



Printing on Ceramic Tiles



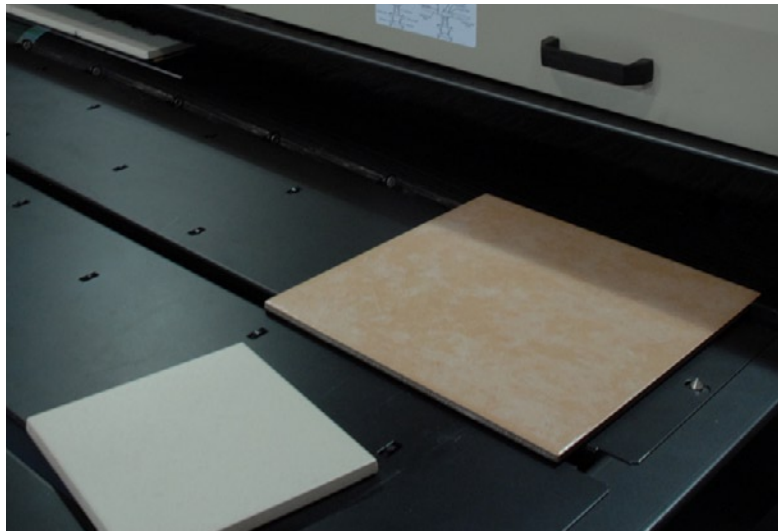
Printing on Ceramic Tiles

This is a companion piece to the FLAAR Report “Printing on Doors” and “Printing a Table Top.” The three reports: “Printing on Doors,” “Printing a Table Top,” and the present “Printing on Floor Tiles,” are progress reports of a long-range research project for printing options for architects and interior decorators. This research project began with curiosity about wide format inkjet printing on textiles such as cotton, polyester and silk. The FLAAR Director, Dr Nicholas Hellmuth, comes from a family background of architects, he studied architecture at Harvard, and FLAAR is associated with the architecture departments of both universities where FLAAR has offices (BGSU in Ohio and UFM in Guatemala).

Every substance and material in a building can be printed on or decorated with a wide-format inkjet printer (if you so desire). Today you can run doors, windows, Venetian blinds, wall sections, floor tiles, ceiling tiles, table tops, and refrigerator doors through wide format flatbed inkjet printers. We are especially interested in all aspects of wide format printer usage for museums and educational parks (such as archaeological sites, which are usually large outdoor museums). Machu Pichu in Peru, Chichen Itza or Tulum in Mexico would be examples, as are the pyramids of Egypt.

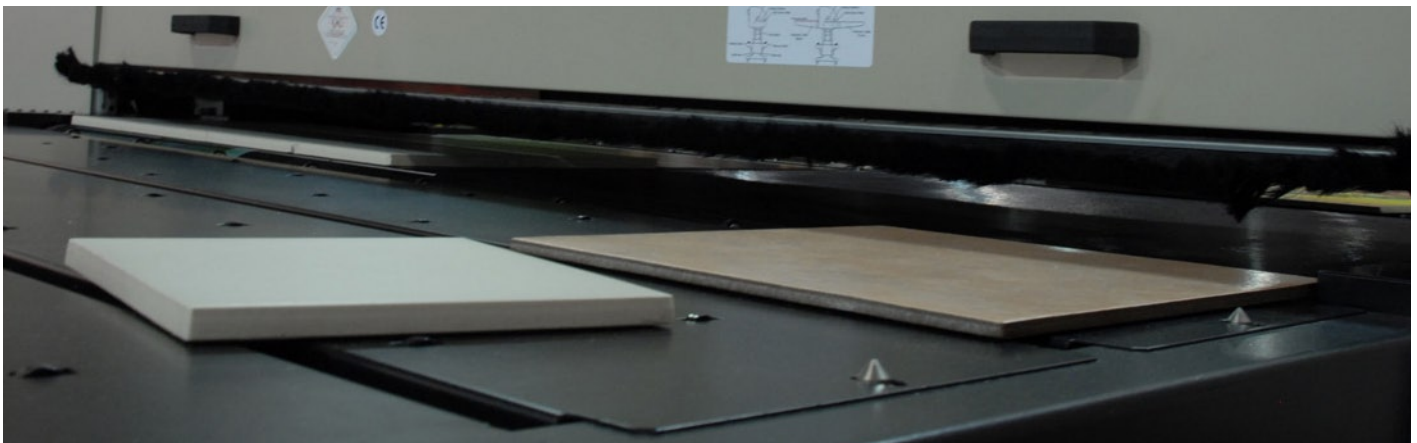
Although this report discusses floor tiles, the same tiles can be used to create wall murals. You can also obviously use these tiles in your bathroom. We used ceramic tiles but a UV-curable ink printer can also handle other floor, wall, and ceiling tiles and comparable architectural and interior decoration materials. But you need to be sure to acquire the FLAAR Reports on UV-printer applications and materials, since printing on “everything” is not the same as the ink sticking to everything you print it on.

When you go to a trade show you see every imaginable size and shape of object decorated with inkjet printable images. At either ISA or SGIA signage printer trade shows you can even see bathroom toilets and sinks decorated with inkjet printed transfers. But seeing a bathroom sink customized in a trade show booth is not the same as actually putting your own photographs or art onto your own bathroom fixtures.



Flora F1-180UV printing tiles at VisCom Italy 07

Since we have not yet reached the stage of printing on three-dimensional furniture (it can be done and is accomplished commercially already, just that we don't yet have this particular equipment). We figured it was more realistic to start by printing on doors and floor tiles.



Flora F1-180UV printing tiles at VisCom Italy 07 This same printer is available in the US, Europe, and Latin America as the Raster Printers Daytona H700UV, www.rasterprinters.com.



Diverse Technologies for Printing on Tiles

There are at least three inkjet printer technologies for printing on floor tiles.

- Dye sublimation heat transfer
- Direct printing with solvent ink printers
- Direct printing with UV-cured ink printers.

Dye sub means printing on transfer paper and then using a heat press to transfer the image via sublimation onto the tiles. We cover this with an entire report in the FLAAR Series on printing signs with inkjet printers. Direct printing with solvent ink printers onto tiles is rarely done, but it is possible if you have a flatbed solvent ink printer. You would tend to need tiles that can accept solvent inks. Keep in mind that both dye sub, solvent ink, and UV-cured ink are for printing on tiles after the tiles have come from the kiln. If you need to bake the design into the tile, that involves other technologies. The best place in the world to learn all this would be trade shows in Italy, since Italy is a world leader in decorating floor tiles. The present report is a FLAAR Fast Facts on printing floor tiles with a UV-curable ink flatbed printer.



Flora F1-180UV printing tiles at VisCom Italy 07

The Experiment

There is a Home Depot near BGSU. "Solid white" tile, 12x12 inches, #177-412, comes in packs of 11 tiles. Why they don't sell an even dozen escapes me. So I bought one pack of 11 tiles.

Because a good UV-curable ink flatbed printer costs about \$250,000, we don't have one (at least not yet, though we hope to before summer 2005, in part because entry level models are now \$75,000, such as from ColorSpan). But a print shop in Toledo, Ohio, has a Durst Rho 160, so off went the doors and tiles to SFG Graphics.

Since this was the first time I had ever attempted to print directly on tiles, and as we had only a few days (and zerobudget), we had to use whatever miscellaneous images we had available. I selected some photos of bromeliads, orchids, a butterfly, and some indigenous Mayan weavings of Guatemala.



Dr. Hellmuth holds tiles printed at SFG Graphics





It took longer than expected to print on the doors so the tiles were delayed until the next day, when I was not present. Thus we don't have step by step photos. The doors took longer than we expected the first day because the printer had to be set-up for the thickness and width of the doors. Then the printer had to be set-up for the thinner and smaller tiles. The tiles, being smaller, also required some experimentation (as you can see by the results). It is clear that we should have run even more experiments, but at \$400 per hour we took the first run off the machine.



Dye sublimation onto 3-dimensional furnishings appeared to have lots of potential when shown by Kolorfusion about three years ago, but then this company never exhibited again and thus we are unsure whether this specific technology works as well as we had hoped. All the other results pictured in this report are direct printing onto ceramic tiles, and are not dye sublimation. Dye sublimation fades too fast (in a matter of months if exposed to the sun) and dye sub ink is priced out of reason in the US. UV-cured printing onto ceramic tiles is a preferable alternative to dye sublimation, especially in the US (dye sub ink is more costly in the US than in Europe).



SFC Graphics tile samples

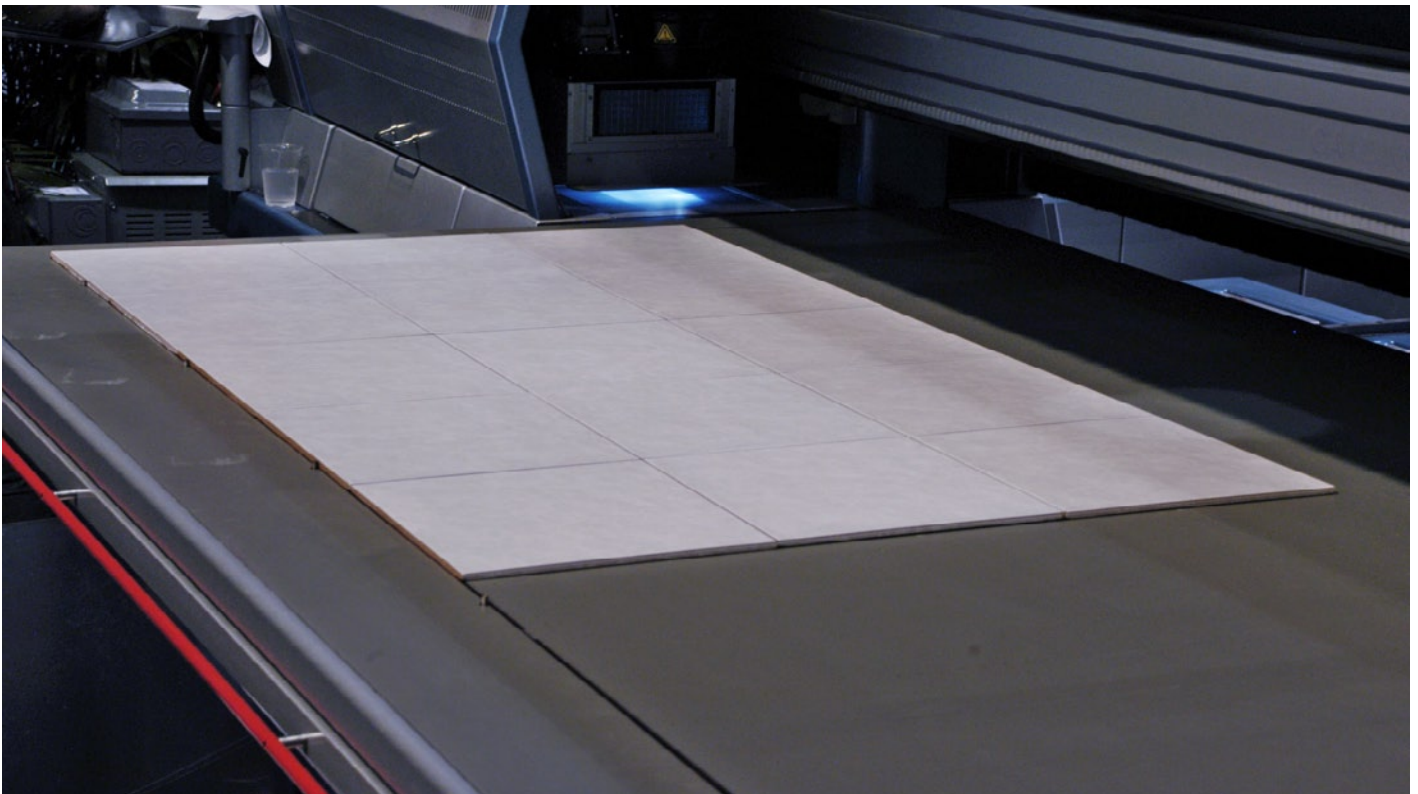
The images got cut off during resizing by the operator in the RIP. This is not an error of the printer itself, but rather a misinterpretation of the desired design.

Any time you run any material, whether it be canvas, or floor tiles, you may have to do a trial run. This gets expensive when the "material" is a door that costs \$20. Two of the door images were most politely described as "experimental" meaning that if this had been intended to produce commercially viable products, we would have had to throw \$40 worth of doors away. On the tiles two were victims of printer experimentation and the rest were victims of design considerations. Overall I was content with the research experiment because I had learned from every mistake. Our next run will be much better planned, and executed, especially when we have our own UV-curable ink flatbed printer in-house.

We also intend to experiment with window glass, window shutters, Venetian blinds, table tops, and other items of furniture, interior decoration, and parts of buildings, such as ceiling tiles.



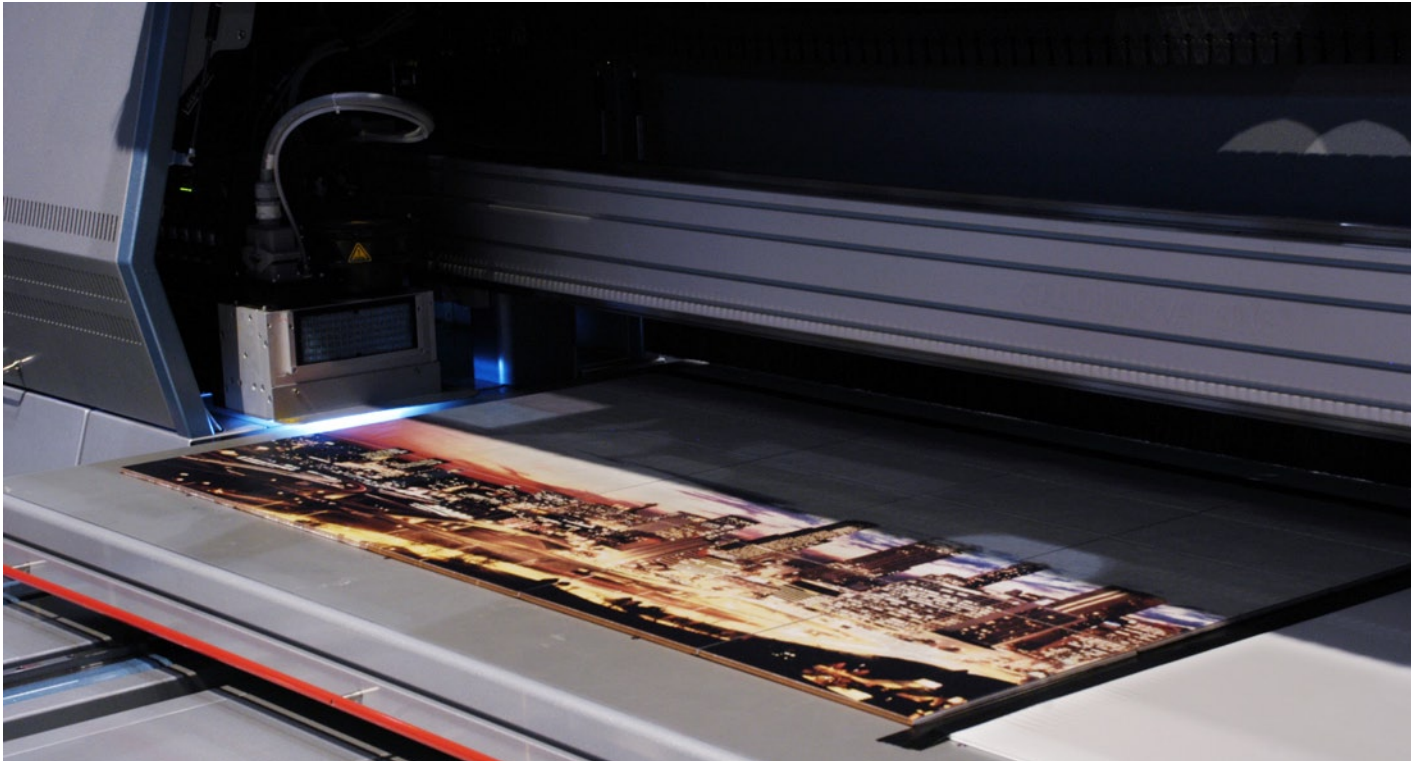
Gandinnovations 1224 UV at GraphExpo 07 printing tiles.



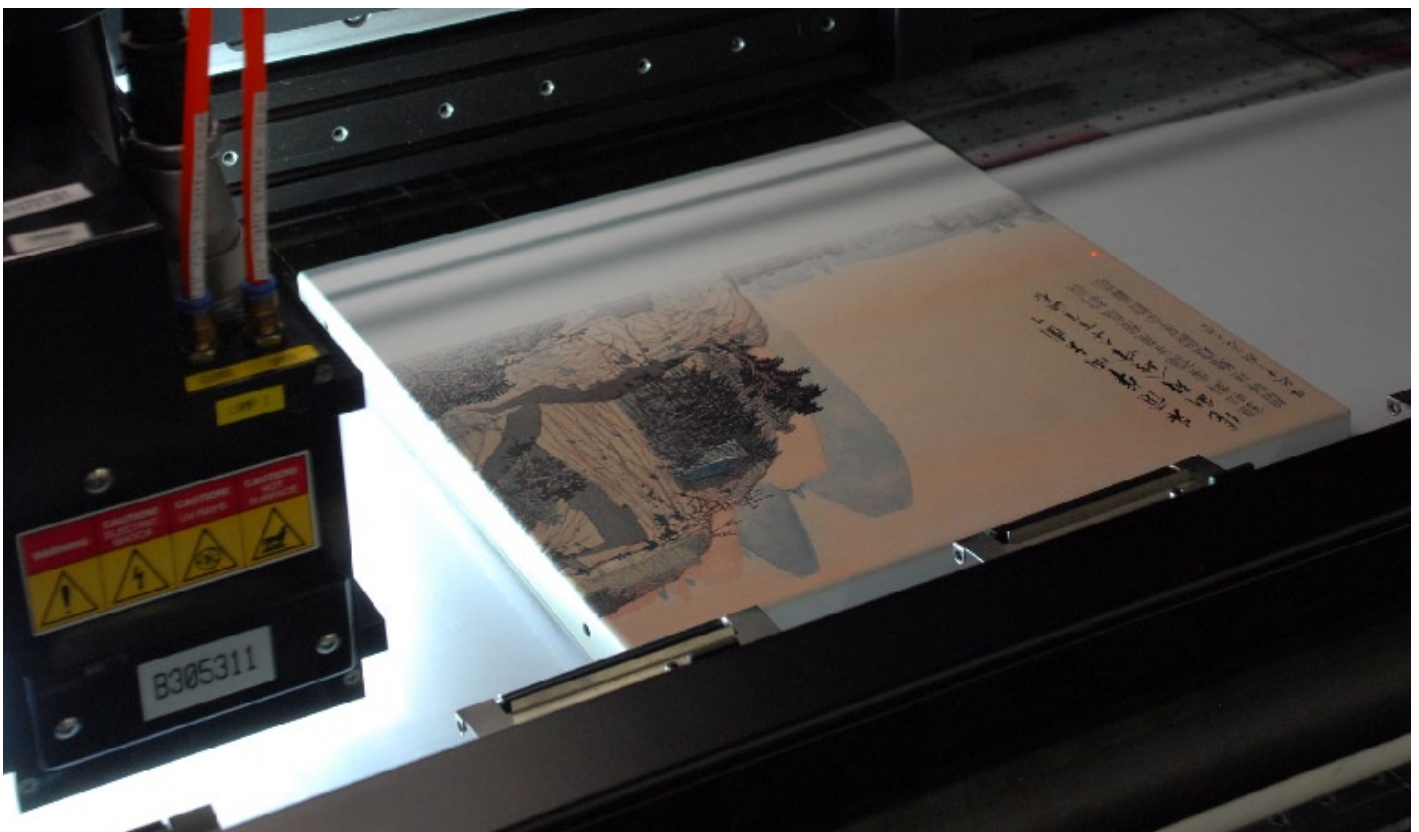
Alternatives

How could we have printed on these tiles otherwise?
And achieved a brighter image?

- First, we could have tweaked the image, such as by boosting the saturation.
- Second, we could have spray-treated the surface of the tile pure white, primed it with inkjet receptor material, and then run it through an Encad NovaJet 850.
- Third, we could have painted the entire surface of the tile white and run it through a UV-curable ink flatbed printer.
- Option four for decorating a wooden door would be printing on glossy paper and applying the glossy paper to the door; this is not a serious option for a floor tile.



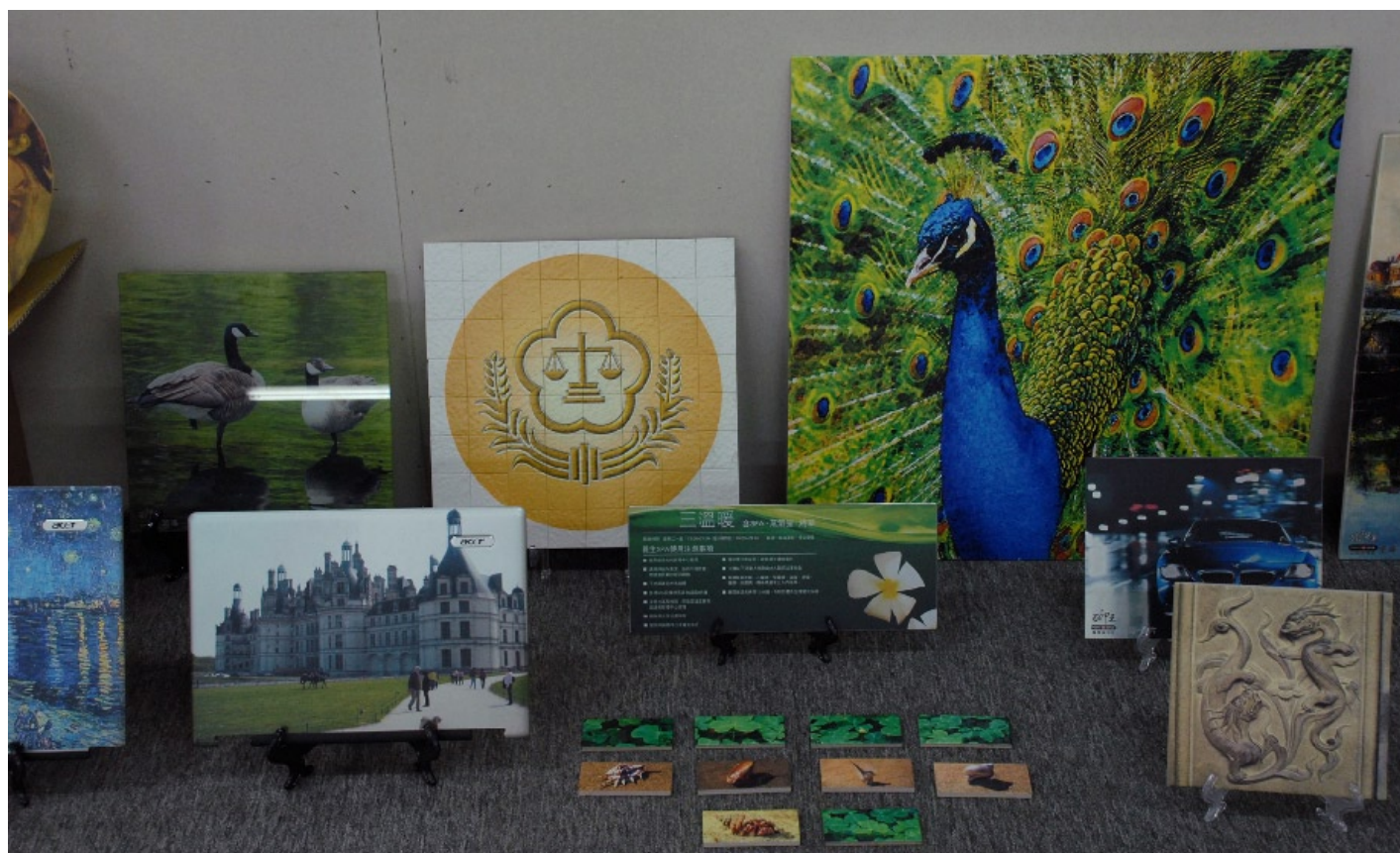
Gandinnovations 1224 UV at GraphExpo 07 printing tiles.

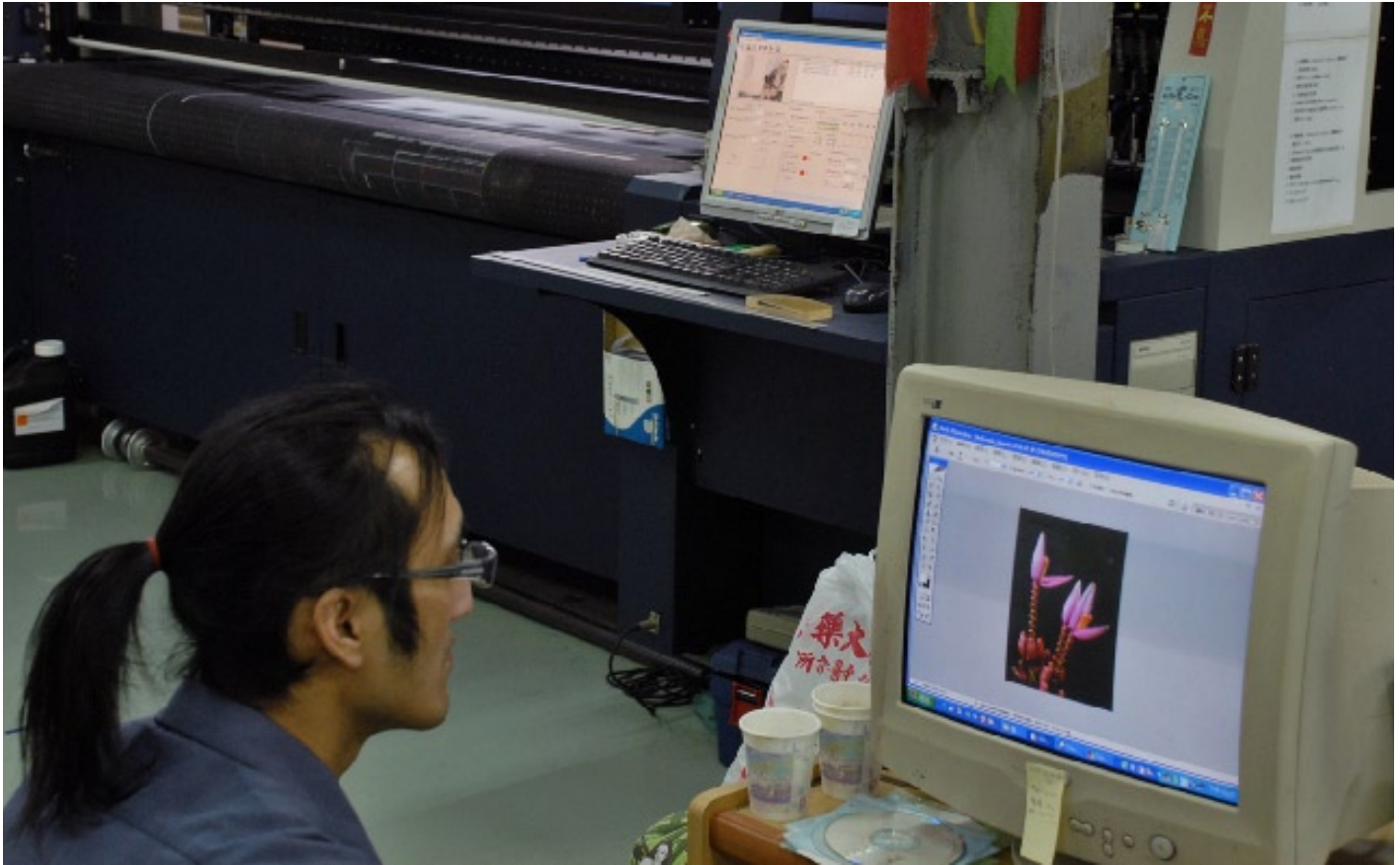


Tile samples printed on at GCC factory visit



Ceramic samples printed on with a GCC 250 UV





FLAAR photography printed on a ceramic tile with a GCC 250 UV



But with the floor tile two more options do appear:

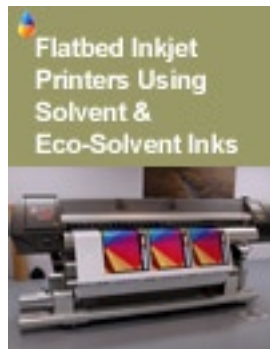
- Fourth, run the tile directly through a flatbed solvent ink printer such as those manufactured by Sprin. This narrow format printer can print on one tile at a time, but at high resolution. It would probably be necessary to prime the tile, and it would take a long time to dry (during which time it would outgas solvents).
- Fifth, obtain a tile whose surface is prepared for receiving dye sublimation heat transfer. In this technology you print onto transfer paper. You take the paper and put it on top of the object you wish to transfer the design to. You use an iron or heat press. The heat sublimates the ink into a gas which permeates the primer on the surface of the tile. This would probably give you the brightest tile of any process.

But I was determined to “print directly onto a floor tile from Home Depot” and that is exactly what I did.

Three different FLAAR Reports of various premium series cover the theory and technology involved in several of the other alternatives.



Flatbed Inkjet Printers using Aqueous Ink lists the few printers that could handle ceramic tiles with “regular” water-based ink, Option 2. You can find this report in the FLAAR Series on printers for signs, on www.wide-format-printers.NET.



Flatbed Inkjet Printers Using Solvent & Eco-Solvent Inks Printing Directly on Thick and/or Rigid Materials (up to 3 inches thick) covers Option 4. You can find this report in the FLAAR Series on solvent ink printers, on www.wide-format-printers.NET.



Which Inkjet Printers Can accomplish Dye Sublimation for Heat Transfer to T-shirts, other textiles, ceramic tiles, and even metal discusses Option 5. You can find this report in the FLAAR Series on printers for signs, on www.wide-format-printers.NET.

FLAAR photography printed on a ceramic tile with a GCC 250 UV



For more information on the GCC StellarJet 250 contact sophie.chang@gcc.com.tw or visit their booth at ISA, FESPA Digital, DRUPA, VISCOM, or ISA



Dr Nicholas Hellmuth and the team who have developed the special primer for treating ceramic tiles show the results in front of the GCC StellarJet 250.



FLAAR photography printed on a ceramic tile with a GCC 250 UV



These are the most beautiful ceramic tiles I have ever seen printed on any UV-cured flatbed printer. The color gamut is superior to most others and the image did not scratch off. You can license the primer and obtain this from GCC, contact sophie.chang@gcc.com.tw to inquire about this primer.



GCC 250 UV tile samples





GCC 250 UV tile samples



Dye-Sub Calendering heat presses	Oil-Based Dye Sublimation	Solvent-Based Dye Sublimation	Water-Based Dye Sublimation	Direct to Textile Printers	Dye Sub via Transfer Paper	Transfer Papers	Textile RIP
Acid Dye Textile Ink	Reactive dye textile inks	Pigmented textile ink	Hybrid UV Textile ink (Sensient)	UV-cured ink for Textiles (Durst)	UV solutions via L&P Virtu	Spectrophotometer ICC profiles for textile printing	Printable fabrics, such as from 3P
Major Textile printers	DigiFab	ATP Color	Sensient	Seiko	Mimaki Textile printers	Mutoh Textile printers	Roland Textile printers
D-Gen	MS	A-TeX					
Monna Lisa	KonicaMinolta	Practika					
Zimmer	Shima Seiki	Keundo					
Ichinose	Sensient	Hollanders					
Robustelli	TexPress	Reggiani					

In 2007 it was possible to begin a long-range sponsored research project on inkjet printing of textiles. This began with a visit to Yuhan-Kimberly in winter 2007 and was followed up by a second longer visit to their DTP Link inkjet textile facilities in 2008. So now it has been possible to test all three of their printers.

The next stage is to inspect Yuhan-Kimberly MC3 Extreme printers in-situ in printshops and write site-visit case studies. This is being planned for later in 2009.

At SGIA 2008 it was possible to finalize discussions with DigiFab for a second project on inkjet textiles. I had been noticing their success in the wide-format textile world for several years and have visited their DigiFab headquarters in Los Angeles. I especially am impressed by their own in-house textile RIP, Evolution RIP.

Presently I am in discussions for possible future projects on hybrid UV curing of textile inks. These are special inks from Sensient that I first saw in action at VISCOM Italy. As soon as it is possible to visit the ink company and visit the separate company that is manufacturing the actual printers we will launch this new project.

Every several months during 2009 look for addition web pages on dye sublimation and additional FLAAR Reports on wide-format digital inkjet printing of textiles.

Printable Fabrics

About five years ago it was possible to visit the headquarters of 3P Inkjet Textiles (while I had been flown to Germany as a consultant for a large paper mill that wanted to switch from traditional paper to making media for wide-format inkjet). 3P was not far away, so I visited them.

I have also inspected the printable textiles of 3P for over seven years at trade shows around the world. A new FLAAR Report is coming out on February on this subject. Plus it was possible to meet with Thomas Poetz at a lecture I gave at a technical university outside Salzburg three years ago. So I know the company for a long time.

Here are the PDFs on textile printers that FLAAR offers so far:

In progress a future FLAAR Report on: Calendering Machines: Heat Transfer Press for Dye Sublimation.

This report will be available as soon as we establish contact with the key calendering machine manufacturers so we can be trained in their company demo rooms. There is not enough time at any trade show, not even 14 days of DRUPA, to inspect all the printers, substrates, RIP software, inks, and accessories for a complete workflow (laminators, cutters, trimmers, etc). So visiting Monti Antonio, AIT, Klieverik, DigiFab (DigiHeat), Transmatic or AIT will be necessary before the FLAAR Report on calendering machines will be issued.

IF YOU WISH TO MEET DR HELLMUTH and speak with him about textile printing, he will be at the Dubai sign and printer show in mid-February. Towards the end of February you can meet Nicholas at the WP Digital InHouse launch of a 5-meter roll to roll UV printer at the Spuhl factory in Wittenback Switzerland.

During the last two weeks of March you can meet with Dr Nicholas Hellmuth in Croatia or any of the neighboring countries. He will be there for two weeks. Contact the nearest office of IB-ProCADD to see which day in which city.

You can also make an appointment to consult with Dr Hellmuth at ISA 2009 or FESPA Digital 2009 (e-mail FrontDesk@FLAAR.org or Skype flaar_mesoamerica)

But the main advantage of coming to the Spuhl Virtu (WP Digital) InHouse event is that there is no cost, no fee to speak with him on Feb. 26 or 27, 2009.

