both single- and double-sided works great, you can run full speed and full lights on this stock, and it just loves the ink. The router can cut any shape out of Dibond and if you are handy, you can cut a groove in the back top layer of aluminum (Dibond is two layers of powder coated aluminum with polyethylene in the center) and then bend the Dibond into a pan sign or just about anything. Home run, baby.

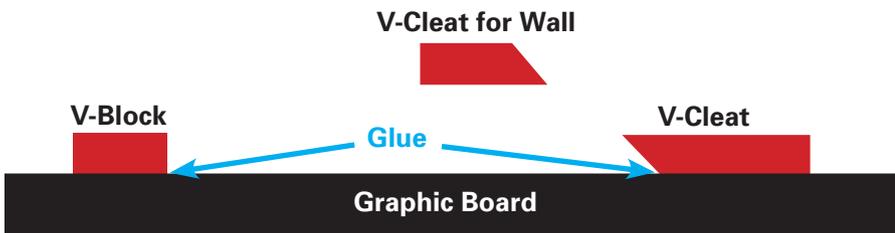
2. Lexan—Sign Grade 3/16" Lexan that is UV-coated on one side (not the side you print on). This is also a huge winner because the only other way to print to this material is to screenprint it or stick vinyl to it. The reason this material is so great is that it comes in 102" wide rolls (at the distributor) so you can have just about any size you want. We have done 16'x6' four-color outdoor backlit signs, protective panels for safety areas, all the way to small displays for outdoor parks. This material cuts nice and does not break in the cold. The only issue is that it is heavy and flexible, so you might have a difficult time handling it. If

# Substrates for Your Flatbed Printer

CONTINUED



Sintra PVC .25" printed and die cut out the center so you see the wall through the letters.



## CUSTOM RIGID SUBSTRATE RESOURCE LIST

Supplier	Product(s)	Web site
Alcan Composites	Sintra, Gator, Dibond, Fome-Cor, Foam-X	<a href="http://www.alcancompositesusa.com">www.alcancompositesusa.com</a>
Altuglas	Plexiglas	<a href="http://www.plexiglas.com">www.plexiglas.com</a>
Coastal Enterprises	Precision Board Plus (HDU)	<a href="http://www.precisionboard.com">www.precisionboard.com</a>
Coroplast	Coroplast, Coroplast Smooth	<a href="http://www.coroplast.com">www.coroplast.com</a>
Bienfang	Mightycore, Pillocore	<a href="http://www.bienfang.com">www.bienfang.com</a>
GE Plastics	Lexan, Acrylic sheet, HDPE	<a href="http://www.geplastics.com">www.geplastics.com</a>
Kommerling	Komatex, Komacel/Plus, KomAlu	<a href="http://www.kommerlingusa.com">www.kommerlingusa.com</a>
Laminators Inc.	Alumalite, Econolite, Omega-Bond	<a href="http://www.laminatorsinc.com">www.laminatorsinc.com</a>
Nudo	AlumaCorr, Alumaf foam, HDPE	<a href="http://www.nudo.com">www.nudo.com</a>
Pitman-Charrette	Cambridge Foam Board	<a href="http://www.charrette.com">www.charrette.com</a>
Plaskolite	Polystyrene, acrylic	<a href="http://www.plaskolite.com">www.plaskolite.com</a>
Primex Plastics	Polystyrene, PETG	<a href="http://www.primexplastics.com">www.primexplastics.com</a>
Seal (Neschen)	Stoplight Inkjet	<a href="http://www.sealgraphics.com">www.sealgraphics.com</a>
Sheffield Plastics	Makrolon SL, Makrolon AR	<a href="http://www.sheffieldplastics.com">www.sheffieldplastics.com</a>
Sign Arts Products	Sign Foam 3 (HDU)	<a href="http://www.signfoam.com">www.signfoam.com</a>
Spartec Corp.	Polystyrene, PETG	<a href="http://www.spartech.com">www.spartech.com</a>
Vycom - CPG	Celtec, Vintec, HDPE	<a href="http://www.cpg-vycom.com">www.cpg-vycom.com</a>

your printer can print white, you will make a lot of money with this material. Warning, only use Sign Grade Lexan as a number of the others we tested failed on the ink adhesion.

3. PVC (Sintra, Kommerling, Omega-EP, etc.)—Again another home run, the manufacturers recognized the huge demand for a white board so the graphics printed on the PVC boards would be accurate in color. The next big plus for PVC is the manufacturers offer (and most distributors stock) large sheets (5'x10') and in many colors (for flatbed printers that can print white). Best applications for PVC are show graphics, wall panels, custom ceiling danglers, in-store displays and so much more. The cutting is a dream, the router just rips through this stock and is very clean after the cut. It is great for double-sided printing and will take a medium heat. Only warning about PVC is that thin stock can buckle under the heat of the lamps, so be careful of double-sided printing on PVC. PVC is not recommended for outdoor applications if the stock is .25" or less and the temperature will ever get below freezing.

4. Polystyrene— This one is a home run across the board. From .020 to .060 (and thicker), from backlit to full light blocking, to special cutting and bending, polystyrene is just a fantastic product. The ink adhesion is great and the stock holds the image very well. Best cut with a blade on .060 or less (you score it and then tear away the edges), and a router tool for thicker than .060. Sizes for this material are all over the map, typically if the material is .030 or less you can get it on a roll, but it is best handled in sheets. A number of distributors are stocking 4'x8' sheets, and I know that if you are willing to wait for an order and you order 1,000 pounds at a time, you can get any size up to 55" wide and just about any length (I stocked 55"x146"). We always stocked .030 opaque, as this is a huge seller. Shipping polystyrene is great as you can roll it and ship it in a tube, and it will not crack in the cold. Polystyrene will yellow over time when used outdoors, but if your ink coverage is 100 percent, then who cares?

5. Stoplight— This one took me months

to find—and what a find! It is 8.5 points thin (less than the thickness of a business card) and a paper stock so the inks stick perfect, this material is ideal for double-sided prints for window graphics. The material is opaque so you cannot see any light through it. Sheets come in just about any size up to 50" wide and you can also get this on a roll. The cost of Stoptlight is very low. The best way to cut Stoptlight is with the drop blade and wow does this material cut nice and very fast! We also print at full speed with max UV light so we can produce a full double-sided image in record time. We love this product and so do our clients.

6. PETG—What is interesting is that I have always known of acrylic (also known as Plexiglas) but I had never heard of PETG. PETG looks like Plexiglas but it is a little softer and as a result prints well and cuts great. The price of PETG is a little more than Plexiglas, but I did not care because it works. Great for backlits, trade show displays and most applications that require a clear, rigid material. Must be routed, and for a very nice look you should flame the edges. Can run at high heat and full speed, but given that you want to print mostly backlits, I would recommend you run the printer at best quality. Again, the white ink would help you greatly on this material. Not recommended for outdoor applications if the temperature will ever get below freezing.

7. Gator Board—I have two favorites here—3/16" and 1/2". I use the 3/16" for all my show and event graphics, the board is nice and light and rigid. As for the 1/2", I use this for two major applications: life-size cutouts with an easel back stand-off graphics. Stand-off graphics are where I print the image on the 1/2" gator, then mount V-Cleats on the back and this makes the graphic stand off from the wall 1/2" and give it dimension—very classy. (See the graphic on page 22 for a V-Cleat setup.)

**The market for very special rigid materials is so vast that I could be writing for days.**

Fantastic ink adhesion and just a great product. Gator will work both indoor and outdoor, plus it comes in all different sizes and thickness. I might note that you can do V-Cleats on just about any rigid material, such as Dibond.

8. Coroplast—Coroplast has for years been a problem for some flatbed inks, and if you are printing solid four-color black to the edge of the print and then trying to cut it, you could (and I did) have ink chipping off the image. The rumor going around is that Coroplast is coming out with a coated product that will not have issues with ink adhesion. A number of the printer companies today have

ink that works very well with Coroplast, but again you need to test the substrate. Coroplast comes in all different colors, and a few thicknesses. Additionally, if you want to wait for delivery and you can order enough, you can get just about any size. I stocked 49"x145" as I printed graphics for the sides of newspaper delivery trucks that had frames at 144"x48". Best to cut with the drop blade as it is fast for the 3/16" material, and use the router for the thicker Coroplast.

9. Foam board—My natural choice is Fome-Cor because this is what we all know as the foam board of choice, but this is not so, many companies make a Fome-Cor lookalike, and they all have different levels of success in printing on them. Some warp badly, while others run fine. We once did a job for more than 600 24" circles double-sided, and we ordered the same foam board we always do called Cambridge Fome Board from Pitman-Charrette. The job was going along nicely, but the distributor ran out of substrate (we bought them out) and we needed more, so we got a box from another source and we could not get one board through the printer without head strikes. You must understand the heads in my machine cost \$84,000 for the set, so if we ran a board that warps and the

heads get taken out, then I am out in the cold with a huge bill for new heads. Not to mention the downtime is a killer. The foam boards cut best with the hard blade and very fast. Print speed is high and lights are at medium.

10. Polyester sheet—Wow, what a great product. We get the Litho printable polyester that is 10 mils thick and the ink sticks so well you cannot scratch it off with a blade. The film comes in clear and white and I understand you can also get black and other colors. My best profit has been printing white on clear for special events and theater displays. This material is very flexible and will allow you to do some very nice displays for P.O.P. and events. This product only comes on a roll (unless you want it cut to sheets) and does not have any issues with the IR heat of the UV lamps. Cutting is done with the drop blade. You can put grommets in this material for hanging.

The market for very special rigid materials is so vast that I could be writing for days, and this is good for both of us. We have done unique jobs where we took a special film (holographic) and covered polystyrene, then printed on it and die cut it out. We also did a special set of glow-in-the-dark Sintra prints where again we covered the boards first, then printed on them. Others were diamond-plate steel, marble, magnet sheeting, slat doors, carpet, fabric, rubber mats, white pine, slate, even a sheet of bamboo. The list is endless, and with white ink, you can print to many surfaces that are not white, making this market is beyond your wildest imagination.

We have just touched on a few of the materials available. If you stop and think of the stores you shop at and all the products they sell that are rigid, you could go crazy! Just remember the heads are very expensive in these machines, so test carefully before you sell it.

Good luck—and be smart with your money, and I will see you on the show floor.

SB

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