FLAAR Reports

April 2010

Thick and Rigid Signage Materials

For Dedicated UV-Curable FLATBED PRINTERS

Nicholas Hellmuth and Pablo Martínez

Please Note

This report has not been licensed to any printer manufacturer, distributor, dealer, sales rep, RIP company, media or ink company to distribute. So if you obtained this from any company, you have a pirated copy.

Also, since this report is frequently updated, if you got your version from somewhere else, it may be an obsolete edition. FLAAR reports are being updated all year long, and our comment on that product may have been revised positively or negatively as we learned more about the product form end users.

To obtain a legitimate copy, which you know is the complete report with nothing erased or changed, and hence a report with all the original description of pros and cons, please obtain your original and full report straight from www.large-format-printers.org.

Your only assurance that you have a complete and authentic evaluation which describes all aspects of the product under consideration, benefits as well as deficiencies, is to obtain these reports directly from FLAAR, via www.wide-format-printers.NET.

Contents

Wood texture sample, printed on I-BOND with a WP Digital Virtu RS 35/48 UV printer.

Different material that can be printed with the ColorSpan 9840 UV printer.

I will cover thick and rigid material alphabetically.

This FLAAR Report is on thick and rigid signage materials. Specialty material for niche applications of flat or rigid materials (architectural, interior decoration) are a separate FLAAR lecture presentation.

Roll-fed material for UV printing of signage is a third and separate FLAAR Reports.

Standard sizes of UV-printable signage materials

In North America the 4x8 foot board is the most common size. Other sizes are available in the US, and different sizes are more popular in Europe. Some companies recognize this market trend and produce a 4x8' flatbed printer for the US market and a 2x3 meter printer for the European market.

Signage applications for UV-printable thick or rigid materials

The most common applications for flat and rigid material are

- Construction signage
  - Construction fence decoration
  - Construction advertising
- Bus stop advertising panels
- Real-estate signs ("For Sale" signs)
- POP
- Trade show graphics
- Sports events

ABS (plastic)

Acrylonitrile butadiene styrene (ABS) inherits beneficial properties from the three materials that are its source. ABS thermoplastic is more robust and resists impact. So if you need durability this is better than other materials.

ABS plastic is made by GE; the same company that makes Lexan.

The material is matte (rather than glossy). It is inexpensive and can be rolled up for shipping and then unrolled and printed and handled as a flat "board." Thickness is available up to at least half an inch.

I do not hear about this material as signage material very often.

Acrylics

Plexiglas is the best known trade mark for this acrylic resin (plastic); it's Altuglas in the rest of the world.

- Lucite and Perspex are both brand names of Lucite International
- Acrilex makes Acriglas Metallic acrylic sheets.
- Cyro makes Acrylite
- Optix by Plaskolite, Inc. is another generic brand.
- Plaskolite is a white acrylic from Plaskolite.
- Acrilex is an acrylic sheet yet looks like brushed aluminum. Another variety looks like stone.

One signage printshop said that his clients do not often ask to have images printed on acrylics. His experience has taught him that "it is easier to mount on acrylic than to print directly on it." He said that you need a promotor (a primer) to lower surface tension for adhesion.

Acrylic samples. Pictures extracted from www.techplast.com and www.backinaction.com.uk

Acrylics applications

Non-illuminated box signs (faces of box signs) as well as backlit displays.

Put white vinyl on the back to create a 3D effect with the letters standing off the front.

Acrylic sample application. Pictures extracted from www.solostocks.com.mx

Aluminum

- Coated aluminum.
- Painted aluminum, .040 thickness is popular.
- Can be folded or bent, cut with regular tools.
- Rigid.
- Resists weather outside, aluminum will not rust.
- Flat, won't warp as easily as does Foam-Cor or lesser materials (so less likely to have headstrikes).

And regular aluminum costs less than DiBond. For real-estate (For Sale) signs, aluminum lasts longer than Coroplast.

ColorSpan 9840 UV , printing some aluminum samples.

Aluminum composite materials manufacturers

- Acrilglas is a faux brushed aluminum from Acrilex that is really acrylic.
- Apolit (Graphic-al OR, Graphica-al DP, Graphic-al LT).
- IuBond comes from the Alubond company.
- AlumaCore, Nudo Products.
- AlumaJet comes in several finishes.
- Alumalite, Omega, Laminators Inc. Corrugated plastic core, aluminum top and bottom.
- Dibond is a lacquered aluminum composite material (ACM). There are two sheets of aluminum with a thermoplastic core. The material is covered with polyester on the surface.
- Dibond is lightweight; single or double-sided.
- D-Lite, painted aluminum over corrugated plastic; Laminators Inc.
- Econolite, a version of Alumalite that has aluminum only on one side; Omega.
- Omega-Bond, solid core polyethylene inside with painted aluminum outside; Laminators Inc.
- Poly-Metal, Nudo Products.
- Reynobond is a brand used in Europe.
- SAF is the maker of Alucobond, Reynobond, and Alpolic ACM.
- Ultra Aluminum, foam-board inner material with anodized aluminum coating.
- Vikubond, a composite sandwich of alu PVC alu from Shanghai Yaret Industrial Group Co. Ltd (China).

Although Dibond is the best known brand, Omega (Laminators Inc.) makes a diverse variety of materials that are faced with aluminum.

It is easier to print on aluminum composite that has a brushed surface. Some other surfaces are too smooth and mirror like (and not all ink may adhere).

With composite materials you can also be clever and mill through upper layer(s) to expose the different color of inner layer(s).

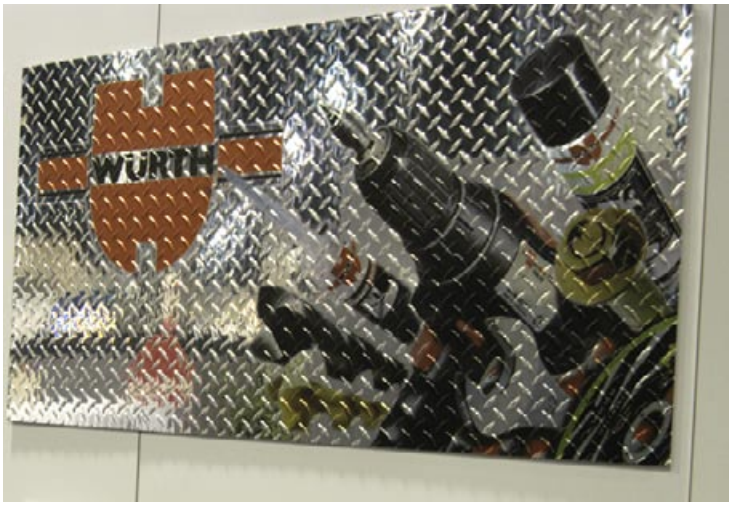
Many other brands of aluminum composite material exist. Some is much better than others relative to abrasion issues.

Aluminum applications with UV printers

Real-estate signs is the biggest use; one sign shop said, "*and towing companies*"

"We laminate just to be safe"
24 x 36" panel costs $8.65

Aluminum printing sample made with a GCC StellarJET K100 UV.



Aluminum printing sample made with a Durst Rho UV printer.

Is recommended to apply a priming to avoid scratches and damages on the paint.

Art board

"Board" material comes in dozens of different thickness and surface finishes. Each application tends to have its own jargon and favorite brand names.

BioBoard

The surface of BioBoard feels more like regular paper than some other brands (FalconBoard, etc). But BioBoard specs do not immediately tell you precisely what it is made of. The FoamaCell web site saids it is foam PVC but that is Foracell and not the material that is comparable to Re-board. Fomacell is not really as eco-friendly sounding as Re-board or X-board (Xanita) or Falconboard.

So a quick readering leaves confusion of what is what, and whether BioBoard is a family of different products or one single material.

I have spoken directly with the head of Re-board of Sweden and had breakfast with the CEO of Xanita in South Africa, but have not yet met the folks of BioBoard or Falconboard.

BioBoard is from PlyVeneer Products. As would be no surprise, there are no copies from Asia. In part because of the uncertainty of the pros and cons of each brand and material, FLAAR will be undertaking research on recyclable printing materials focusing on Re-board, X-board and all comparable products. This project will not cover foamboard or foam core or compressed particle materials (those will be separate projects).

BioBoard comes in 4x8', 4x10', and 5x8' boards, up to 1 inch thick.

www.PlyVeneer.com

Display cardboard samples, at Paiz Vista Hermosa Guatemala. With some artistic work and creativity you can get great results for your products.

Cardboard

UV printers can print onto sheet cardboard or corrugated cardboard (samples for decorating boxes).

Cardboard samples at PRINT ´09.

Composite cardboard

By this I mean material that usually has a honeycomb cell structure and usually adds a white exterior layer on top and bottom so it can be nicely printed on.

- Re-Board (made in Sweden)
- X-board (made in South Africa)
- Falcon Board from Pregis (previously called BeeBoard; made in Holland)
- BioBoard, PlyVeneer (but some of their materials are PVC)
- PlyVeneer mades diverse other related products, such as MiracleBoard/PlyCorr.

Less well known materials and manufacturers include:

- C-Board, Eastsign, Hong Kong
- Honeycomb, Gilman Brothers
- Kor-Board, Panel Processing
- TerraMax, Omega Panel Products, Laminators Inc.
- Tripanel, Tricel Corporation.

PlyVeneer mades diverse other related products, such as MiracleBoard/PlyCorr.

Celtec

Celtec is a brand name for expanded closed cell PVC from Vy-Com Plastics (Scranton Products).

It is not intended to be load-bearing.

www.vycomplastics.com

Corrugated board

An industrial-sized printer for this material is the Scitex Vision CORjet. This printer does not use UV-cured inks. But the new Sun FastJet does use UV-curing inks, and is designed specifically to print on corrugated board and other packaging materials.

The trend is for some stores to exhibit products still inside their shipping boxes. This way the box has to be nicely decorated with a good image of the product that is inside. So the box itself becomes a POP sign.

Composite cardboard, Re-board sample at Viscom Italy ´09.

Coach and table made of Re-board at Viscom Italy ´09. These are some samples of what you can do with this media.

Coroplast media sample.

Coroplast sign sample. This sign was printed with a ColorSpan 9840 UV printer.

Corrugated plastic (see Coroplast)

Coroplast

Coroplast is a premium brand name for corrugated plastic, fluted polypropylene. Coroplast comes in white, black and many colors. The carrying boxes that the US Post Office uses to move mail around in are a Coroplast-like material.

- 4 mm is popular, also 8 mm, 10 mm and other thicknesses
- static is a main issue, so may work best if corona treated
- May take a long time to cure
- May have ink abrasion issues in a moist climate
- Some customers may prefer aluminum, because in winter Coroplast can become brittle
- All of this material has a corrugated surface, so may not produce as crisp an image as expected.
- Pressure rollers may press down and leave a "trail"
- Can be cut with a knife or trimmer, but leaves residue
- Pre-cut is best; otherwise too much detritus
- And it's hard to cut fluted material evenly.
- A few sheets may be warped; best not to feed these through the printer
- Susceptible to scratching
- You must use tac-cloth to clean off anything you cut yourself
- Coroplast is not easy to glue with normal adhesives.
- Flame retardant Coroplast is available.
- A 10 mm thick 4x8 ft sheet (48 x 96 inches) costs about $32.

Coroplast (or comparable material of other brands) are used for community event signage (United Way, for example). If you drive through farming areas you see lots of ads for different types of seeds: these may be printed on Coroplast.

Some brands are not as good as other brands, so be sure you learn which is which.

Some inks print okay on Coroplast with no primer. But Sericol ink (at least up to 2009) required a primer. You may also need corona treatment. Depends on the ink brand and depends on which brand of corrugated plastic you buy.

But Coroplast will not hold up forever, so it is best for temporary signage if used outdoors.

Many other brands of corrugated plastic boards are available

Corex, Corulite, Inteplast, Plasticor by Spartech Plastics are three of many different brands.

But some off-brand corrugated plastic may not print as well. Each different brand of UV-curable ink will have a different rate of adhesion. Some UV inks will scrape off after several months. Even if we had a list available, the ink formulas change every few months.

The owner of both a Durst Rho 160 and a ColorSpan 72UVX said "both the Rho and the ColorSpan print okay on Coroplast, but the results look nicer on the ColorSpan because of its higher dpi."

Coroplast sample printed with a ColorSpan 9840 UV printer.

Coroplast Applications

Coroplast is used primarily for low cost temporary "throw-away signs", for real-estate FOR SALE signs, and political ads on lawns.

Spring and summer are big times for Coroplast use, golf outings, more real estate signs.

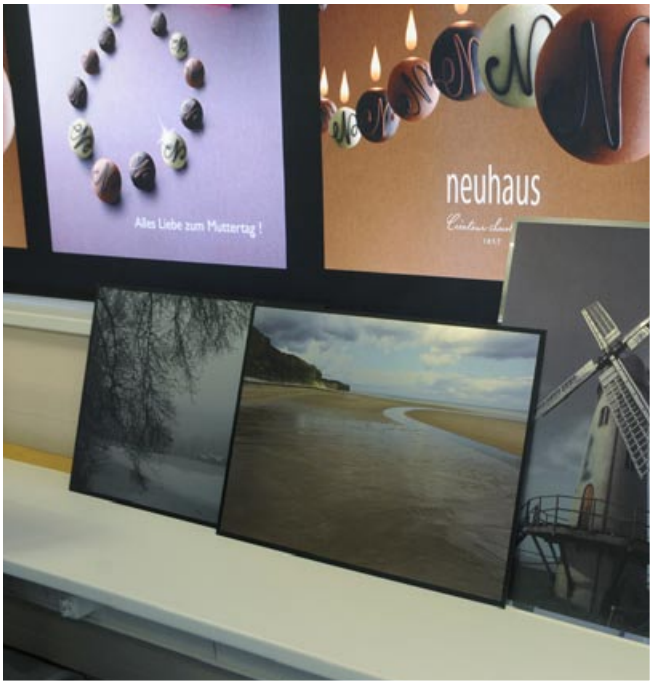
Main competition for Coroplast is aluminum. Coroplast is cheaper alternative. Coroplast is lighter weight than aluminum. Coroplast is thick enough to fit better into "slide-in" frames.

But Coroplast is also used for POP in stores.

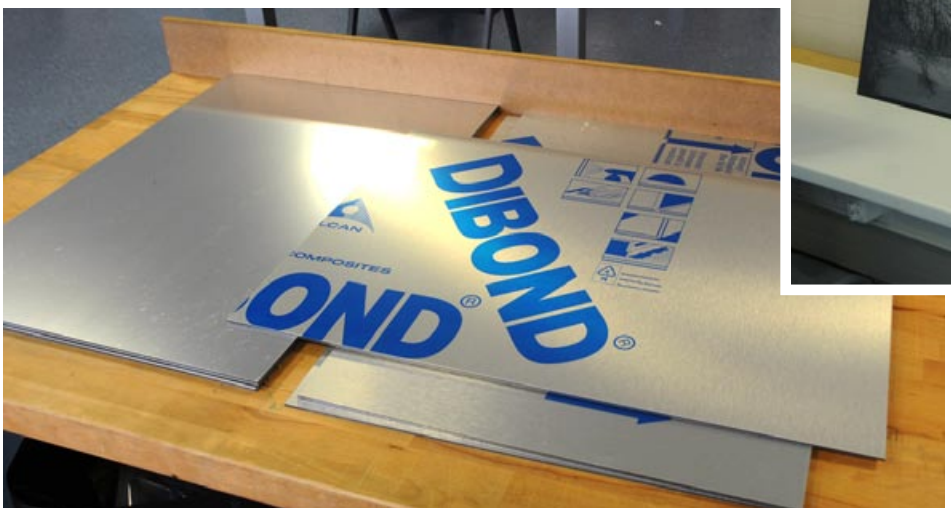
Dibond

Dibond is a rigid ACM, aluminum composite material. A thin aluminum sheet is on the top and on the bottom. In between is a core of thermoplastic.

Dibond is a trademark of Alcan, comes in 4 x 8 ft, 4 x 10 ft, and 5 x 10 ft sizes at several thicknesses. You can print on Dibond with UV-cured inks or solvent inks, and you can cut it with a Kongberg cutter-router.



Fine art samples printed on Dibond.



Dibond boards samples.

Duraplast

Duraplast is an international brand name for a foamboard-like material. "It's between plastic and paper, a nice surface, but still susceptible to static charge (like Coroplast has static issues also).

Falconboard

This is a brand name for a material from Hexacomb that is comparable to Re-board and X-board from Xanita. But Falconboard is much more flexible because there is significantly less material inside (this is a polite way of saying that Falconboard has poor structural stability). So if it is really less cost, and if you do not need strength or longevity, then look at Falconboard. Otherwise, most of the other boards are much stronger (but correspondingly a bit higher in price).

What is noticeable about trade magazine prese releases praising Falconboard is that there is not one single iota of actual evaluation of factual review of the actual product: the trade magazine simple repeats, verbatim, what the manufacturer claims. For example, they claim "it cuts cleanly…and is resistant to denting, warping…."

But cut it yourself and see what happens. Then cut other competing materials from different manufacturers and you will quickly see the pros and cons (of each and every kind of material).

Being resistant to denting and warping is word-smithing because it bends and is easily smashed (since inside is primarily air).

None of these comments mean that you should buy competing brands and not Falconboard. None of these comments mean that Falconboard is bad. And, Falconboard is now changing their material because clearly other people have pointed out the same issues compared with stronger material from all competitors (Re-board, Xanita, etc).

But all of these comments document that FLAAR is curious about comparative results and that it would be a shame if you need a strong material and you buy a weak material. Yet if all you want is a cheaper product, for temporary signage, in a protected area, then you may be perfectly content with Falconboard.

Hexacomb is a business unit of Pregis.

www.Falconboard.com

Fiberglass

Prints on some fiberglass with some inks may not pass the tape pull-off test well. But fiberglass is a really strong material, albeit heavy. Just be aware that particulates may be dangerous to your health if you mill it (rout it with a flatbed cutter-router).

FiberBrite is plastic but reinforced with fiberglass. FiberBrite offers fiberglass-reinforced plastic (FRP).

www.fibreglast.com

Foam board material, diverse brands

- Bienfang (foamboard), Kappa(plast) (newly formed Smurfit Kappa Group), Kapa (not to be confused with Kappa), Gatorboard, Fome-Cor, Foam-x (Foamex), Omegaboard,
- Gilman Brothers offer DURAPLAST, Insite Foam Board and other brands. Insite is whiter than other brands (other brands may be too yellow).
- Jet Mount, Hartman (HartPrint) for point of sale
- PlyFloam from PlyVeneer
- Ultraboard (United Industries)
- Ultraprint, foamboard, 4x8 ft, Nielsen Bainbridge

Elmer's (of Elmer's Glue fame) bought Bienfang in recent years.

Also see SBS.

Different foam board samples.

Foam board material, diverse properties

White foam, white paper.
Black foam, black paper.

Foam board material (faced with clay)

Foam-Cor is a brand name of an extruded polystyrene foam material sandwiched between white paper that has been coated with clay to make a good printing surface.

Gatorfoam is a core of polystyrene foam covered with wood fibers in resin (Alcan).

Gatorboard is much more rigid than Foam-Cor. Outside is faced with paper.

Foam board material (faced with polystyrene)

Gatorplast (International Paper) is extruded polystyrene foam core coated with polystyrene on both outside surfaces.

Elmer's brand is preferred by Acuity (Oce Arizona UV-cured printers).

Foam board: pros and cons

Fome-Cor warps quickly when you mount photos on it and hang it up. Gatorplast is more rigid.

May warp under excessive heat.

Cheap foam board such as Fome-Cor tends to warp too much (even without heat).

Fome-Cor is flammable.

foam (sponge-like)

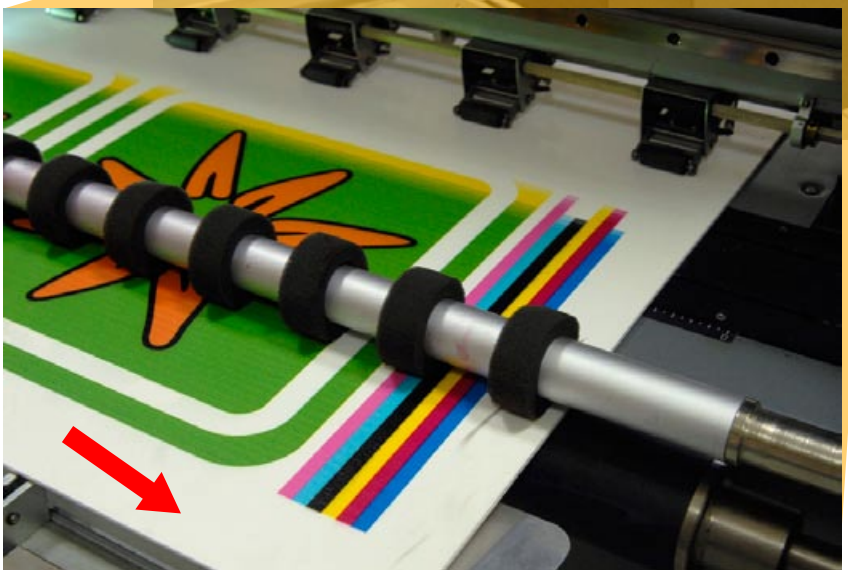
I saw this foam in the rack of sample materials printed by the Grapo Octopus, in the Xaar booth at DRUPA 2004.

This is foam, like a sponge, without stiff (board) covering) Polyurethane-Aquazone (Reilly Foam company). This foam is used in carpet.

Forex

Plastic closed-cell rigid PVC sheets
Dense white material
3, 5, 19mm thicknesses
Can be milled, machined, thermo-formed, but not laser-cut due to unpleasant PVC by-products.
Forex is a brand name of Alcan, same company that makes Dibond, Kapa, Gatorfoam, and Fome-Cor. Forex is popular in Germany.

The Infinity UV hybrid printer uses pinch rollers to feed the rigid media.



Forex printing sample made with a Infinity UV hybrid printer.

HDPE

HDPE = high density polyethylene resin material is used for screen printing (and for the bottles of shampoo that you buy at the store). HDPE can be thermoformed, so it can be used for display gauges.

FRP

Fiberglass Reinforced Plastic, from American Fiber Technologies.

Gatorfoam

A brand name of an extruded polystyrene foam board with a bright white surface.

KAPA

This brand (from Alcan) is what I see a lot of in Europe.

KT Board

An inkjet-printable PVC foam board
A lot of this board seems to be sold out of China

KYDEX

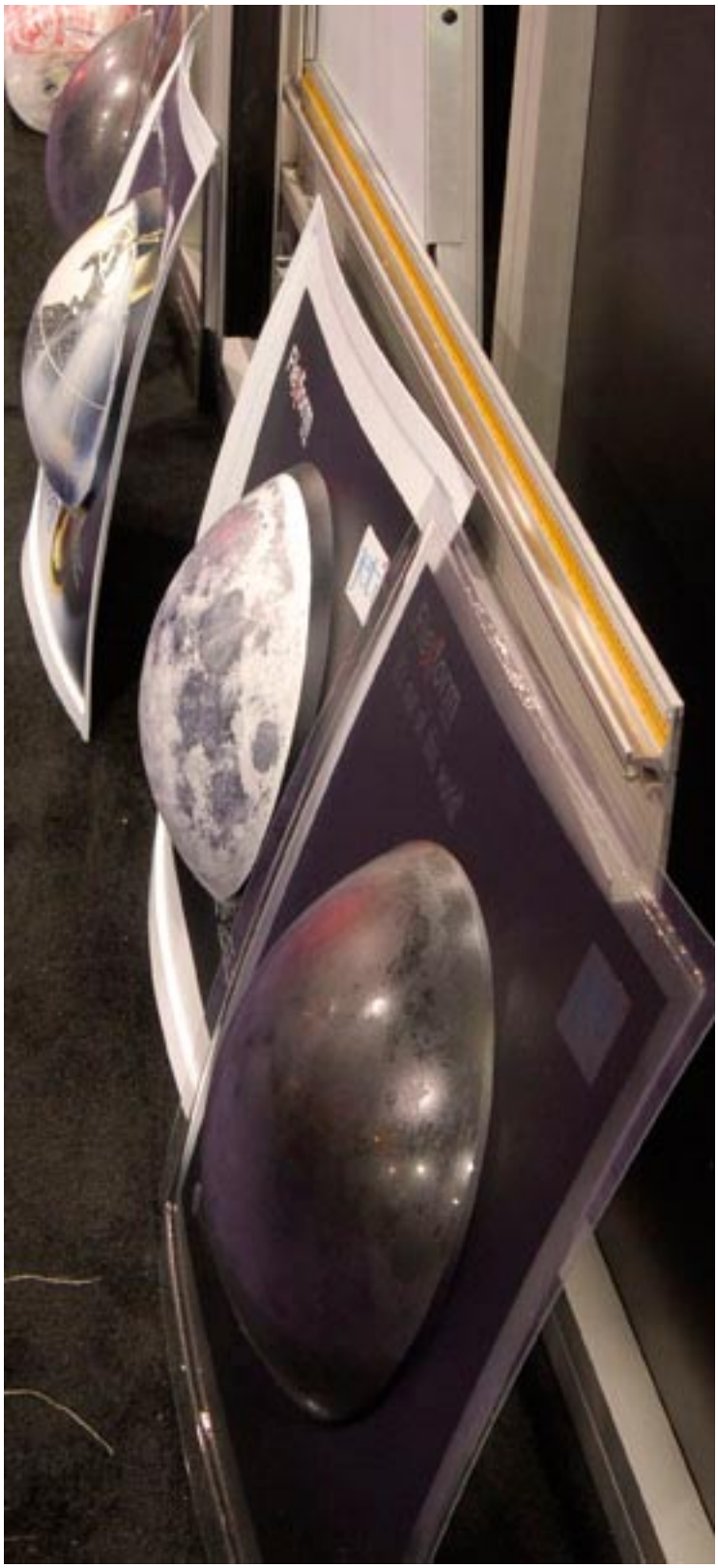
Thermoplastic sheet made by Kleerdex
Thermo-formable

Lenticular lenses

The question is how many advertisers are actually willing to have such in-your-face images. In one airport there were 20 different lenticular signs along a single walkway. I was physically seasick by the time I was into the terminal. I don't think this was the effect the client was paying their good money for.

Many people don't take lenticular images seriously, since they associate it with a child's toy, or with something that is not serious. So to make a lenticular image effective, you have to be unusually adept.

To print any kind of lenticular image you need extreme patience and a very precise image, lens, and printer.



Lenticular samples at ISA ´07.

Lenticular signage sample at GRAPO factory visit.

Lenticular signage sample at FESPA ´07.

Lenticular sample at FESPA ´07, with this effect you can give to the signage a realistic view.

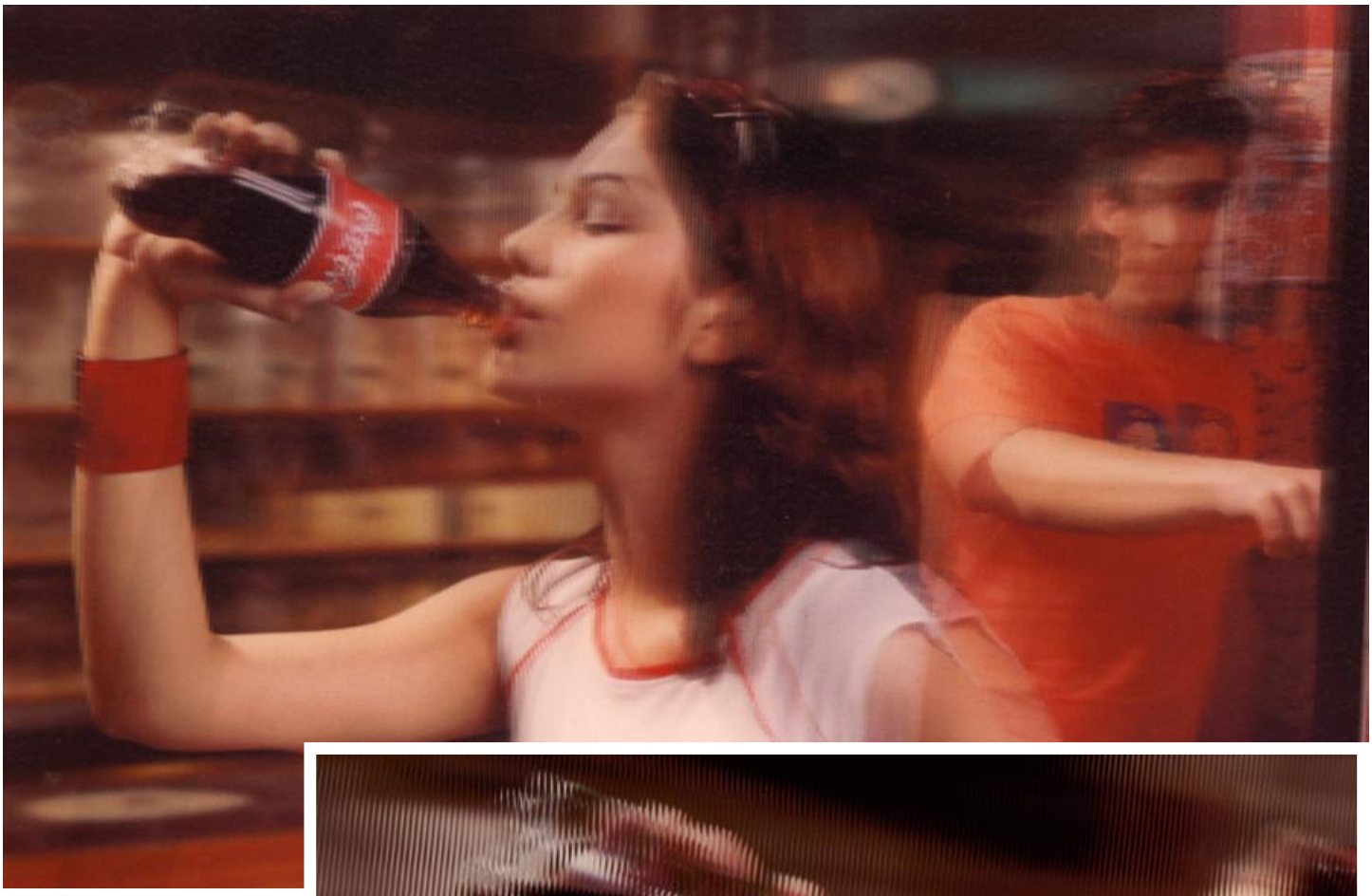
Human Eyes is a special kind of lenticular system.

Human Eyes has offered many interesting products that are more dramatic than simple lenticular images.

Human Eye booth, at GoA ´07.

Lenticular samples at Human Eye booth, GoA ´07.

The lenticular effect gives to the sign a motion sense that is visually attractive.



Lenticular printing is a multi-step process consisting of creating a lenticular image from at least two existing images.

The media texture and printing style gives the motion effect to the lenticular images.

Lexan

Lexan is a brand of GE Plastics. Lexan is durable, indeed may be bulletproof (the Apple Computer iPod is made from Lexan). The back material (backlit) of slot machines made be made from Lexan.

Lexan has some similarities to Plexiglas (acrylic) but is not rigid.
Lexan is thermo-formable
Bus shelters may be made of Lexan sheets

Had serious adhesion issue with Vutek ink during 2005. But this can be as much an issue with the material as with the Vutek ink. Some materials come in several kinds of surface: for printing signage, or for mounting. Obviously the kind for signs is a bit more expensive.

"Lexan prints the same as acrylic or polycarbonate, which means: no printing issues per se, but a little dull in appearance. So we don't use Lexan much; not as much demand." (ColorSpan 9840uv user).

Another printshop owner said "we don't use this much since it is too costly."

Masonite

Fiberboard (compressed wood sawdust…), but since it's brown in color, it's a challenge to print on it without white ink. This is the high density material used for peg boards. It is like MDF but harder. It is commonly used as a signboard.

If I remember, Masonsite filed a silly lawsuit claiming the right to print on some kind of application. If my memory is correct and the company was indeed Masonite, this kind of lawsuit is not beneficial to overall progress.

Masonite sample printed on a Neolt UV flatbed printer, at FESPA ´05.

MDF (medium density fiber board)

MDF is made by scores of different companies.

MDF is used to dry mount photos onto the MDF board.

In theory MDF board resists warping.

MDF boards can be coated, which naturally allows a better print to be produced.

MDO

MDO = Medium Density Overlay board,
MDO is plywood that has been coated with a resin surface finish.
Many different brand names, Creazon is one (compressed board). But Creazon is listed by Gandy as an "inconsistent material"
Durable outdoors

In the US, the 4x8 ft size is standard. Thicker material is more rigid than thinner MDO board. If your MDO board warps, this is not good for head crashes.

4x8' MDO boards skew on Vutek 200/600
DuPont Cromaprint 22uv that vacuum can't hold down a warped MDO board.

MDO board sample, DuPont site visit ´06.

MDO Board Applications

Construction site signs, commercial real estate signs, pre-development signs.

"Yes, prints great, we like that a lot" (ColorSpan 9840uv).

"Did 64 MDO signs for one single construction site. Were custom 32 x 32 inch size."

"No issues, no calls complaining; this was our first big run after we got the printer. Client liked it very much."

Melamine

Shaw and Slavsky, Detroit, cited in a Durst Rho handout that they printed on Melamine. The printshop where we have inspected an Infiniti UV printer also lists Melamine as a material they print on.

Melamine is a resin adhesive, widely used for making cheap plastic dishes, as well as tables and chairs.

Melamine is used in countless other products, despite the fact it is made from some rather nasty materials: urea and formaldehyde.

Where you might print onto "Melamine" is when the Melamine resin adhesive is used to bind together wood chips or even sawdust to form a compressed material (in other words, fake wood).

Plywood, Particle Board (PB), Medium Density Fiberboard and other materials use Melamine (www.dsm.com). These are the products you would tend to print onto, so not always actually onto "Melamine."

Changes in humidity may case warping. This material will also bow if you store it standing it (it will tend to sag over time). Warped material is the major cause of head crashes.

Metal

Aluminum
- Actual aluminum
- Painted aluminum
- Alubond

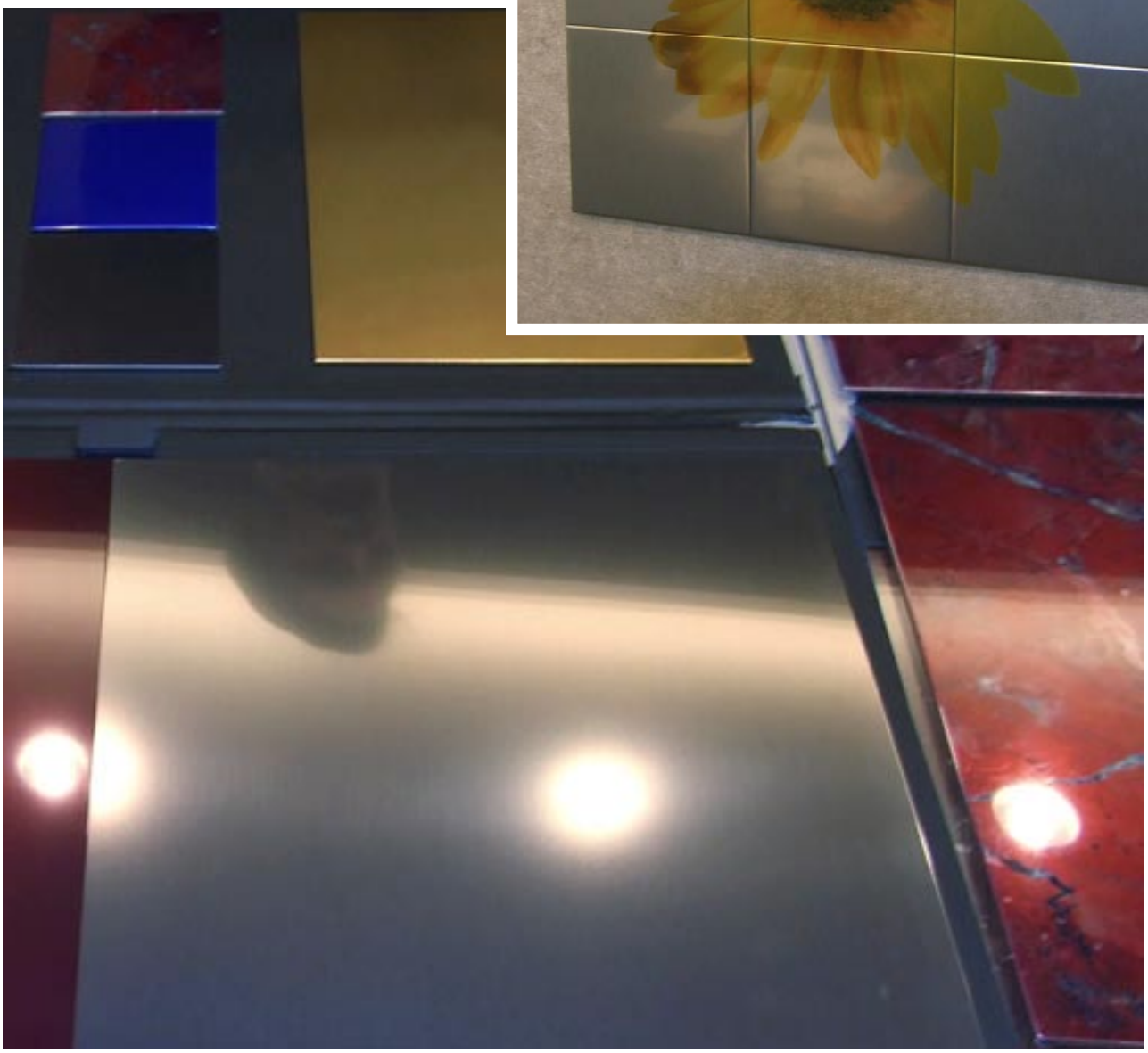
Copper
Brass
Stainless steel

Thin metal sheets can have heat issues.

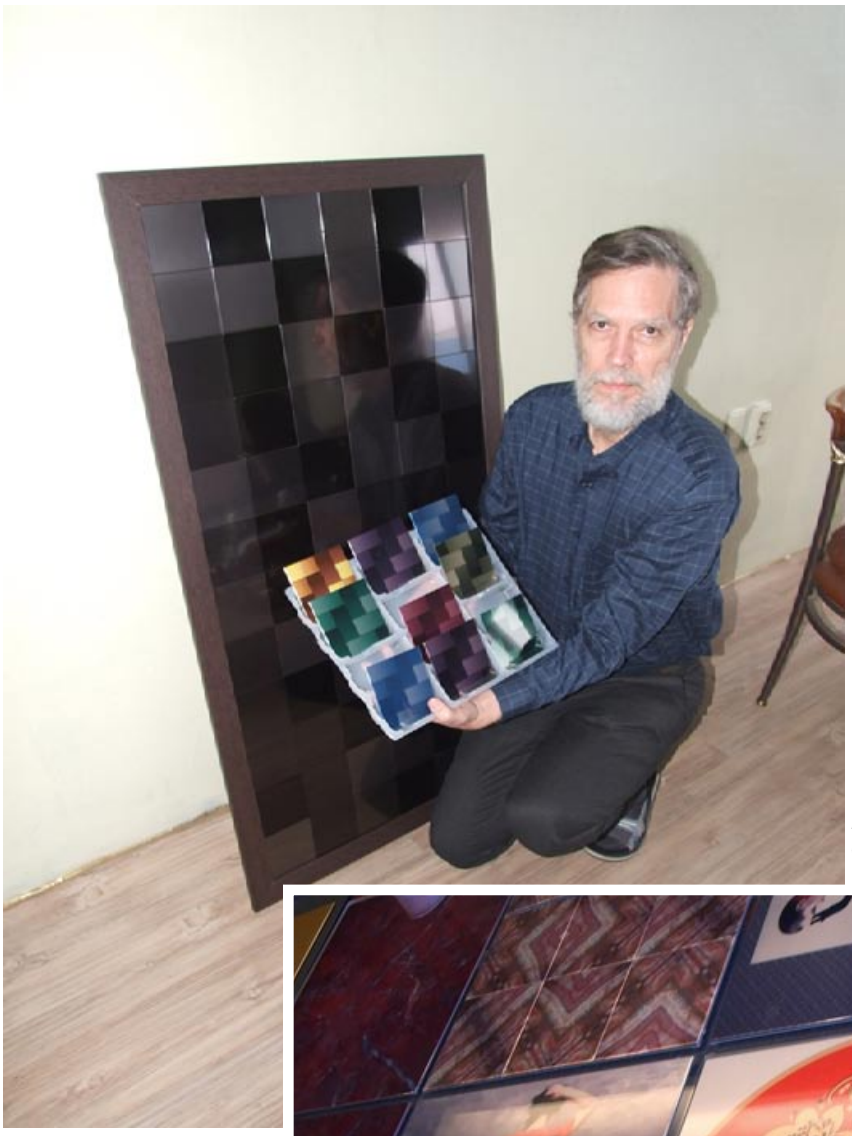
Durst melamine sample, at DRUPA ´08.

With the melamine you can obtain similar textures and results than with the original materials, such as wood.

Decoration on aluminum offers the advantage that the substrate itself has a longer life time that most other materials.



Aluminum is suitable for both interior and outdoor decoration, IP&I aluminum tile sample.



Dr. Nicholas Hellmuth holding some aluminum tiles, at IP&I demo room, 2009.

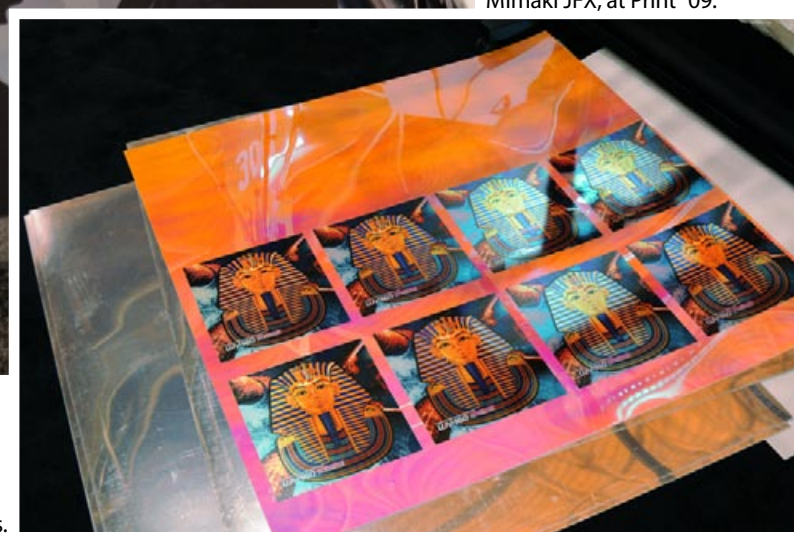
The color gamut on aluminum is considerably wide and in some applications even beautiful colors could be achieved.

Metallic effect materials

I had to create this name to cover the diverse range of new materials that you see at trade shows. The most dramatic is that exhibited at the Mimaki booth (the image of an Egyptian pharoh). These materials come in diverse chemical compositions.

Some of the many companies that offer this kind of material include:
Booksmart Studio (Brushed Silver, Satin Gold, etc).

Metallic sample printed with a Mimaki JFX, at Print ´09.



These materials come in diverse chemical compositions.

Particleboard

You can obtain this from many sources, such as Panel Processing.

Permalight

American Permalight makes a photo luminescent rigid material out of PVC or aluminum for safety signs such as Exit signs.

PETG

PETG is one of many materials that is used for cola and water bottles that are used by the ton in many countries. The same material is also one of the nicest printable surfaces for wide-format roll-to-roll printers (but is expensive). In some formats, and as thick rigid form, PETG can be a plastic substitute for glass (or for acrylics). It is easier to print onto PETG than onto acrylics (in terms of subsequent adhesion).

PETG = Polyethylene Terepthalate Glycol. When you Google PETG you get a ton of information.

Many plastics companies make this material. Since flatbed routers can cut (mill) rigid plastics, the use of rigid plastics is rising. Ink companies are having to improve their UV-cured inks to adhere better to rigid plastics materials.

- VIVAK from Sheffield Plastics is one of many brands. Comes in 4x6 and 4x8' sheets.
- Xcel Products mades a material from PETG.

PLA

A plastic made from corn, available from Spartech.

Polymer
This material features several dozen different textures.
The surface is acrylic to accept UV inks.
Half inch thick but only up to 2x4' size.

Polycarbonate

Lexan, Macrolon, etc

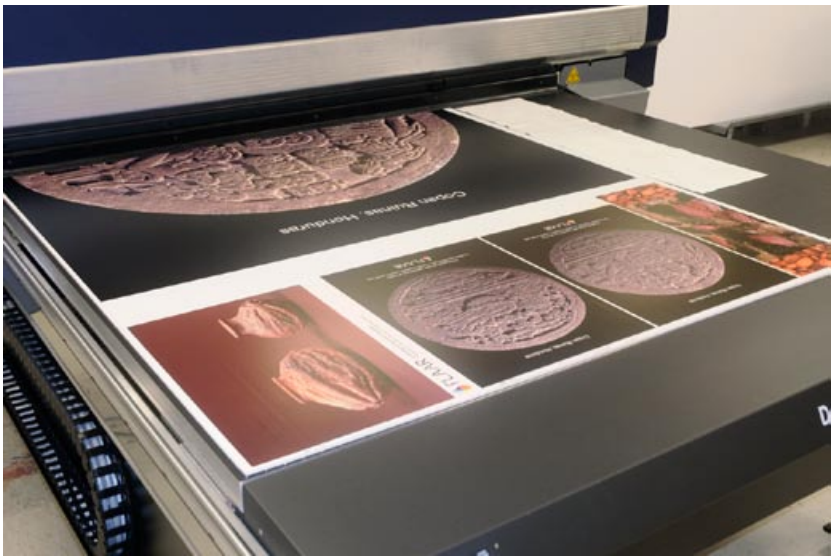
Tuffak is a polycarbonate sheet made by Altuglas International, the manufacturer also of Plexiglas. Tuffak is thermoformable and is almost unbreakable. Comes in clear and white in many sizes and thicknesses.

Macrolon plastic may be a substitute for Plexiglas

Thermo-formed (Heat-Formed) Applications with UV inks at Grapo factory visit in 2008.

Thermo-forming samples at Grapo factory visit in 2008.

The PETG can be used to make almost any kind of sign.



Gerber Solara Ion, printing some PVC samples, at Gerber factory.

Dr. Nicholas Hellmuth revaluating some PVC samples, at Gerber factory.

PVC printing sample.

PP

PP is more transparent; PE is more opaque, so you will not see any coating that may be needed. PE is more durable than Styrene and more environmentally friendly.

(fluted) polypropylene (PP)

Comparable to corrugated paper but this material is a plastic. Other than for printing on, PP is used for packaging fruits and vegetables.
heat sensitive
can be translucent, or various colors
OPP, Oriented PolyPropylene film

Thicknesses range from 2mm to 10mm

Can come with corona treatment; can be treated for flame retardancy
polypropylene (Olefinic plastics) Coroplast is trademark for one form of corrugated plastic (polypropylene).

Often comes already corona treated

PVC

PVC is polyvinyl chloride
Expanded PVC is best known as Sintra. Other brands include:

- Celtec, foam-based PVC sheet from Vycom (www.cpg-vycom.com)
- Ex-Cel-Pro, PVC foam sheet, 48x96 inches, 4x8 ft, Jains Irrigation Systems.
- Forex is another brand of closed cell rigid PVC foam sheet
- InteFoam
- Komatex expanded PVC (also see Sintra, which is a brand name of another company's extruded closed-cell polyvinyl chloride).
- Komabrite (Kommerling)
- Omega-EP
- Sintra

Be aware that some PVC boards can yellow; other PVC boards have good ink adherence; others less adherence. So you need to test, since if we report "ink adherence is good" this is only for one brand of ink only for that year. A different printer with a different ink will react in another way. And every year or so the ink chemistry changes anyway.

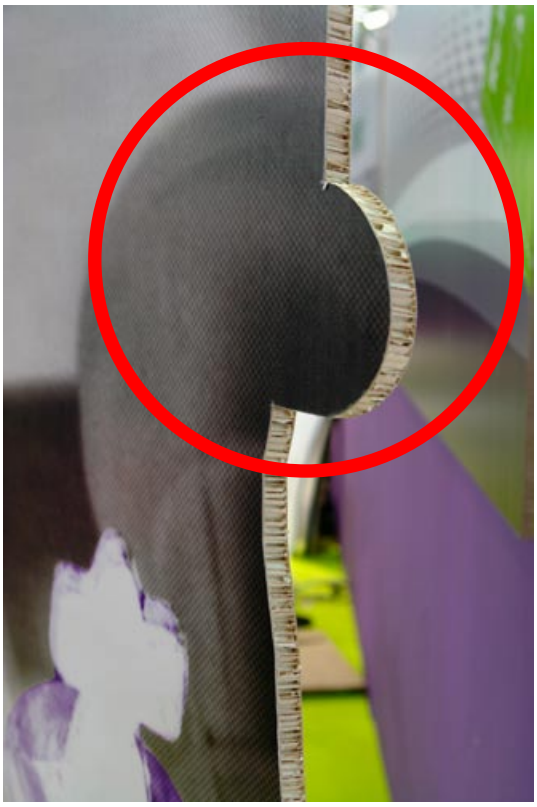
In past years the ink of VUTEk PressVu printers had trouble adhering to PVC; if the .2mm PVC film was bent or in any way moved out of its flat shape, the ink showed crease lines. VUTEk ink had even more problems printing onto TPU (Thermoplastic Polyurethane).

Re-board

Re-board is a paper-based "cardboard" product made by Design Force AB in Sweden. I have met the CEO (at VISCOM Paris '09 trade show) and learned about the product also at several trade shows. Re-board is comparable to X-board from Xanita or BioBoard from PlyVeneer. Another material is Falconboard (but nowhere near as structurally strong as Re-board or Xanita products).

There will be a special future FLAAR Report on these various products: Re-board, X-board, BioBoard, Falconboard and the comparable material elsewhere.

www.DesgnForce.se
www.re-board.net



Re-board printed sample. This media is produces in a maximum format of 1,6 x 3,2 m. with a thickness of between 5 and 52 mm.

SBS

SBS = Solid Bleached Sulphate Board. Playing cards are made with thin SBS because of a layer of blockout (stop-light). SBS is like chipboard but bleached. It can be recycled.

One print shop manager said that "it won't print with solvent ink." He also said it is "easier than foamboard.

Signboard

Generic sign board can have a vinyl surface, so it's a nicer surface than rough MDO surface.

Many brands exist, such as Omega SignBoard.

Silicone Elastomer

This was in a list of samples at a trade show. Dow Corning makes this kind of material. If you put the words Silicone Elastomer into Google, you immediately get a wide variety of helpful links (so many we don't include them in our bibliography).

Re-bord is a lightweight material and ideal for the manufacture of furniture, walls, stands, displays and other structures.

Coffee printed table made with re-board.

Sintra: End-User Comments

"We only print on Sintra occasionally; it is more rigid than Styrene, but Styrene prints better. Sintra can be printed only on one side, and it's not always easy to figure out which side that is." Sintra is used for in-store displays, such as at Lowes, Wal-Mart, etc.

Styrene

Polystyrene is a plastic sheet, needs to be stored flat.
Usually white but several colors are available.
Translucent is also available for backlit.
Surface finish is glossy and prints attractively. A glossy finish helps with UV inks since UV inks are inherently matte.
Styrene cuts better than Coroplast.

Spartech is one of many sources of Styrene.
UltraFlex offers Styrene and a diverse variety of other materials.
Primex Plastics is another source.

Styrene should be wiped down with alcohol.
"Too much bubbling if you try to print .020 Styrene. So we have to use 0.30 Styrene."

But the owner of a ColorSpan 9840uv uses .020 Styrene "with no heat issues" "Lays on great, comes out great; client is very happy."

For point of sale signs. Another printshop said he uses Styrene very commonly. He also suggested looking at a bio-material similar to Styrene from Pace Industries (www.Pace-Industries-Inc.com). Pace Industries makes "BIOGRAPH.ics (sic), available as sheets and rolls. It is biodegradable.

Test how Styrene reacts to your ink and curing system for possible adhesion issues.

Styrene: End-User Comments

Pretty good material to print on with a ColorSpan 72UVX. .060 is best. .040 may buckle and then you get head strikes. You must clean it down.

Dr. Hellmuth, holding a PVC sample, printed with a ColorSpan 9840 UV.

Tarps (tarpaulin)

In the past tarps were waterproofed canvas, but nowadays the ones you buy at Wal-Mart are cheap synthetic material, primarily polyethylene. Other tarps are nylon, vinyl or polyester.

Some solvent printers can handle the thickness of a tarp (be careful if it has grommets).

But for sure a flatbed, hybrid, or combo printer can handle tarps, even with grommets.

TPU

TPU is Thermoplastic Polyurethane.

Wood

X-board, Xanita

WP RS35/48 UV printing some wood samples.

Table mat printed. If you are a restaurant owner you can print everything in your restaurant, even directly on your table tops.

Wood door sample, printed with Jeti UV printer.

Sun NEO UV, printing somo wood samples.

Nicholas Hellmuth, evaluating Sun NEO UV led system, characterized for not producing heat.

Samples of Signage Materials

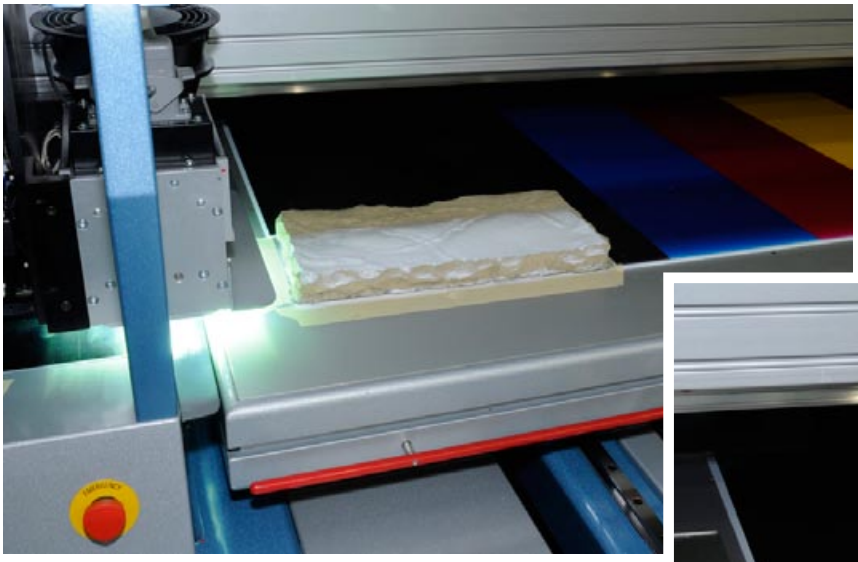
At SGIA, October 2003, Vutek exhibited a sample of materials in a grid, as follows. I am guessing these were printed with the UV-curable ink flatbed:

3M Controltac Pressure Sensitive	Spartec Plastics backlit PET G	Vinyl Plastics Corona treated styrene Styrene (matte appearance)
Lamitech-Daving Poly Guard White card stock	GE Plastics Lexan (backlit) Polycarbonate	Alcan Composites Forex Classic Processed Sintra
Alcan Composites Foam X Foam-filled board	Vinyl Plastics Translucent (backlit) Styrene	Spartec Plastics ABS

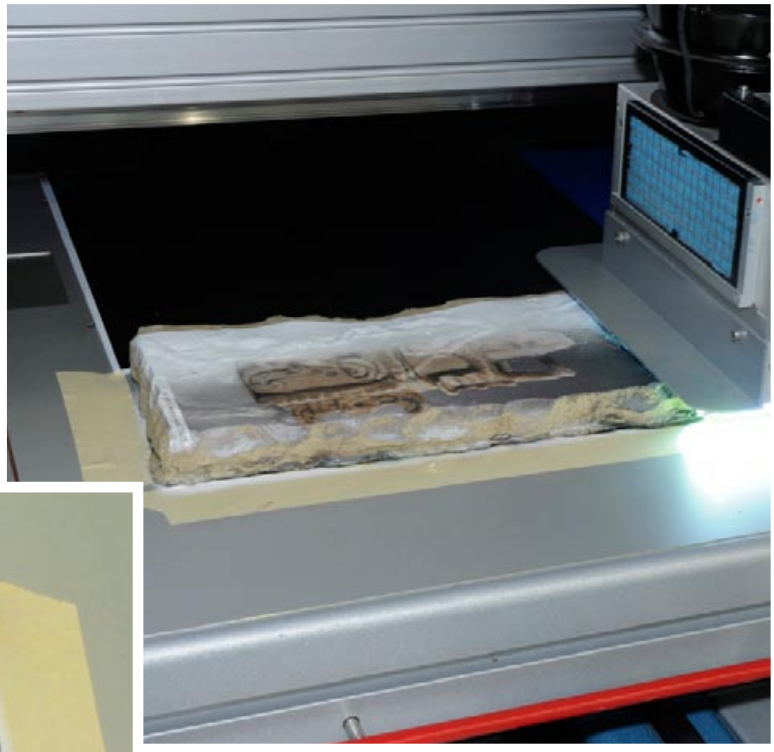
White on Black: Durst Rho

Durst Rho 160W white UV ink printing sample, at DURST ´04.

White on Black: Gandinnovations



Gandinnovations Jeti 1224 printing a white layer on a floor tile before printing the final image.



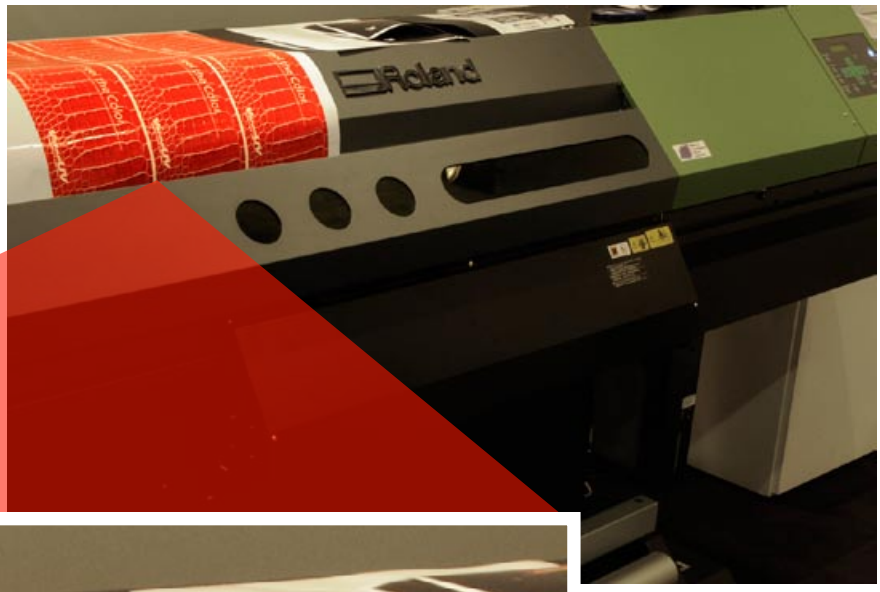
The reason of printing a pre white layer on this tile is to ensure color accuracy in the final output.

White on Black with other UV Printers

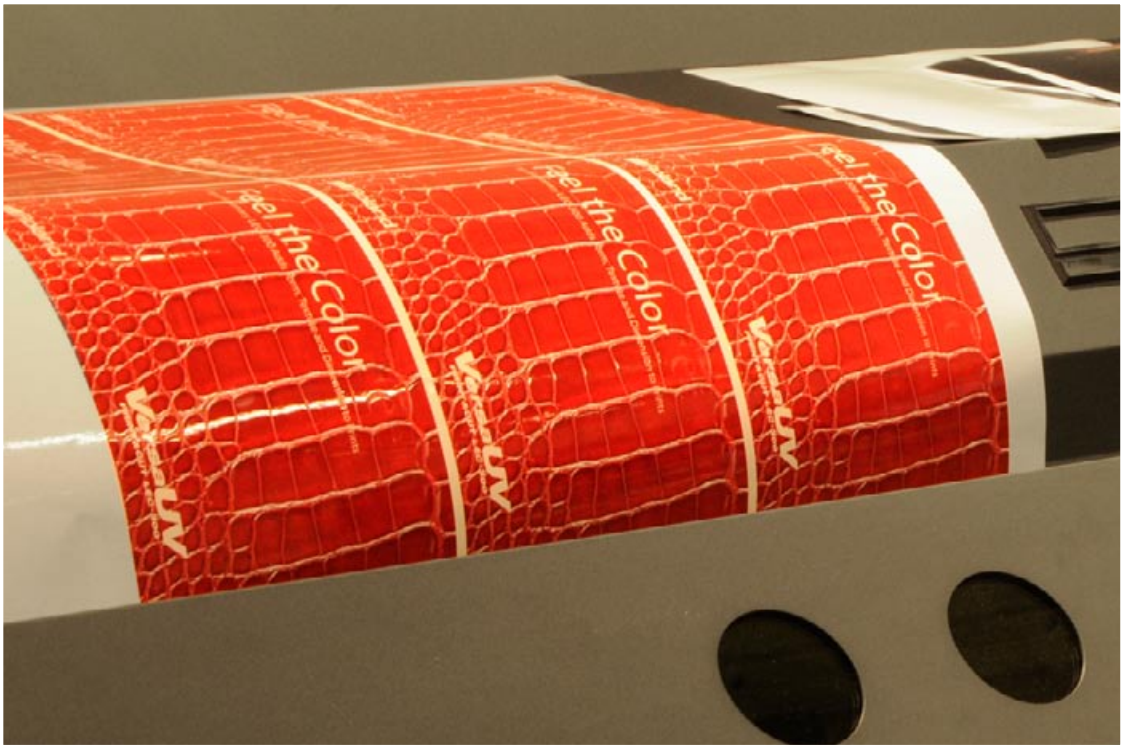
"White with DuPont Cromaprint 22uv is not opaque enough to print on dark colored surfaces"

Spot Varnish: Durst Rho

Durst was one of the first companies to offer spot varnish. But when I visited a print shop that had the Rho 600, he said that so far he has not gotten the spot varnish to work acceptably. This print shop also has an Inca UV flatbed, so they have prior experience with UV printers in general.



Roland VersaUV LEC-300 at Photokina ´08.



The Roland VersaUV LEC-300 has produced faux crocodile skin texture by applying layers of varnish.

Preparing Rigid Materials for Use

Rigid materials were not made to be used with UV ink.

Most rigid materials that you print on today, were developed decades ago, most for backing for signage (to mount photos onto, or to put vinyl-cut letters or designs onto).

Most large sheets are sloppily cut, and are not rectangular.

Manufactures of materials are so used to churning out their regular stuff that they don't yet worry about the special needs for UV printers (no warping; no chipped edges; all things that cause head strikes on inkjet printers).

Shipping of large sheets is a problem too, especially for the corners.

Some materials needs to be treated before this can be printed.

Storing of large sheets is a problem too, especially for the corners.

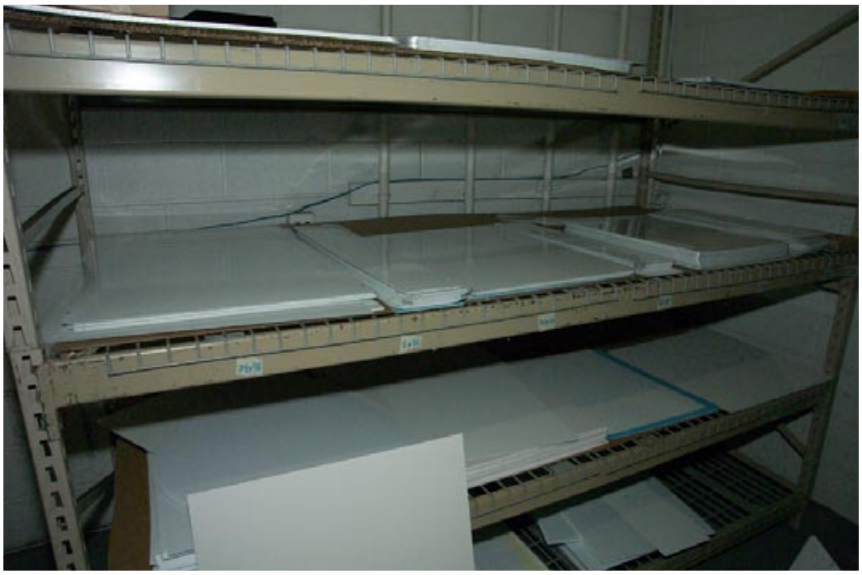
Handling: Store flat

If you store panels or sheets upright, they will sag. This warped shape will cause head strikes. Styrene and Coroplast must be stored flat but Sintra can be stored on edge.

But because storing so many different kinds of materials flat takes up a lot of space, and because people are in a hurry, sooner or later sheets are stored upright.

This will kill a $2000 printhead.

If you store panels or sheets upright, they will sag and this warped shape will cause head strikes.



This is a good sample of how to handle rigid media.

Handling: Clean Everything

Use an ionized air gun to clean materials, to minimize static electricity possibly caused by wiping the materials clean with a rag.

- Dust
- Oil of any kind
- Fingerprints
- Wipe off
- Ask for "white glove" treatment

Use gloves when handling media. The natural oil from your fingers will leave a fingerprint; the ink won't adhere to this spot. So the finished print will have your fingerprints in nice white finger-sized blemishes.

One print shop operator said "problems are a mixture of many kinds of contaminants, sometimes it's a bad batch; sometimes the surface is marred with dead bugs.

Cleaning rigid materials

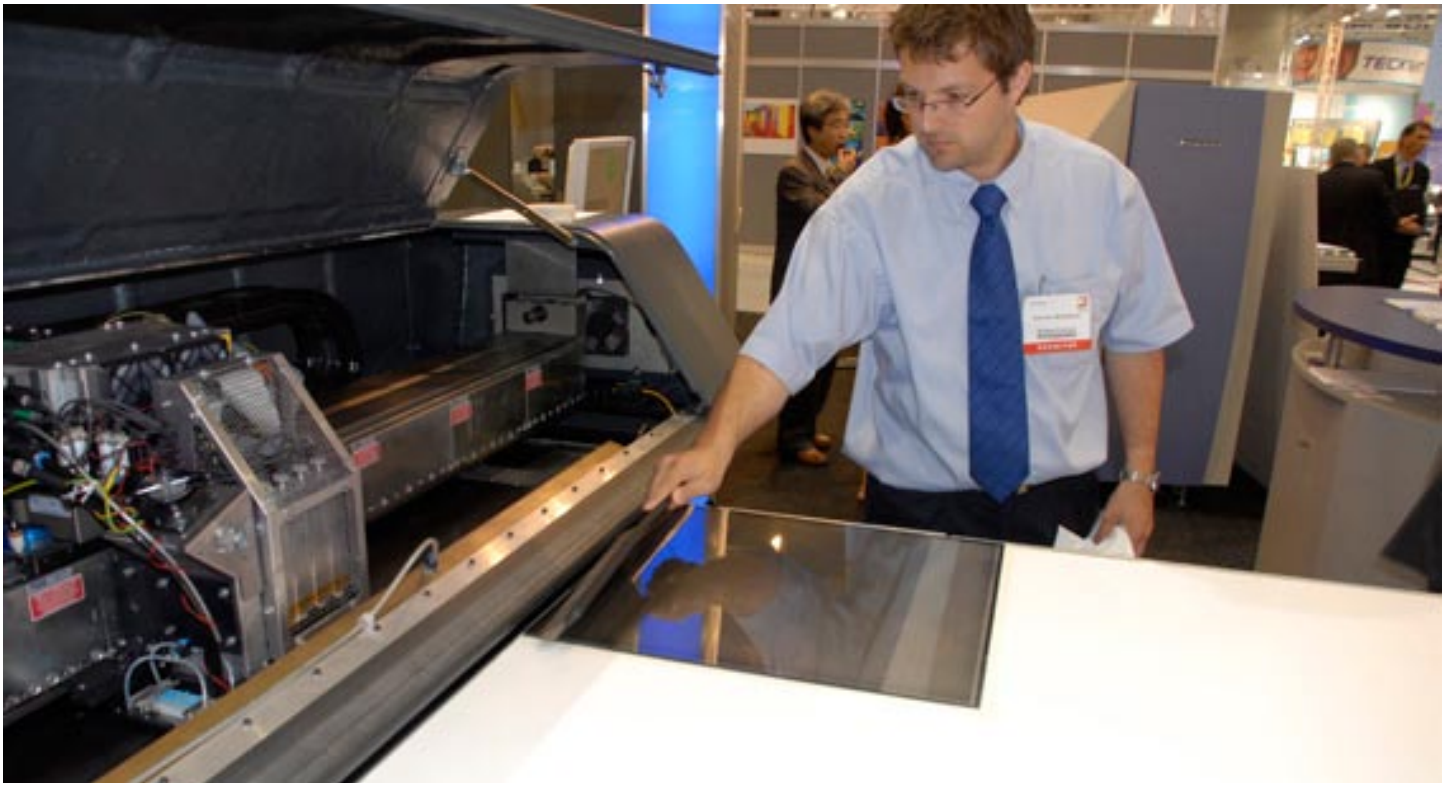
"We use alcohol only on glass. Otherwise we use a sticky pad on a roller to clean materials."

"Film cleaner works." (the liquid to clean photographic film).

Most print shops use ISP alcohol. However alcohol (if not totally dried and wiped off) can leave a smear which shows up as an actual smear pattern when the ink is printed on top of it.

The operator showed me a print where the pattern of wiping with alcohol was visible on the printed piece (as a result they had to throw it away). In other words you have to dry off any alcohol that you use. (Zund, St. Louis)

"We clean everything" said the owner of a ColorSpan 9840UV.



To improve the printing quality you should keep clean the printing medias, to avoid patterns.

Most print shops use ISP alcohol. However alcohol (if not totally dried and wiped off) can leave a smear which shows up as an actual smear pattern when the ink is printed on top of it.

Problems are a mixture of many kinds of contaminants, sometimes it's a bad batch; sometimes the surface is marred with dead bugs or dust.

Corona (discharge) treatment

Polypropylene often comes already corona (discharge) treated. Coroplast works best if corona treated, but most print shops are not familiar with corona treatment equipment or procedures.

Cutting rigid materials

If you cut your materials with a saw, or even with a knife blade or guillotine, you will leave particles.

These particles will get all over the inside of your printer.

These particles will get all over the surface of your material.

When the ink lands on top of these particles (that are on top of the material) they will fall off quickly, leaving spots.

In other words, you absolutely need to maintain a clean environment.

It is best to have your materials pre-cut, professionally, with some kind of a system that does not leave dust.

Or else, you need a vacuum-cleaner to run along all four edges of the materials to get off the worst of the dust.

And you need to wipe down each surface.

Dust is your worst enemy in your printshop

If you have a painting room in your printshop, it better be isolated. Otherwise paint droplets float around your room and will settle on the surface of materials.

By a painting room we mean any use of a paint spray gun.

If you have an electric saw anywhere in your printshop, it better be isolated. Otherwise bits of sawdust will float around your room, and will settle on the surface of materials.

If your building is near a construction site, that raises dust by excavation, sawing, blasting (especially sand blasting), you need to seal all windows, doors, freight entries.

If you have rugs or carpets, they raise a dust problem too.

Many heating, air-conditioning, or other kinds of air-handlers generate dust as well (especially if the air-handlers are old).

Residual detritus is a major problem if you cut the materials yourself in your print shop.

The Island Clean Air, Duster 3000 removes dust, odors, smoke, mists, spray powder, toxic fumes, pollen, and a lot more.

The Island Clean Air, Fume Pro is an attachment that provides source capture and ambient air filtration.

Flame Retardant / Flame Resistance

Since every country and each city or area may have their own fire laws, we are not the appropriate place to obtain documentation on which materials meet codes all over the world. But a flame retardant form of Coroplast is available.

Heat related issues

Heat sensitive materials would include polyethylene, polypropylene, shrink-wrap, very thin and thermal sensitive papers, plastic coated cartons, PVC and aluminum foil

Wax paper, or any material with a low surface energy, beads up.

Extremely thin styrene and thin Lexan may each have problems bubbling up.

"Yes, some materials don't do well under heat, especially thin materials, A lot of polyethylene plastics must be tested before accepting a client's order to use this particular material."

If you have a sophisticated UV printer you can vary the UV lamp temperature. If your UV printer is entry level, you may only have OFF and On for your lamp. Either way, some materials can take full heat; others require medium heat, and a few materials need the lamps turned way down.

Kresten anti-static control system, at GraphExpo ´08.

Cold related issues

"UV ink does not like really cold materials"

"Keep materials above 60 degrees F."

"Ink does not stay on cold metals especially."

Static problems

"Have problems with Coroplast; static problems; you see fuzzy edge."

Merely the act of rubbing the material to clean it, can result in static charges.

General Principles: Quality of the material's Surface is crucial

There are many brands of Coroplast-like material. Coroplast is only one trademark. You can buy corrugated plastic from a dozen other companies.

But some UV-cured ink sticks best on real Coroplast.

Some UV-cured ink does not stick well on cheap off-brand corrugated plastic.

Fraser anti-static system, at FESPA Amsterdam ´09.

The "same material" may really be dramatically different

Even when your supplier swears that "its all the same" there are tremendous differences.

One reason is if the supplier is buying in bulk from China.

Materials from China vary from one container load to another. Each container load, even if "the same as the previous one" may differ considerably in content and surface finish.

And, even major companies like Kodak, don't warn you that their materials vary depending on what mill they buy them from

Kodak, and many major brands, but most of their materials from China. So don't let the Kodak brand label fool you.

Kodak closed most of their own mills years ago. Kodak imports cheap junk from China and puts its own brand name on it (without warning you).

Kodak advertisements claim their own labs and their own experience goes into the materials they put their brand labels on.

The sample problem happens with some other brand names too: they either change sources, change recipes, or import from China.

Preparing the Surface has at least four components

1. Cleanliness
2. Prime coating
3. Corona treatment (or flame or other treatment)
4. Abrading

We have earlier mentioned cleanliness, and the need to wipe down each surface with alcohol or other appropriate cleaning solutions. And the environment must be dust free.

Priming means painting or spraying the surface with a primer. Corona discharge treatment was discussed earlier. Now it is crucial to mention that some slippery and polished surfaces may need to be abraded (roughened) if priming them is not as effective.

Floor tiles, especially floor tiles, need to be roughened. Joe Clarke quotes a printshop owner who says that aluminum may also need it's surface to be abraded (2007, Digital Graphics magazine).

Standard sizes

4 x 8 feet (48 x 96 inches) is a common size for Coroplast, DiBond, MDO board and other materials in the US. This is why Gandinnovations is now offering a dedicated flatbed at precisely 4 x 8 ft size.

4 x 10 ft is another size you see frequently, such as for DiBond.

5 x 10 ft is another typical size in the US.

Sample average Costs

A 10 mm thick 4x8 ft sheet (48 x 96 inches) of Coroplast costs about $32.

Manufacturers Index.

www.saf.com SAF is a fabricator for Alucobond, Reynobond, and Alpolic ACM.

Concluding Remarks:

What % of which material are most popular

One print shop used primarily MDO boards, with a Vutek 200/600. Another print shop also printed a lot of MDO boards, with a DuPont Cromaprint 22uv. A third printshop did almost no MDO board at all; their percentages are as follows:

- Styrene, 35-40%
- Coroplast 35-40%
- Duraplast 15%
- Gatorfoam 10%
- Miscellaneous materials fill the rest, including roll-fed

A printshop in Chicago printed primarily on Coroplast and aluminum material.

Three kinds of materials to print on:

- Signage materials, flat
- Signage materials, roll-to-roll
- Architectural materials (they tend to be flat, except for textiles, which are roll-to roll)
- Unusual materials
  - For niche markets
  - Or for artists

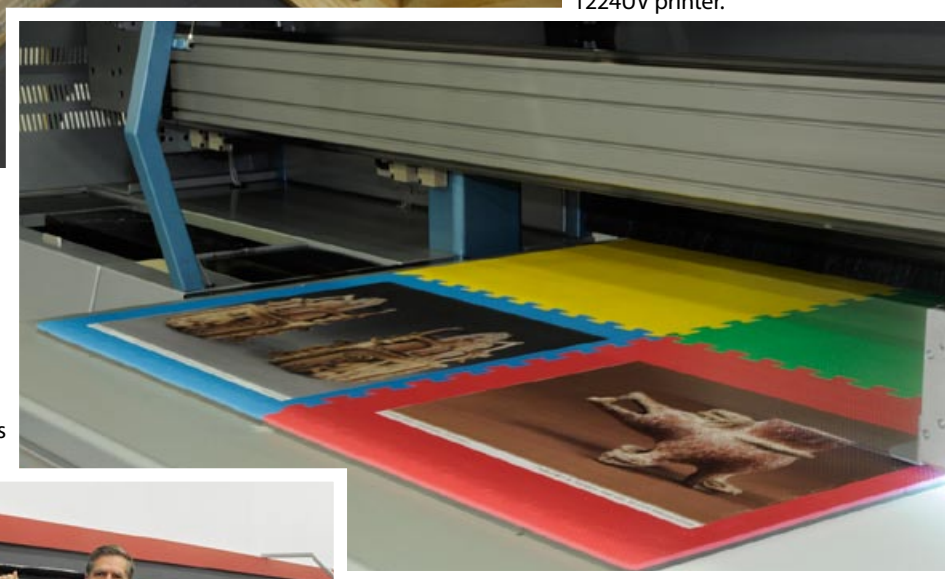
Architectural Materials (we discuss in separate lecture)

- Carpet
- Ceramic
- Ceiling tiles
- Concrete
- cork
- Cubicle wall sections (office cubicle wall sections)
- Flooring tiles, ceramic
- Flooring tiles, plastic
- Glass
- leather
- Metal
- mirrors
- Plasterboard
- Stone (porous, not smooth)
- tarpaulin
- wood

Grapo blinds applications sample for architecture.

Gandinnovations 1224 UV tile printing sample.

Variety of rigid material that can be printed with the Gandinnovation 1224UV printer.

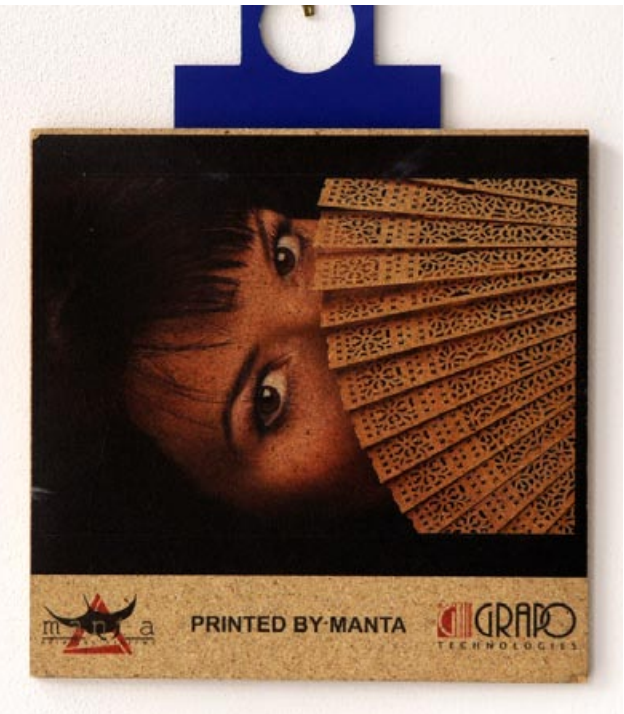


Gandinnovation 1224UV printing FLAAR pictures on foam mats.

Dr. Nicholas Hellmuth, holding some foam mats samples, printed on a 1224UV printer, at his Gandinnovation factory visit ´08.

Gandinnovation 1224UV printing cacao FLAAR pictures on floor tiles.

Ceramic tiles samples printed by Gandinnovations Jeti 1224 at factory visit 2008.



Grapo cork sample, printed on a Manta UV printer.

You don´t need to limit your UV-curable flatbed to signage.

Grapo textile UV printing sample.

Some material can be used to decorate interiors.

Bibliography

For Flatbeds Only: Rigid Substrates. The Big Picture Magazine, Sept 2006, pp. 50-58.

Lengthy, lots of listings, so an excellent guide; but nowhere is a mention of any defects, warping, need for corona treatment, problems of adhesion, need to clean by hand before printing. The discussion of Fome-Cor does not indicate that this material warps when you hang it on the wall and thus looks cheap. It warps relatively quickly after you hang it (if you mount photos to it).

KING, Dave
2005, The Long and the Flat of it. Digital Graphics Magazine, July 2005, pp. 18-23.

This is better than articles in most trade magazines because it dares to list what does not work as well as to praise what works well. Most trade magazines don't list the deficiencies of products as pointedly as would be preferable.

No author listed
2009, Rigid Proliferation. Big Picture, October 2009, pp 44-50.

A nice list, albeit in trade magazine style, which means no pros and cons are mentioned and a perhaps excessive number of companies are included in the list. It would help to distinguish the major players from the minor players.

www.answers.com/topic/lexan
Has excellent description of Lexan.

www.coroplast.com

www.fibreglast.com/?source=goog&keyword=composite+material

www.iconprint.com

www.rfpco.com/pdfs/Melamine.pdf
On Melamine decorated as fake wood panels.

www.ridoutplastics.com/plexprim.html
A primer on Plexiglas.

April 2010.

Reality Check

Being a university professor for many years does not mean we know everything. But intellectual curiosity often leads us to enter areas that are new to us. So we do not shirk from entering areas where we are obviously not yet expert. If in your years of wide format printing experience have encountered results different that ours, please let us know at ReaderService@FLAAR.org. We do not mind eating crow, though so far it is primarily a different philosophy we practice, because since we are not dependent on sales commissions we can openly list the glitches and defects of those printers that have an occasional problem.

FLAAR and most universities have corporate sponsors but FLAAR web sites do not accept advertising, so we don't have to kowtow to resellers or manufacturers. We respect their experience and opinion, but we prefer to utilize our own common sense, our in-house experiences, the results from site-visit case studies, and comments from the more than 53,000 of our many readers who have shared their experiences with us via e-mail (the Survey Forms).

Licensing Information

If you wish to distribute this report to other people within your company, please obtain a site licensing agreement for multiple copies from FLAAR by contacting ReaderService@FLAAR.org Substantial discounts are available for licensing to distribute within your company; we call this a subscription. The advantage of a subscription license is that you can opt for automatic updates. You may have noticed that FLAAR reports tend to be updated as additional information becomes available.

In some instances a license would be available to distribute outside your company, including in other languages.

To distribute this report without subscription/license violates federal copyright law. To avoid such violations for you, and your company, you can easily order additional copies from www.wide-format-printers.NET.

Update Policy

Starting in 2008, updates on UV-curable wide-format inkjet printers are available for all individuals and companies which have a subscription, or to companies who are research project sponsors. If you are a Subscriber or manager in a company that is a research sponsor, you can obtain the next update by writing ReaderService@FLAAR.org. If you are neither a Subscriber or a research sponsor, simply order the newest version via the e-commerce system on www.wide-format-printers.NET. Please realize that because we have so many publications and many are updated so frequently that we have no realistic way to notify any reader of when just one particular report is actually updated.

There is a free PDF that describes the UV-curable inkjet printer Subscription system. Subscriptions are available only for UV-related wide-format printer publications.

FLAAR Reports on UV-curable roll-to-roll, flatbed, hybrid, and combo printers are updated when new information is available. We tend to update the reports on new printers, on printers that readers ask about the most, and on printers where access is facilitated (such as factory visits, demo-room visits, etc).

Reports on obsolete printers, discontinued printers, or printers that not enough people ask about, tend not to be updated.

FLAAR still publishes individual reports on solvent printers, and on giclee printers, but subscriptions on these are not yet available; these FLAAR Reports on solvent, eco-solvent, and water-based wide format printers have to be purchased one by one.

Please Note

This report has not been licensed to any printer manufacturer, distributor, dealer, sales rep, RIP company, media, or ink company to distribute. So, **if you obtained this from any company, you have a pirated copy.**

If you have received a translation, this translation is not authorized unless posted on a FLAAR web site, and may be in violation of copyright (plus if we have not approved the translation it may make claims that were not our intention).

Also, since this report is frequently updated, if you got your version from somewhere else, it may be an obsolete edition. FLAAR reports are being updated all year long, and our comment on that product may have been revised positively or negatively as we learned more about the product from end users.

If you receive any FLAAR Report from a sales rep, in addition to being violation of copyright, it is useful to know if there is a more recent version on the FLAAR web site, because every month new UV printers are being launched. So what was good technology one month, may be replaced by a much better printer elsewhere the next month.

To obtain a legitimate copy, which you know is the complete report with nothing erased or changed, and hence a report with all the original description of pros and cons, please obtain your original and full report straight from www.FLAAR.org.

Your only assurance that you have a complete and authentic evaluation which describes all aspects of the product under consideration, benefits as well as deficiencies, is to obtain these reports directly from FLAAR, via www.wide-format-printers.NET.

Citing and Crediting

A license from FLAAR is required to use any material whatsoever from our reports in any commercial advertisement or PR Release.

If you intend to quote any portion of a FLAAR review in a PowerPoint presentation, if this is in reference to any product that your company sells or promotes, then it would be appropriate to ask us first. FLAAR reports are being updated every month sometimes, and our comment on that product may have been revised as we learned more about the product from end users. Also, we noticed that one company cited the single favorable comment we made on one nice aspect of their printer, but neglected to cite the rest of the review which pointed out the features of the printer which did not do so well. For them to correct this error after the fact is rather embarrassing. So it is safer to ask-before-you-quote a FLAAR review on your product.

The material in this report is not only copyright, it is also based on years of research. Therefore if you cite or quote a pertinent section, please provide a proper credit, which would be minimally "Nicholas

Hellmuth, year, www.FLAAR.org." If the quote is more than a few words then academic tradition would expect that a footnote or entry in your bibliography would reference the complete title. Publisher would be www.FLAAR.org.

If you intend to quote any portion of a FLAAR review in a PowerPoint presentation, if this is in reference to any product that your company sells or promotes, then it would be appropriate to license the report or otherwise notify us in advance. FLAAR reports are being updated every week sometimes, and our comment on that product may have been revised as we learned more about the product from end users. Also, we noticed that one company cited the single favorable comment we made on one nice aspect of their printer, but neglected to cite the rest of the review which pointed out the features of the printer which did not do so well. For them to correct this error after the fact is rather embarrassing. So it is safer to ask-before-you-quote a FLAAR review on your product.

Legal notice

Inclusion in this study by itself in no way endorses any printer, media, ink, RIP or other digital imaging hardware or software. Equally, exclusion from this study in no way is intended to discredit any printer.

Advisory

We do our best to obtain information which we consider reliable. But with hundreds of makes and models of printers, and sometimes when information about them is sparse, or conflicting, we can only work with what we have available. Thus you should be sure to rely also on your own research, especially asking around. Find another trustworthy end-user of the same make and model you need to know about. Do not make a decision solely on the basis of a FLAAR report because your situation may be totally different than ours. Or we may not have known about, and hence not written about, one aspect or another which is crucial before you reach your decision.

The sources and resources we may list are those we happen to have read. There may be other web pages or resources that we missed. For those pages we do list, we have no realistic way to verify the veracity of all their content. Use your own common sense plus a grain of salt for those pages which are really just PR releases or outright ads.

We are quite content with the majority of the specific printers, RIPs, media, and inks we have in the FLAAR facilities. We would obviously never ask for hardware, software, or consumables that we knew in advance would not be good. However even for us, a product which looks good at a trade show, sounds good in the ad literature, and works fine for the first few weeks, may subsequently turn out to be a lemon.

Or the product may indeed have a glitch but one that is so benign for us, or maybe we have long ago gotten used to it and have a workaround. And not all glitches manifest themselves in all situations, so our evaluator may not have been sufficiently affected that he or she made an issue of any particular situation. Yet such a glitch that we don't emphasize may turn out to be adverse for your different or special application needs.

Equally often, what at first might be blamed on a bad product, often turns out to be a need of more operator experience and training. More often than not, after learning more about the product it becomes possible to produce what it was intended to produce. For this reason it is crucial for the FLAAR team and their university colleagues to interact with the manufacturer's training center and technicians, so we know more about a hardware or software. Our evaluations go through a process of acquiring documentation from a wide range of resources and these naturally include the manufacturer itself. Obviously we take their viewpoints with a grain of salt but often we learn tips that are worthy of being passed along.

FLAAR has no way of testing 400+ specifications of any printer, much less the over 101 different UV printers from more than 46 manufacturers. Same with hundreds of solvent printers and dozens of water-based printers. We observe as best we can, but we cannot take each printer apart to inspect each feature. And for UV printers, these are too expensive to move into our own facilities for long-range testing, so we do as best as is possible under the circumstances. And when a deficiency does become apparent, usually from word-of-mouth or from an end-user, it may take time to get this written up and issued in a new release.

Another reason why it is essential for you to ask other printshop owners and printer operators about how Brand X and Y function in the real world is that issues may exist but it may take months for these issues to be well enough known for us to know the details. Although often we know of the issues early, and work to get this information into the PDFs, access to information varies depending on brand and model. Plus with over 300 publications, the waiting time to update a specific report may be several months. Plus, once a printer is considered obsolete, it is not realistic to update it due to the costs involved.

For these reasons, every FLAAR Report tries to have its publication date on the front outside cover (if we updated everything instantly the cost would be at commercial rates and it would not be possible to cover these expenses). At the end of most FLAAR Reports there is additionally a list of how many times that report has been updated. A report with lots of updates means that we are updating that subject based on availability of new information. If there is no update that is a pretty good indication that report has not been updated! With 101 models of UV printers, several hundred solvent printers, and scores of water-based printers, we tend to give priority to getting new reports out on printers about which not much info at all is available elsewhere. So we are pretty good about reporting on advances in LED curing. But glitches in a common water-based printer will take longer to work its way through our system into an update, especially if the glitch occurs only in certain circumstances, for example, on one type of media. With several hundred media types, we may not yet have utilized the problem media. While on the subject of doing your own research, be sure to ask both the printer operator and printshop owner or manager: you will generally get two slightly different stories. A printer operator may be aware of more glitches of the printer than the owner.

If a printer is no longer a prime model then there is less interest in that printer, so unless a special budget were available to update old reports, it is not realistic to update old reports. As always, it is essential for you to visit printshops that have the printers on your short-list and see how they function in the real world.

But even when we like a product and recommend it, we still can't guarantee or certify any make or model nor its profitability in use because we don't know the conditions under which a printer system might be utilized in someone else's facility. For ink and media, especially after-market third-party ink and media, it is essential that you test it first, under your conditions. We have no way to assure that any ink or media will be acceptable for your specific needs in your specific print shop. As a result, products are described "as is" and without warranties as to performance or merchantability, or of fitness

for a particular purpose. Any such statements in our reports or on our web sites or in discussions do not constitute warranties and shall not be relied on by the buyer in deciding whether to purchase and/or use products we discuss because of the diversity of conditions, materials and/or equipment under which these products may be used. Thus please recognize that no warranty of fitness or profitability for a particular purpose is offered.

The user is advised to test products thoroughly before relying on them. We do not have any special means of analyzing chemical contents or flammability of inks, media, or laminates, nor how these need to be controlled by local laws in your community. There may well be hazardous chemicals, or outgassing that we are not aware of. Be aware that some inks have severe health hazards associated with them. Some are hazardous to breathe; others are hazardous if you get them on your skin. For example, some chemicals such as cyclohexanone do not sound like chemicals you want to breathe every day. Be sure to obtain, read, and understand the MSDS sheets for the inks, media, and laminates that you intend to use. Both solvent, eco-solvent, and UV-curable inks are substances whose full range of health and environmental hazards are not yet fully revealed. It is essential you use common sense and in general be realistic about the hazards involved, especially those which are not listed or which have not yet been described. FLAAR is not able to list all hazards since we are not necessarily aware of the chemical components of the products we discuss. Our reports are on usability, not on health hazards.

Most inks are clearly not intended to be consumed. Obviously these tend to be solvent inks and UV-curable inks. Yet other inks are edible, seriously, they are printed on birthday cakes. Indeed Sensient is a leader in a new era of edible inks. Therefore the user must assume the entire risk of ascertaining information on the chemical contents and flammability regulations relative to inks, media or laminates as well as using any described hardware, software, accessory, service, technique or products.

We have no idea of your client's expectations. What students on our campus will accept may not be the same as your Fortune 500 clients. In many cases we have not ourselves used the products but are basing our discussion on having seen them at a trade show, during visiting a print shop, or having been informed about a product via e-mail or other communication.

Results you see at trade shows may not be realistic

Be aware that trade show results may not be realistic. Trade shows are idealized situations, with full-time tech support to keep things running. The images at a trade show may be tweaked. Other images make be "faked" in the sense of slyly putting on primer without telling the people who inspect the prints. Most UV inks don't stick to all materials; many materials need to be treated.

Or the UV prints may be top-coated so that you can't do a realistic scratch test.

Booth personnel have many standard tricks that they use to make their output look gorgeous. In about half the cases you will not likely obtain these results in real life: in most cases they are printing uni-directional, which may be twice as slow as bi-directional.

Trade show examples tend to be on the absolutely best media. When you attempt to save money and use economy media you will quickly notice that you do not get anywhere near the same results as you saw in the manufacturer's trade show booth, or pictured in their glossy advertisement. Five years ago we noticed Epson was laminating prints to show glossy output because their pigmented inks could not print on actual glossy media. The same equipment, inks, media, and software may not work as well in your facility as we, or you, see it at a trade show. All the more reason to test before you buy; and keep testing before you make your final payment. Your ultimate protection is to use a gold American Express credit card so you can have leverage when you ask for your money back if the product fails.

Images printed at trade show may be in uni-directional mode: so you may not realize the printer has bi-directional (curing) banding defects until you unpack it in your printshop. Bi-directional curing banding is also known as the lawnmower effect. Many printers have this defect; sometimes certain modes can get rid of it, but are so slow that they are not productive.

You absolutely need to do print samples with your own images and the kind provided by your clients. Do not rely on the stock photos provided by the printer, ink, media, or RIP manufacturer or reseller. They may be using special images which they know in advance will look fabulous on their printer. Equally well, if you send your sample images to the dealer, don't be surprised if they come back looking awful. That is because many dealers won't make a serious effort to tweak their machine for your kind of image. They may use fast speed just to get the job done (this will result in low quality). Check with other people in your area, or in the same kind of print business that you do. Don't rely on references from the reseller or manufacturer (you will get their pet locations which may be unrealistically gushy): find someone on your own.

Factors influencing output

Heat, humidity, static, dust, experience level of your workers (whether they are new or have prior years experience): these are all factors that will differ in your place of business as compared with test results or demo room results.

Actually you may have people with even more experience than we do, since we deliberately use students to approximate newbies. FLAAR is devoted to assisting newcomers learn about digital imaging hardware and software. This is why Nicholas Hellmuth is considered the "Johnny Appleseed" of wide format inkjet printers.

Therefore this report does not warranty any product for any quality, performance or fitness for any specific task, since we do not know the situation in which you intend to use the hardware or software. Nor is there any warranty or guarantee that the output of these products will produce salable goods, since we do not know what kind of ink or media you intend to use, nor the needs of your clients. A further reason that no one can realistically speak for all aspects of any one hardware or software is that each of these products may require additional hardware or software to reach its full potential.

For example, you will most likely need a color management system which implies color measurement tools and software. To handle ICC color profiles, you may need ICC color profile generation software and a spectrophotometer since often the stock pre-packaged ICC color profiles which come with the ink, media, printers and/or RIPs may not work in your situation. Not all RIPs handle color management equally, or may work better for some printer-ink-media combinations than for others.

Be aware that some RIPs can only accept ICC color profiles: you quickly find out the hard way that you can't tweak these profiles nor

generate new ones. So be sure to get a RIP which can handle all aspects of color management. Many RIPs come in different levels. You may buy one level and be disappointed that the RIP won't do everything. That's because those features you may be lacking are available only in the next level higher of that RIP, often at considerable extra cost. Same thing in the progression of Chevy through Pontiac to Cadillac, or the new Suburbans. A Chevy Suburban simply does not have all the bells and whistles of the Cadillac Escalade version of this SUV.

Don't blame us… besides, that's why we are warning you. This is why we have a Survey Form, so we can learn when you find products that are inadequate. We let the manufacturers know when end users complain about their products so that the manufacturers can resolve the situation when they next redesign the system.

Most newer printer models tend to overcome deficiencies of earlier models. It is possible that our comparative comments point out a glitch in a particular printer that has been taken care of through an improvement in firmware or even an entirely new printer model. So if we point out a deficiency in a particular printer brand, the model you may buy may not exhibit this headache, or your kind of printing may not trigger the problem. Or you may find a work-around.

Just remember that every machine has quirks, even the ones we like. It is possible that the particular kind of images, resolution, inks, media, or other factors in your facility are sufficiently different than in ours that a printer which works just fine for us may be totally unsatisfactory for you and your clients. However it may be that the specific kind of printing you need to do may never occasion that shortcoming. Or, it may be that your printer was manufactured on a Monday and has defects that are atypical, show up more in the kind of media you use which we may not use as often or at all during our evaluations. Equally possibly a printer that was a disaster for someone else may work flawlessly for you and be a real money maker for your company.

So if we inspect a printer in a printshop (a site-visit case study), and that owner/operator is content with their printer and we mention this; don't expect that you will automatically get the same results in your own printshop.

In some cases a product may work better on a Macintosh than on a PC. RIP software may function well with one operating system yet have bugs and crash on the same platform but with a different operating system. Thus be sure to test a printer under your own specific work conditions before you buy.

And if a printer, RIP, media, or ink does not function, return it with no ands, ifs or buts. Your best defense is to show an advertising claim that the printer simply can't achieve. Such advertising claims are in violation of federal regulations, and the printer companies know they are liable for misleading the public.

But before you make a federal case, just be sure that many of the issues are not user error or unfamiliarity. It may be that training or an additional accessory can make the printer do what you need it to accomplish. Of course if the printer ads did not warn you that you had to purchase the additional pricey accessory, that is a whole other issue. Our reviews do not cover accessories since they are endless, as is the range of training, or lack thereof, among users.

The major causes of printer breakdown and failure is lack of maintenance, poor maintenance, spotty maintenance, or trying to jerry-rig some part of the printer. The equally common cause of printer breakdown is improper use, generally due from lack of training or experience. Another factor is whether you utilize your printer all day every day. Most solvent and UV printers work best if used frequently. If you are not going to use your printer for two or three days, you have to put flush into the system and prepare it for hibernation (even if for only four or five days). Then you have to flush the ink system all over again.

Also realize that the surface of inkjet prints are fragile and generally require lamination to survive much usage. Lamination comes in many kinds, and it is worth finding a reliable lamination company and receiving training on their products.

Also realize that no hybrid or combo UV printer can feed all kinds of rigid materials precisely. Some materials feed well; others feed poorly; others will skew.

Although we have found several makes and models to work very well in our facilities, how well they work in your facilities may also depend on your local dealer. Some dealers are excellent; others just sell you a box and can't provide much service after the sale. Indeed some low-bid internet sales sources may have no technical backup whatsoever. If you pay low-bid price, you can't realistically expect special maintenance services or tech support later on from any other dealer (they will tell you to return to where you paid for the product). This is why we make an effort to find out which dealers are recommendable. Obviously there are many other dealers who are also good, but we do not always know them. To protect yourself further, always pay with a level of credit card which allows you to refuse payment if you have end up with a lemon. A Gold American Express card allows you to refuse payment even months after the sale. This card may also extend your warranty agreement in some cases (check first).

Most of the readers of the FLAAR Reports look to see what printers we use in our own facilities. Readers realize that we will have selected the printers that we like based on years of experience and research. Indeed we have met people at trade shows who told us they use the FLAAR web site reports as the shopping list for their corporate purchases.

Yes, it is rather self-evident that we would never ask a manufacturer to send a product which we knew in advance from our studies was no good. But there are a few other printers which are great but we simply do not have them in our facilities yet.

So if a printer is not made available by its manufacturer, then there is no way we can afford to have all these makes and models in our facility. Thus to learn about models which we do not feature, be sure to ask around in other print shops, with IT people in other corporations, at your local university or community college. Go to trade shows…. but don't use only the booth…ask questions of people in the elevator, in line at the restaurant, anywhere to escape the smothering hype you get in the booth.

Realize that a FLAAR Report on a printer is not by itself a recommendation of that printer. In your local temperature, in your local humidity, with the dust that is in your local air, with your local operator, and with disorientation of the insides of a printer during rough shipment and installation, we have no knowledge of what conditions you will face in your own printshop. We tend to inspect a printer first in the manufacturing plant demo room: no disjointed parts from any shipment since this printer has not been lifed by cranes and run over a rough pot-holed highway or kept in smeltering heat or freezing cold during shipment.

Taking into consideration we do not know the conditions in which you may be using your hardware, software, or consumables, neither the author nor FLAAR nor either university is liable for liability, loss or dam-

age caused either directly or indirectly by the suggestions in this report nor by hardware, software, or techniques described herein because.

Availability of spare parts may be a significant issue

Chinese printers tend to switch suppliers for spare parts every month or so. So getting spare parts for a Chinese printer will be a challenge even if the distributor or manufacturer actually respond to your e-mails at all. Fortunately some companies to have a fair record of response; Teckwin is one (based on a case of two problematical hybrid UV printers in Guatemala). The distributor said that Teckwin sent a second printer at their own expense and sent tech support personnel at their expense also. But unfortunately both the hybrid UV printers are still abandoned in the warehouse of the distributor; they were still there in January 2009. But Teckwin has the highest rating of any Chinese company for interest in quality control and realization that it is not good PR to abandon a client or reseller or distributor all together.

Recently we have heard many reports of issues of getting parts from manufacturers in other countries (not Asia). So just because you printer is made in an industrialized country, if you are in the US and the manufacturer is X-thousand kilometers or miles away, the wait may be many days, or weeks.

Lack of Tech Support Personnel is increasing

The recession resulted in tech support issues: some manufacturers may need to skimp on quality control during a recession, or switch to cheaper parts suppliers. Plus they are not hiring enough tech support during a recession. So the bigger and more successful the company, in some cases the worse these particular problems may be.

Any new compiled printer may take a few months to break in

Any new printer, no matter who the manufacturer, or how good is the engineering ane electronics, will tend to have teething issues. Until the firmware is updated, you may be a beta tester. This does not mean the printer should be avoided, just realize that you may have some downtime and a few headaches. Of course the worst case scenario for this was the half-million dollar Luscher JetPrint: so being "Made in Switzerland" was not much help.

Counterfeit parts are a problem with many printers made in China

Several years ago many UV printers made in China and some made elsewhere in Asia had counterfeit parts. No evaluation has the funding available to check parts inside any printer to see if they are from the European, Japanese, or American manufacturer, or if they are a clever counterfeits.

Be realistic and aware that not all materials can be printed on equally well

Many materials don't feed well through hybrid (pinch roller on grit roller systems) or combo UV systems (with transport belts). Banding, both from poor feeding, and from bi-directional (lawnmower effect) are common on many UV-curable inkjet printers.

It is typical for some enthusiastic vendors to claim verbally that their printer can print on anything and everything. But once you unpack the printer and set it up, you find that it requires primer on some materials; on other materials it adheres for a few weeks but then falls off.

And on most hybrid and many combo printers, some heavy, thick, or smooth-surfaced materials skew badly. Since the claim that the printer will print on everything is usually verbal, it is tough to prove this aspect of misleading advertising to a jury.

Not all inks can print on all materials. And at a trade show, many of the materials you see so nicely printed on, the manufacturer may be adding a primer at night or early in the morning: before you see the machine printing on this material.

We feel that the pros and cons of each product speak more than adequately for themselves. Just position the ad claims on the left: put the actual performance results on the right. The unscrupulous hype for some printers is fairly evident rather quickly.

Be sure to check all FLAAR resources

Please realize that with over 200 different FLAAR Reports on UV printers, you need to be sure to check the more obscure ones too. If a printer has a printhead issue, the nitty gritty of this may be in the FLAAR Report on printheads. The report on the model is a general introduction; if we discussed the intimate details of printheads then some readers might fall asleep. And obviously do not limit yourself to the free reports. The technical details may be in the reports that have a price to them. Our readers have said they prefer to have the general basics, and to park the real technical material in other reports that people can buy if they really want that level of information.

So it may be best to ask for personal consulting. The details of the problems with the ColorSpan 5400uv series are rather complex: namely the center row of the Ricoh printheads. This would require an expensive graphic designer and consultants to show the details. And the design of the printhead would probably be altered by the time we did any of this anyway. So it is essential to talk with people: with other end-users, and with FLAAR in person on a consulting basis.

Acknowledgements

With 19 employees the funding has to come from somewhere, so we do welcome project sponsorship, research grants, contributions that facilitate our educational programs, scholarships for co-op interns and graduate students, and comparable project-oriented funding from manufacturers. The benefit for the end-user is a principle called academic freedom, in this case,

- The freedom of a professor or student to speak out relative to the pros and cons of any equipment brought to them to benchmark.
- The freedom to design the research project without outside meddling from the manufacturer.

Fortunately, our budget is lean and cost effective as you would expect for a non-profit research institute. As long as we are not desperate for money we can avoid the temptation to accept payment for reprinting corporate PR hype. So the funding is used for practical research. We do not accept (nor believe) and certainly do not regurgitate corporate PR. For example, how many manufacturer's PR photos of their products have you seen in our reports or on our web sites?

Besides, it does not take any money to see which printers and RIPs function as advertised and which don't. We saw one hyped printer grind to a halt, malfunction, or otherwise publicly display its incapabilities at several trade shows in a row. At each of those same trade shows another brand had over 30 of their printers in booths in virtually every hall, each one producing museum quality exhibits. Not our fault when we report what we see over and over and over again. One of our readers wrote us recently, "Nicholas, last month you recom-

mended the …… as one of several possible printers for our needs; we bought this. It was the best capital expenditure we have made in the last several years. Just wanted to tell you how much we appreciate your evaluations….”

FLAAR is a non-profit educational and research organization dedicated for over 36 years to professional photography in the arts, tropical flora and fauna, architectural history, and landscape panorama photography.

Our digital imaging phase is a result of substantial funding in 1996 from the Japanese Ministry of Public Education for a study of scanning and digital image storage options. This grant was via Japan's National Museum of Ethnology, Osaka, Japan. That same year FLAAR also received a grant of $100,000 from an American foundation to do a feasibility study of digital imaging in general and the scanning of photographic archives in particular.

The FLAAR web sites began initially as the report on the results of these studies of scanners. Once we had the digital images we began to experiment with digital printers. People began to comment that our reports were unique and very helpful. So by 1999 we had entire sections on large format printers.

FLAAR has existed since 1969, long before inkjet printers existed. Indeed we were writing about digital imaging before HP even had a color inkjet system available. In 2000 FLAAR received an educational grant from Hewlett-Packard large format division, Barcelona, Spain, for training, for equipment, and to improve the design and navigation on the main web sites of the FLAAR Network. This grant ran its natural course, and like all grants, reached its finishing point, in this case late 2005.

In some cases the sponsorship process begins when we hear end-users talking about a product they have found to be better than other brands. We keep our ears open, and when we spot an especially good product, this is the company we seek sponsorship from. It would not be wise of us to seek sponsorship from a company with a sub-standard or otherwise potentially defective printer. So we usually know which printers are considered by end-users to be among the better brands before we seek sponsorship. After all, out of the by now one million readers, we have heard plenty about every single printer out there.

We thank MacDermid ColorSpan (now part of HP), Hewlett-Packard, Parrot Digigraphic, Color DNA, Canon, Gandinnovations, and other companies for providing funding for technology training for the FLAAR staff and our colleagues at Bowling Green State University in past years and for funds to allow us to attend all major international trade shows, which are ideal locations for us to gather information. We thank Caldera, EskoArtwork, EFI Rastek, EFI and VUTEk, OTF (Obeikan), Drytac DigiFab, Barbieri electronic, Seiko II, Parrot Digigraphic, AT Inks, Sepiax inks, Sam-Ink, Dilli, Grapo, and WP Digital for providing funds so that we can make more of our publications free to end-users. During 2000-2001 we had grants to cover all the costs of our publications, and all FLAAR Reports were free in those early years. As that early grant naturally expired after a few years, we had to begin charging for some of our reports to cover costs. Now (in 2010), we are seeking corporate sponsorship so we can gradually make another 20% of our publications free to our readers.

Since 2006 we do a major part of our evaluations at a factory and headquarters demo room. Since the university does not fund any of these trips, it is traditional for the manufacturer to fund a research sponsorship. In the US this is how most university projects are initiated for decades now, and it is increasing. In fact there is a university in Austria that is not an “edu” but is a “GmbH”, funded by the chamber of commerce of that part of Austria. In other words, a university as an educational institution, but functioning in the real world as an actual business. This is a sensible model, especially when FLAAR staff need to be on the road over a quarter of a million miles per year (roughly over 400,000 km per year total for the staff). Obviously this travel is hosted since unless money falls from heaven there most realistic way to obtain funding to get to the demo rooms for training is direct from the source.

It has been helpful when companies make it possible for us to fly to their headquarters so we can inspect their manufacturing facilities, demo rooms, and especially when the companies make their research, engineering and ink chemistry staff available for discussions. When I received my education at Harvard I was taught to have a desire to learn new things. This has guided my entire life and is what led me into wide-format digital imaging technology: it is constantly getting better and there is a lot to learn every month. Thus I actively seek access to improving my understanding of wide format printer technology so that we can better provide information to the approximately quarter-million+ readers of our solvent and UV printer web site (www.large-format printers.org) and the over half a million who read either our wide-format-printers.org site or our roughly half million combined who read our digital-photography.org and www.FineArtGicleePrinters.org sites.

Barbieri electronic (color management), Caldera (RIP), ColorSpan, DEC, Durst, EFI, EskoArtwork, Gerber, Grapo, IP&I, Mimaki USA, Mutoh, Obeikan, Dilli, Drytac, GCC, NUR, Oce, Shiraz (RIP), Sky AirShip, Sun, Teckwin, VUTEk, WP Digital, Xerox, Yuhan-Kimberly, Zund have each brought FLAAR staff to their headquarters and printer factories. AT Inks, Bordeaux, InkWin, Sepiax, Sam-Ink, and Sunflower ink have brought us to inspect their ink manufacturing facilities and demo rooms. Notice that we interact with a wide range of companies: it is more helpful to our readers when we interact with many different companies rather than just one.

We have visited the world headquarters and demo rooms of HP in Barcelona and received informative and helpful technology briefings from HP about every two years. We are under NDA as to the subjects discussed but it is important that we be open where we have visited. Mimaki Europe has had FLAAR as their guest in Europe to introduce their flatbed UV printer, as have other UV-curable manufacturers, again, under NDA as to the details since often we are present at meetings where unreleased products are discussed. Xaar has hosted an informative visit to their world headquarters in the UK. You don't get this level of access from a trade magazine writer, and I can assure you, we are provided much more detailed information and documentation in our visits than would be provided to a magazine author or editor. Companies have learned that it's a lot better to let us know up front and in advance the issues and glitches with their printers, since they now know we will find out sooner or later on our own. They actually tell us they realize we will find out on our own anyway.

Contributions, grant, sponsorships, and project funds from these companies are also used to improve the design and appearance of the web sites of the FLAAR Information Network. We thank Canon, ColorSpan, HP, ITNH, and Mimaki for providing wide format printers, inks, and media to the universities where FLAAR does research on wide format digital imaging. We thank Epson America for providing an Epson 7500 printer many years ago, and Parrot Digigraphic for providing access to their digital equipment, also for providing three different models of Epson inkjet printers to our facilities on loan at BGSU (5500, 7600, 7800). We thank Mimaki USA for providing a JV4 and then a Mimaki TX-1600s textile printer and Improved Technologies (ITNH) providing their Ixia model of the Iris 3047 giclee printer.

We thank 3P Inkjet Textiles and HP for providing inkjet textiles so we could learn about the different results on the various textiles. IJ Technologies, 3P Inkjet Textiles, ColorSpan, Encad, HP, Nan Ya Pepa,

Oracal, Tara and other companies have provided inkjet media so we can try it out and see how it works (or not as the case may be; several inkjet media failed miserably, one from Taiwan, the other evidently from Germany!). We thank Aurelon, Canon, ColorGate, ColorSpan, ErgoSoft, HP, PerfectProof, PosterJet, Onyx, Ilford, CSE ColorBurst, ScanvecAmiable, Wasatch and many other RIP companies for providing their hardware and software RIPs.

We thank Dell Computers for providing awesome workstations for testing RIP software and content creation with Adobe Photoshop and other programs. We also appreciate the substantial amount of software provided by Adobe. As with other product loaned or provided courtesy of ProVar LLC (especially the 23" monitors which makes it so much easier to work on multiple documents side by side).

We thank Betterlight, Calumet Photographic, Global Graphics, Westcott, Global Imaging Inc. Phase One, and Bogen Imaging for helping to equip our archaeological photo studios at the university and its archaeology museum in Guatemala. Heidelberg, Scitex, CreoScitex (now Kodak) and Cruse, both in Germany, have kindly provided scanners for our staff to evaluate.

We really liked some of the results whereas some of the other products were a bit disappointing. Providing samples does not influence the evaluations because the evaluators are students, professors, and staff of Bowling Green State University. These personnel are not hired by any inkjet printer company; they were universities employees (as was also true for Nicholas Hellmuth). The testing person for the HP ColorPro (desktop printer) said he frankly preferred his Epson printer. When we saw the rest results we did not include this Hewelt-Packard ColorPro printer on our list of recommended printers, but we love our HP DesignJet 5000ps so much we now have two of them, one at each university.

Sometimes we hear horror stories about a printer. The only way we can tell whether this is the fault of the printer design, or lack of training of the operator, is to have the printer ourselves in-house. Of course some printer manufacturers don't understand the reasons we need to have each make and model; they are used to loaning their demo units for a week or so. That is obviously inadequate for a serious review.

Some of the media provided to us failed miserably. Three printers failed to meet common sense usability and printability standards as well (HP 1055, one older desktop model (HP Color Pro GA), and one Epson). Yet we know other users who had better results; maybe ours came down the assembly line on a Monday or Friday afternoon, when workers were not attentive. One costly color management software package was judged "incapable" by two reviewers (one from the university; second was an outside user who had made the mistake of buying this package).

So it's obvious that providing products or even a grant is no shield from having your products fail a FLAAR evaluation. The reason is clear: the end user is our judge. The entire FLAAR service program is to assist the people who need to use digital imaging hardware and software. If a product functions we find out and promulgate the good news. If a product is a failure, or more likely, needs some improvement in the next generation, we let people know. If a product is hyped by what an informed user would recognize as potentially false and misleading nonsense, then we point out the pathetic discrepancies very clearly.

This is what you should expect from an institute which is headed by a professor.

Actually, most of our reviews are based on comments by end users. We use their tips to check out pros and cons of virtually every product we discuss. You can't fool a print shop owner whose printer simply fails to function as advertised. And equally, a sign shop owner who earns a million dollars a year from a single printer brand makes an impact on us as well. We have multiple owners of ColorSpan printers tell us that this printer is their real money earner for example. We know other print shops where their primarily income is from Encad printers. Kinkos has settled on the HP 5000 as its main money maker production machine, and so on.

Yet we have documentation of several print shop companies whose business was ruined by specific brands that failed repeatedly. It is noteworthy that it is always the same brand or printer at both locations: one due to banding and printheads then simply no longer printing one color; the other brand due to pokiness of the printer simply not being competitively fast enough. Same with RIPs, we have consistent statements of people using one RIP, and only realizing how weak it was when they tried another brand which they found substantially better. Thus we note that companies which experiment with more than one brand of product tend to realize more quickly which brand is best. This is where FLAAR is in an ideal situation: we have nine RIPs and 25 printers. Hence it is logical that we have figured out which are best for our situation.

Grant funding, sponsorship, demonstration equipment, and training are supplied from all sides of the spectrum of printer equipment and software engineering companies. Thus, there is no incentive to favor one faction over another. We receive support from three manufacturers of thermal printheads (Canon, ColorSpan and HP) and also have multiple printers from three manufacturers of piezo printers (Epson, Seiko, Mutoh, and Mimaki). This is because piezo has definite advantage for some applications; thermal printheads have advantages in different applications. Our reviews have universal appeal precisely because we feature all competing printhead technologies. Every printer, RIPs, inks, or media we have reviewed have good points in addition to weaknesses. Both X-Rite and competitor GretagMacbeth provided spectrophotometers. Again, when all sides assist this program there is no incentive to favor one by trashing the other. Printer manufacturer ad campaigns are their own worst enemy. If a printer did not make false and misleading claims, then we would have nothing to fill our reviews with refuting the utter nonsense that is foisted on the buying public.

It is not our fault if some printers are more user friendly, print on more media than other brands. It is not our fault that the competing printers are ink guzzlers, are slow beyond belief, and tend to band or drop out colors all together. We don't need to be paid by the printer companies whose products work so nicely in both our universities on a daily basis. The printers which failed did so in front of our own eyes and in the print shops of people we check with. And actually we do try to find some redeeming feature in the slow, ink gulping brands: they do have a better dithering pattern; they can take thick media that absolutely won't feed through an HP. So we do work hard at finding the beneficial features even of printers are otherwise get the most critique from our readers. Over one million people will read the FLAAR Information Network in the next 12 months; 480,000 people will be exposed to our reports on wide format printers from combined total of our three sites on these themes. You can be assured that we hear plenty of comments from our readers about which printers function, and which printers fail to achieve what their advertising hype so loudly claims.

An evaluation is a professional service, and at FLAAR is based on more than 11 years of experience. An evaluation of a printer, an ink,

a software, laminator, cutter or whatever part of the digital printing workflow is intended to provide feedback to all sides. The manufacturers appreciate learning from FLAAR what features of their printers need improvement. In probably half the manufacturers FLAAR has dealt with, people inside the company did not, themselves, want to tell their boss that their pet printer was a dog. So printer, software, and component manufacturers have learned that investing in a FLAAR evaluation of their product provides them with useful return on investment. Of course if a printer manufacturer wants only a slick Success Story, or what we call a “suck up review” that simply panders to the manufacturer, obviously FLAAR is not a good place to dare to ask for such a review. In several instances it was FLAAR Reports that allowed a company to either improve their printer, or drop it and start from scratch and design a new and better one.

And naturally end-users like the opportunity to learn about various printers from a single source that covers the entire range from UV through latex through all flavors of solvent.

We have also learned that distributors often prefer to accept for distribution a printer or other product on which a FLAAR Report already exists.

We turn down offers of funding every year. These offers come from PO Box enterprises or products with no clearly visible point of manufacture. Usually the company making the offer presumes they can buy advertising space just by paying money. But that is not what our readers want, so we politely do not accept such offers of money.

Contributions, grants, sponsorships, and funding for surveys, studies and research is, however, open to a company who has an accepted standing in the industry. It is helpful if the company has a visible presence at leading trade shows and can provide references from both end users and from within the industry. Where possible we prefer to visit the company in person or at least check them out at a trade show. Obviously the product needs to have a proven track record too. Competing companies are equally encouraged to support the FLAAR system. We feel that readers deserve to have access to competing information. Competition is the cornerstone of American individualism and technological advancement.

FLAAR also covers its costs of maintaining the immense system of 8 web sites in three languages and its facilities in part by serving as a consultant such as assisting inkjet manufacturers learn more about the pros and cons of their own printers as well as how to improve their next generation of printers. It is especially useful to all concerned when manufacturers learn of trends (what applications are popular and for what reasons). For example, manufacturers need to know whether to continue designing software for Mac users, or concentrate software for PC users. So the survey form that you fill out is helpful to gather statistics. You benefit from this in two ways: first, you get the FLAAR reports in exchange for your survey form. Second, your comments bring (hopefully) change and improvement in the next generation of printers. When we do survey statistics, then the names, addresses, and telephone numbers are removed completely. A survey wants only aggregate numbers, not individuals. However, if you ask about a specific brand of printer, and do not opt out, we forward your request to a pertinent sponsor so you can obtain follow-up from that brand, since we ourselves do not have enough personnel to respond to each reader by telephone. But we do not provide your personal information to outsiders and our survey form has an opt out check-off box which we honor.

FLAAR also serves as consultants to Fortune 500 companies as well as smaller companies and individuals who seek help on which printers to consider when they need digital imaging hardware and software.

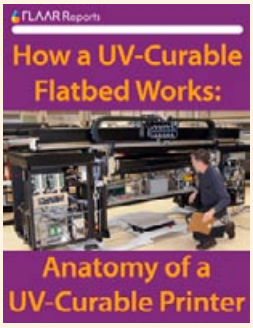
A modest portion of our income comes from our readers who purchase the FLAAR series. All income helps continue our tradition of independent evaluations and reviews of inkjet printers, RIPs, media, and inks.

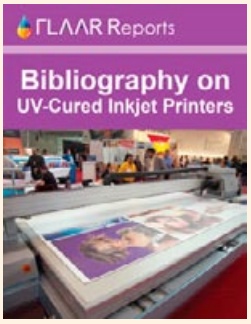
These are some of the most

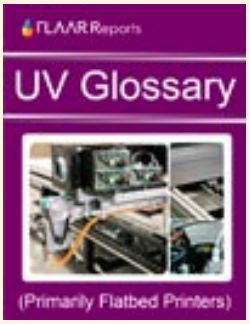
Recent FLAAR Reports (2008-2010)

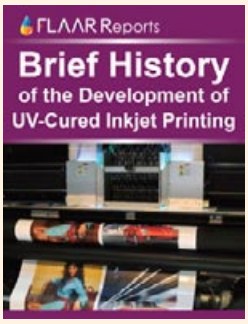
You can find these and more reports at: www.wide-format-printers.NET

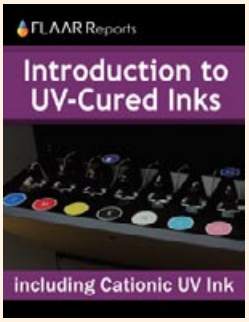
Introduction to UV Curable Inkjet Flatbed Printers



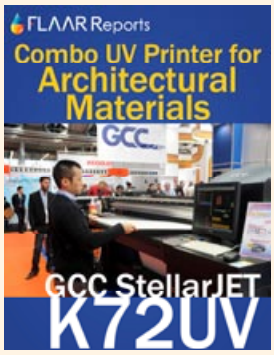








Most recent UV Printers



These are some of the most

Recent FLAAR Reports (2008-2010)

You can find these and more reports at: www.wide-format-printers.NET

Comments on UV Inkjet Printers at Major Trade Shows 2007-2009

UV Printers Manufactured in China, Korea and Taiwan