



Nicholas Hellmuth

## Eco-Solvent, Bio-Solvent & Dye Sublimation Textile Inks



### How to Judge After-Market Inks (Third-Party Alternative Inks)

## How to Judge After-market Inks (Third Party Alternative Inks) INKWIN -A Different Asian Ink Company

Inkwin was a company I was interested in before I visited Shanghai, China. I first noticed this ink brand since I saw its large booth at FESPA Digital in Switzerland. Inkwin also exhibits at other trade shows around the world.

I have to say frankly that my initial impression of ink made in Asia is typical because of the Chinese domestic market price wars among the ink manufacturers there. Many ink companies are declining because of the quality problem and more serious economic situation. But in Switzerland I noticed that the managers and owners of companies from Europe were in the booth of Inkwin; I knew these owners personally, and figured that if they were all visiting this one booth, that I should visit the booth too, to learn what was attracting them. These are companies who distribute and sell Mimaki, Mutoh, Roland type solvent printers in their countries (outside China).

### Different business logic

It is well known that products from China, and some from Korea and Taiwan, tend to come at a very cheap price because they use whatever chemical is cheapest. Most companies in these countries skip persistent quality assurance.

The ultimate goal is to decrease the price to compete with rivals. This model of cycle spirals downwards in the following way: Low price is offered, to win a share in market, then decrease again for competition, then have to choose low level chemical materials (some company even use dye for solvent pigment ink). If then a problem happens with a faulty batch of ink, they lower down price again. With inadequate profit from the sales, the company may go out of business. But then they use a new brand name and start a new cycle.

This kind of business model has already tarnished the reputation of printers and inks made in Asia, even though it is a new field compared with other conventional field, such as toys. But if you look back to the 1950's, that was when Japan was making copies of Leica cameras. Thirty years later Nikon beat Leica by making excellent cameras (I had three Leica cameras in 1960's and 1970's but switched to Nikon by the 1980's). The same thing is now happening with UV-cured flat-bed printers: the first models were inadequate (as DuPont found out quickly). Yet today (2008) printers from Teckwin are excellent and UV printers from RTZ (Flora) are better than in past years. So the same can be expected with ink from Asia: some companies will learn that buyers in Europe, North America and Latin America need quality and consistency in addition to a reasonable price. So just as I am curious about which UV-printer manufacturers in China will join the ranks of international acceptability, I was also interested in finding out which Chinese ink companies would reach acceptable international standards.

I visited the InkWin factory in summer 2008, before the Shanghai sign printer trade show. In the warehouse of raw material it turned out that most of the pigments were from CIBA and Clariant. It is totally different from other China ink factories who primarily use pigments with boxes with Chinese characters.



*Main entrance to the original building of the Inkwin factory, Jinnan, north of Shanghai. There are two additional large buildings behind this that you don't see in this view. Plus there is their headquarters in a Shanghai office building, and all their labs for testing (at a university outside Shanghai).*

It is true that China products have the advantages of price since the tax, land, labor and salary costs in China are much lower compared with Europe and America. However, if you want to produce good ink, you have to choose quality raw materials, invest in all kinds of advanced devices for production, test, especially for developing a new ink.



*The entrance area of the main building that has offices in front of the two adjacent factory buildings.*



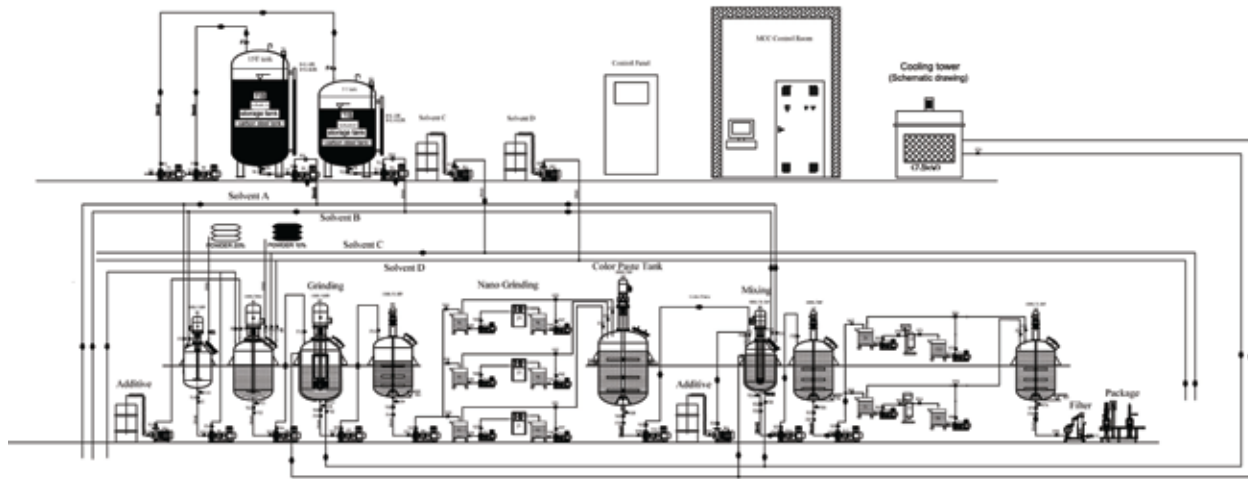
*But what really counts is how well the ink actually functions in an actual printshop. So after visiting Inkwin headquarters in Jinan, test labs at a university, and offices (in Shanghai), three evaluators from the main FLAAR office visited a printshop in Guatemala City, Central America, that had a Lijun and a D.G.I. solvent printer. The owner said he had tried Lyson solvent ink but that it clogged his printheads. He then tried Inkwin ink and now prefers this. He said there were no problems, that the Inkwin ink performed well.*



*Outside view of the second workshop of INKWIN.*



*Inside view of the second workshop of INKWIN.*



**New facilities:** Starting last December, every month the factory has at least 100 tons of inks waiting to be produced, that's why they have to put on this new production line. After this new production-line has been installed in this new workshop, the factory will be capable to produce 800 tons of ink a month. Currently they have 4 production lines : Solvent ink line, ECO-solvent ink line Bio ink line, and Sublimation ink line. But to best ensure the quality of this factory, the company will produce no more than 500 tons inks monthly.

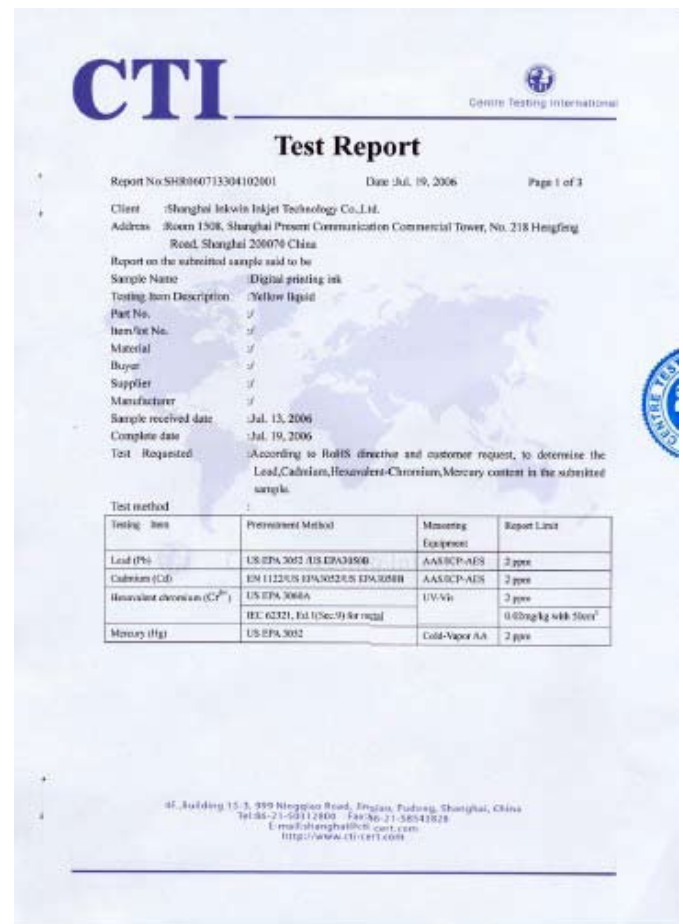
Dr. Li, who previously worked in Inkware in the US, is now the president of Inkwin. During the several days I had access to speaking with him, he told me the philosophy and goal of Inkwin people is to find a balance and give customers the solution with the best ratio of quality and fair price and let both customers and factory succeed.



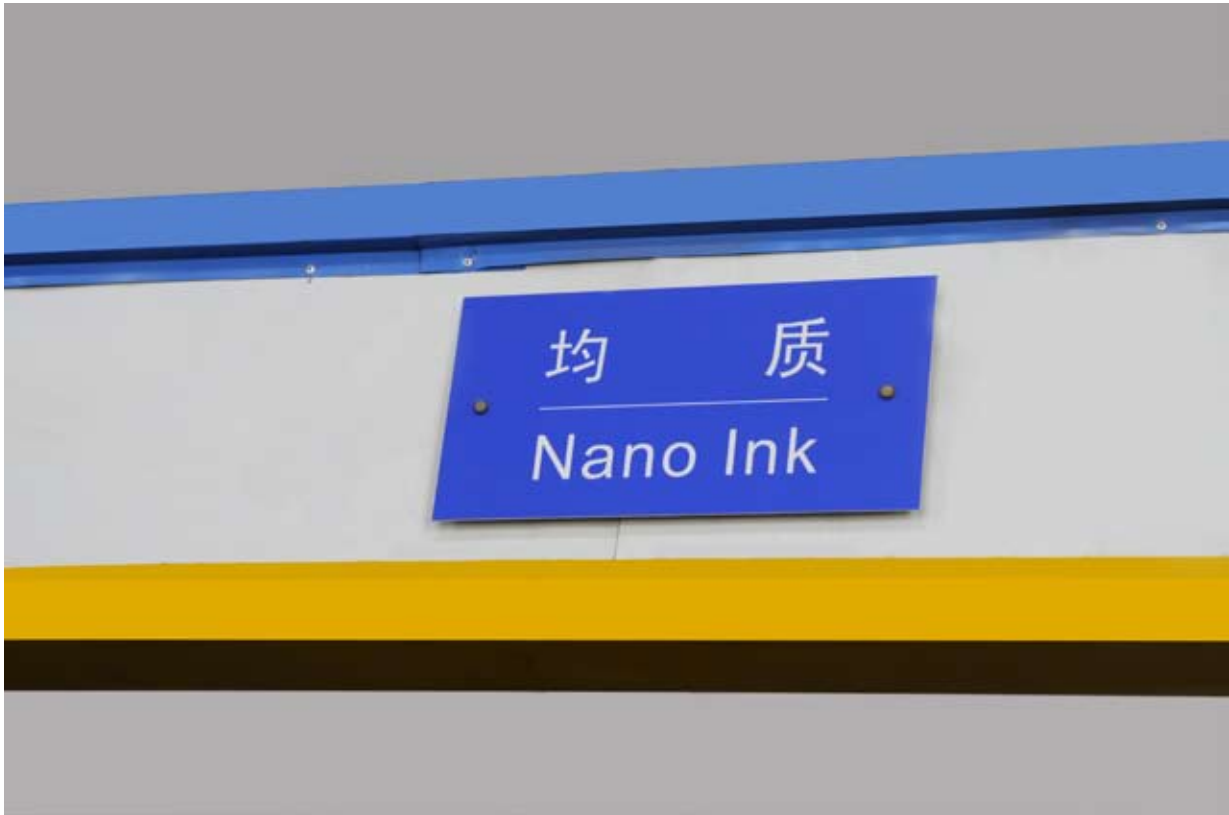
**Inkwin warehouse. Inkwin inks have been sold to all continents around the world, more than 60 countries.**



*Nanogrinding machine This machines is from Switzerland,  
only INKWIN in China has this machine.*



**Pall certification, certifying that Inkwin only use PALL filter in the production of ink. EU ROHS certification.**



*Notice the capability for grinding nano-particles for pigments. This is a sign of a capability that not Chinese ink companies have access to.*







*If you are making ink 24 hours a day, 7 days a week, all month, and all year, it is natural that you get ink stains on the containers.*



*Material Science and Engineering College (From left to right Michael Li, Nicholas Hellmuth, and Jack Wang)*



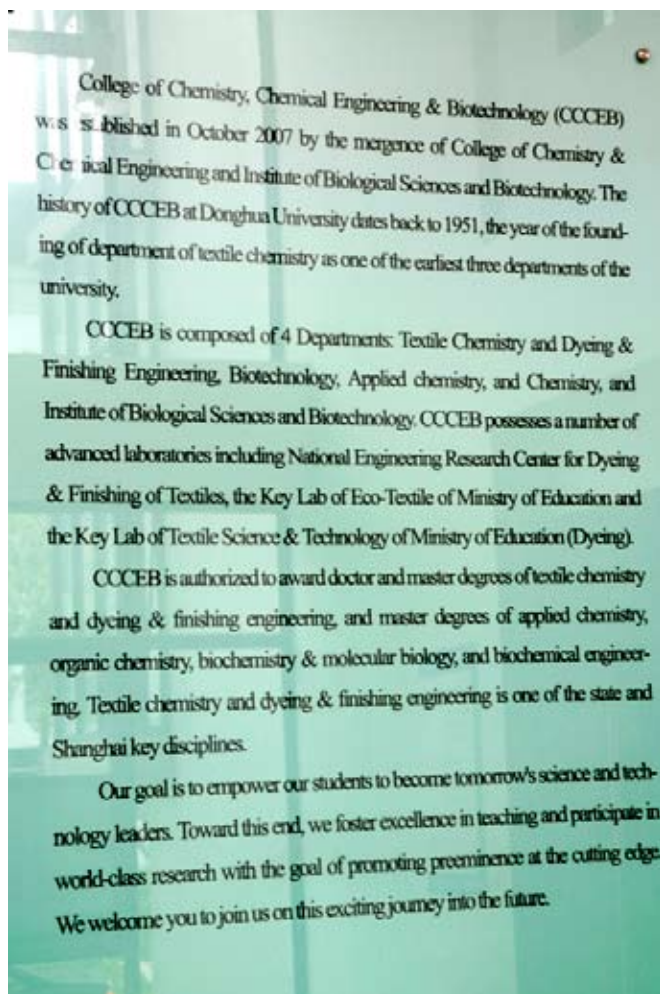
*Analysis and Test Center.*



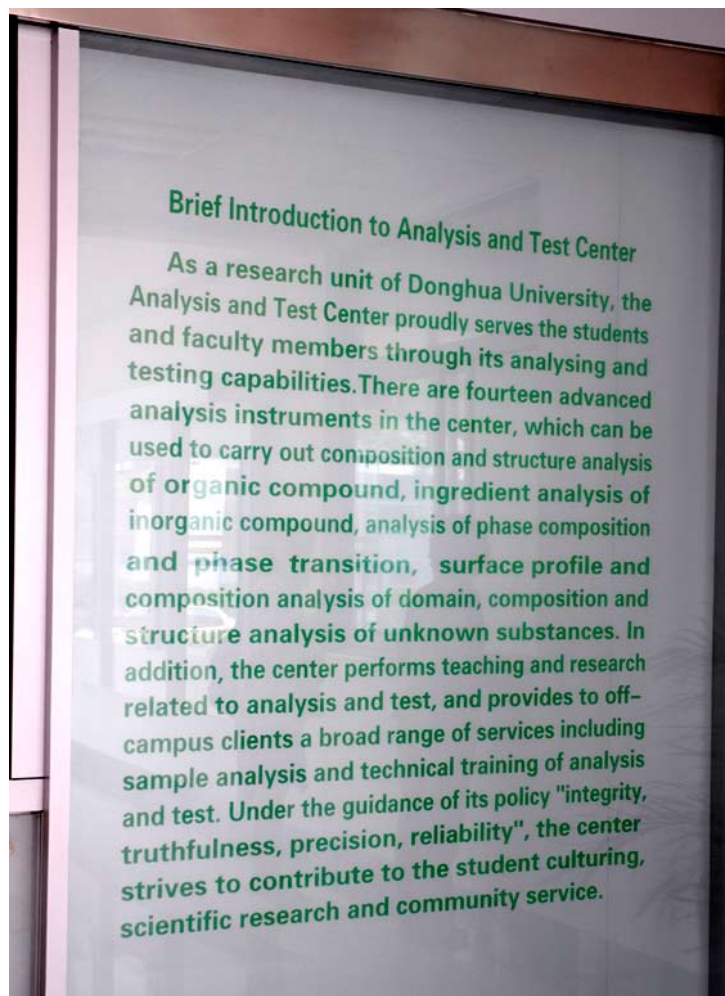
*A part of Campus of Donghua University in front of material science and engineering college.*



*View in front of the maingate of Material Science and Engineering.*



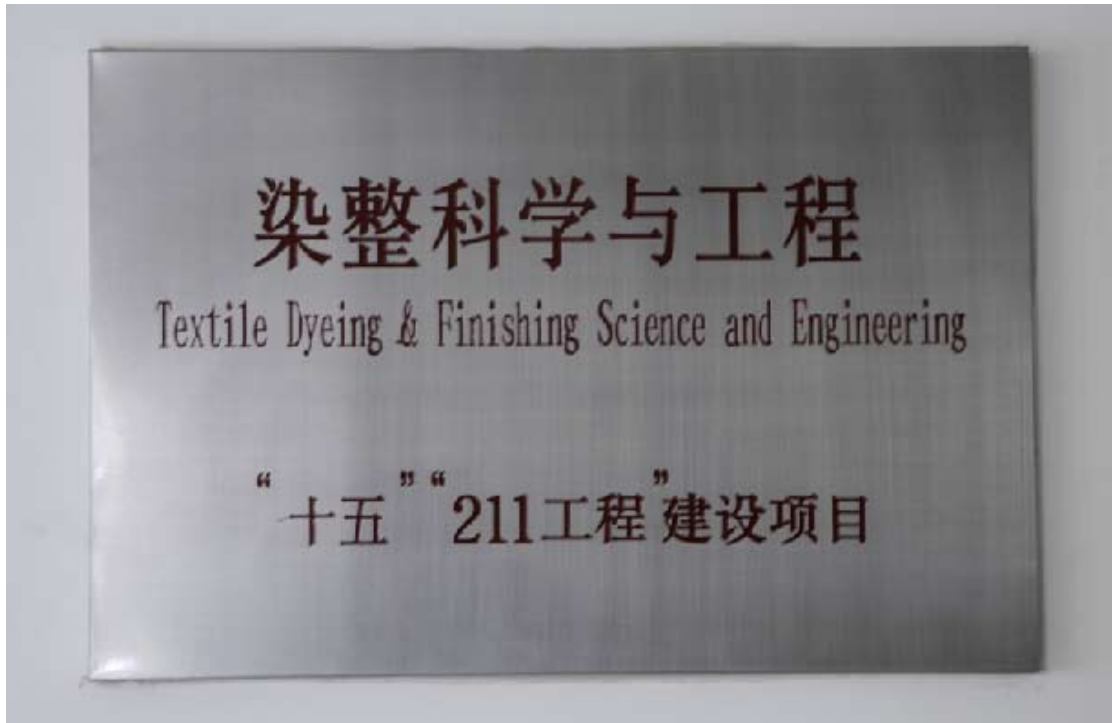
*A brief introduction to college of Chemistry, Chemical Engineering and Biotechnology.*



*Brief Introduction of Analysis and Test Center.*



Signs for CCCEB.



*A sign for textile Dyeing and Finishing Department in Donghua University.*



*A sign for the Lab of Xiaqin Wang (X.Q.Wang )*



*The third floor of Analysis and Test Center.*



*An advanced rheometer.*

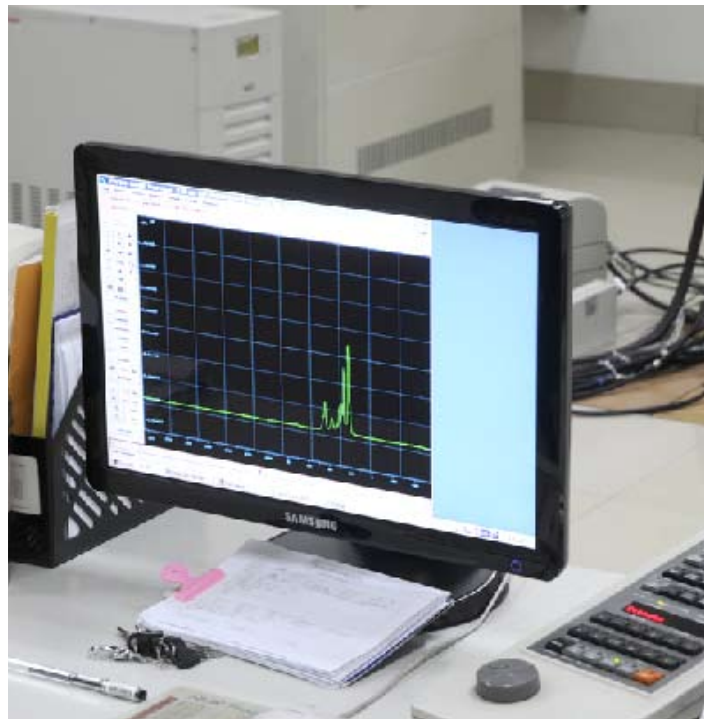


*Nano-particle and Zeta-potential analyzer.*





*NMR testing device.*



*A nuclear magnetic resonance (NMR) spectrum.*



*Two sets of GPC.*



*Nano-particle and Zeta-potential analyzer.*



*Fourier transfer infrared (FTIR) testing device.*



**XRD**



**Data processing of X-ray scattering.**



*Atomic Force Microscopy (AFM)*



*Extraction impurities from fabrics.*



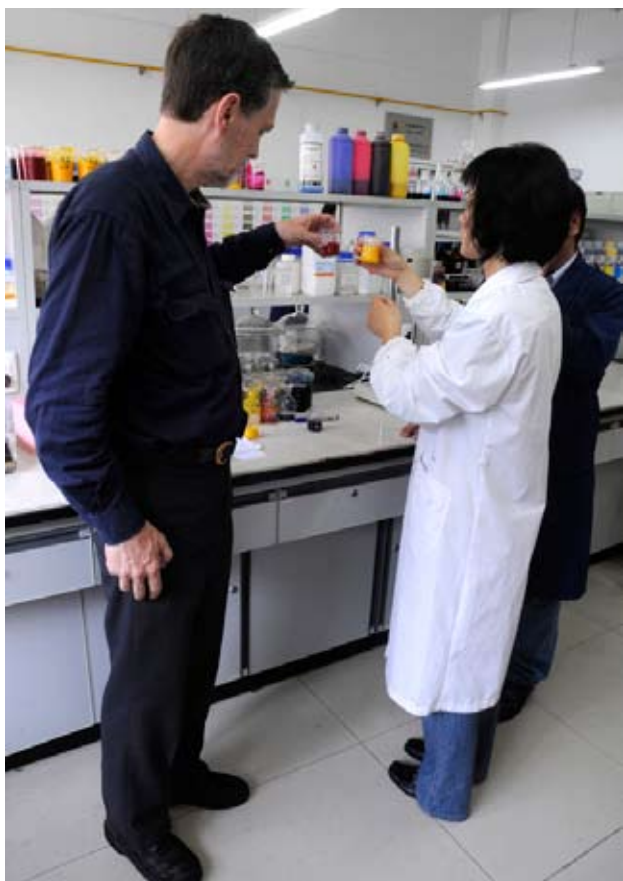
*Some ink samples for printing tests.*



*Ink Samples.*

### Different R&D

I visited Inkwin laboratory on 31st, July. Different from other ink companies, the Inkwin R&D center is in a university, which is the first textile department in a university in China. In its laboratory, I met Dr. Wang, who is the chief supervisor of R&D Department of Inkwin, post-doctor from Kyoto University, Japan and the professor in the College of Chemistry, Chemical Engineering and Biotechnology. The current investigation in her Lab is focused on inkjet printing and biology materials and she is supported financially by Inkwin and other important foundations in China, such as Natural Science Foundation, Nanotechnology. This laboratory is very clean and every instrument is taken charge of by a professional R&D person. Here I found Nano-particle and Zeta-Potential Analyzer, Laser Diffraction Particle Size Analyzer. I saw a sign "National Engineering Research Center for Dyeing and Finishing of Textiles" in the door of the lab. One professor showed me Ms Wang's articles in some famous journals, Chem, Commun, Macromolecules and Langmuir etc. This lab is one of the best for developing inkjet ink that I have visited, it can be compared and even better than many other European labs.



*A photo taken from R&D center of INKWIN (From left to right Nicholas Hellmuth, Xiaqin Wang, and a graduate student).*



*Nichals Hellmuth and Xiaqin Wang were discussing some ink samples.*



*A photo taken from R&D center of INKWIN ( From left to right Michael Li, XiaQin Wang, Dongmei Li, And Xuexia Song).*



*Samples of digital textile printing.*



### What is the ultimate customer concern?

Some answer either best quality or lowest price. Dr Li gave me a different insight---innovation and a diverse set of inks to chose from to obtain a solution.

"It is clearly logical that price is so important for customers and our factory too," Dr Li said, "We couldn't agree with it more. But a best price that can help you win a market at the same time can lose that market because it means low quality for your prints and low profit for factory. As the time goes, it will give you many headaches, such as short outdoor durability, low color density (even some factories add dye for solvent pigment ink), the low grinding level causes pigment to settle down, then clog and damage the print-head because factory needs profit to survive"

"Innovative talent doesn't only help you make a good quality product, but also gives you the capacity of providing increase in new market share and support for customers. It is no doubt that an innovative company has a good quality product to maintain your current market."

We should pay attention to the new things in the rapid changing digital printing field. For example, Inkwin has added the production of eco-solvent disperse dye sublimation ink which can use the current wide digital printers with Xaar, Spectra and Epson heads to print on polyester, a recycled media, mostly used for clothes, curtains etc. This kind of printing method is still relatively new in the world. It is no doubt that this ink, which is also a bottle-neck, offers a printshop owner a new vision and extends the applications for the printer and polyesters. Inkwin is currently helping customers to design a solution with sublimation installation and finding the suitable polyester.



**Quality control staff is checking the quality of this batch of ink by printing test of 10 square meters twice, only when the print-work is 100% perfect, the ink can be approved for delivery.**



*A photo taken in rheolometer testing room (From left to right Jack Wang, operator, Xiaqin Wang, Nicholas Hellmuth, and Michael Li)*

There was a big exhibition, APPPEXO in Shanghai during my visit in China. I noticed here, same as I observed at FESPA Digital in Geneva, Switzerland in May 2008, that most customers at the Inkwin booth are not Chinese, but come from overseas, such as Sweden, France, Brazil, Chile, India, Tanzania etc.

Each salesperson has a handbook, which is a technical collection, introducing the factory, quality control systems, print-head technology, different inkjet and ink type, printer factory and different models list, the factors affecting the performance of ink, Xaar, PALL and ROHS certificates etc.

Victor Lewis, who is one of the salesmen, tells me that its company is very careful to collect all relevant information to facilitate supporting customers and also has a training program every half month, and they also have meeting to improve customer care, product and management every week between all the staff of in-company. Mr. Lewis also informed me that Dr Li has a different eye to choose new employees, from different majors, chemical, marketing, literature, engineering etc, so this can help them learn and improve from each other.

In addition, all staff is provided the chance from the company to go overseas to attend exhibitions and visit customers. I noticed this in the Inkwin booth in Switzerland. Each person who has this opportunity to travel outside China then and he must gather up all that they learned and write a report after the trip, so other colleagues can also learn that market.

I also had the opportunity to speak with Sunny, the young sales rep who was also the translator for my visit. Since my visit was for five days, including Inkwin facilities both in Jinan and in Shanghai, it was possible to learn a lot about how Inkwin functioned. It takes more than ink chemicals to make an ink work: it takes people who stand behind the ink. This is why I made the effort to visit the factory, visit the test labs, visit the main office, and visit their booth in major international trade shows.

### **Different Quality Control system**

I know that most Asia ink factory don't know what a quality control system is, so I was curious, before visiting, if, and what, quality control system was in place at Inkwin. But I realized that there are ink companies now, in 2008, that have achieved a new standard. This is visible when I saw its production line and talked with Ms Xi who has a master's degree in Chemistry. She is now the director for quality control in the Inkwin factory.

As an expert she knows all kinds of technical parameters of ink and has a "special right" as she can stop all the shipment if she says the ink is not acceptable, even no matter what the president insists on. It is well known that not every batch of ink is totally same because each batch of raw materials maybe has a small difference. But the ink can maintain at a relatively stable level if you use the best disperse, filtration and centrifuge devices. Ms Xi told me its process of quality includes

- Raw material checking,
- Pigment dispersion,
- Ink formulation and Physical parameters test,
- Grinding check,
- Filtration,
- Printing test
- and Samples remains etc.

In its factory, there are Laser Diffraction Particle-size Analyzer, Microscope and other test apparatus for viscosity and surface tension. I learned that the particle size of the ink is in the range of 100nm-500nm. I also found the BUHLER grinding machines from Swiss and PALL filtration system work excellently in the factory.

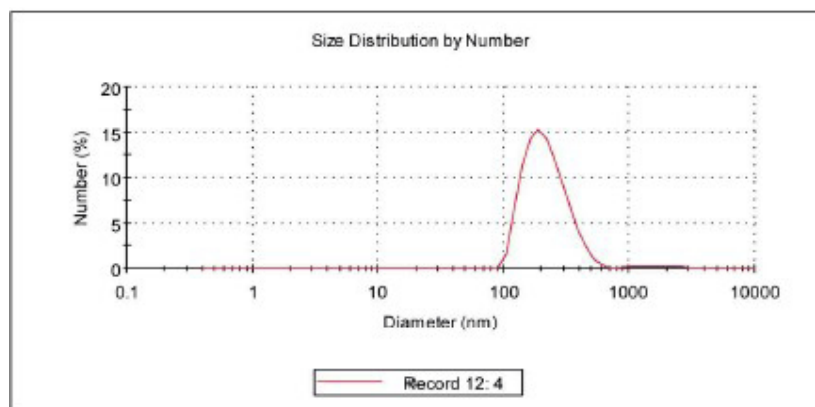
Ms Xi told me that all the batches of ink must be tested on the printers to assure the performance of ink. There are several wide format printers only for testing in the factory. Each batch of ink will experience printing tests of at least 10 square meters twice on printers and only if the double check is 100% perfect, the ink can be approved for delivery. If any problem happens, the ink must be reproduced, and then retested, if approved by her. Only then can it can be shipped.



View from right side of Material Science and Engineering.

### Different Vision

When I walked around in Inkwin factory, I found that its workers were testing its BioWin ink on a printer with XAAR128/360 heads. The odor is very light, with a little fragrance like wine. Dr Li told me this is the "True Green" ink made from the corn, which is a natural resource, and replace several toxic solvent, such as Cyclohexanone and MEK. This ink is currently one of the most environmentally friendly ink in the world. It's very surprising to me when I knew an Asia ink Nanogrinding machine This machines is from Switzerland, only Inkwin in China has this machine.



During my visit I learned about bio-ink. Previously I only heard VUTEK had this ink and it OEMed this bio-ink for MUTOH America. Then a few other European companies started with bio-ink too. Dr Li told me that they had this ink since 2007 and has exhibited it at ISA and FESPA.

This product is specially produced care for human health, overloading pollution to our earth and strict environment regulations of European and American countries. "Why and how do you produce bio-solvent ink," I asked. "I have this idea for a long time," Dr Li said, "I attended all kinds of fairs in the world and I recognized that bio ink has a nice future soon, but Inkwin was not big enough during that period, if we tried to go further with this concept, we would have no result, so we had to wait for a suitable chance to research and popularize it. Before we produced this ink, we had finished a lot of research about biodegradable inkjet ink and as an addition, we also produce eco-solvent based disperse dye sublimation ink besides bio-solvent ink". During Shanghai Show, I found Inkwin's dye sublimation ink in their booth with samples.

### **Different Experience**

On 1st, July, during my visit in the sales office of Inkwin in downtown of Shanghai, more than 20 sales representatives were busy communicating with their customers. In its meeting room, I found the certificate from XAAR and PALL. Jack Wang, the vice-president told me this XAAR certificate is the unique official certificate for XAAR 128/360 printheads. I first saw PALL certificate for an ink company in its office. Mr. Wang told me all the filters in the Inkwin factory are PALL and they had a long-run cooperation with PALL. Not only this, Inkwin also has a nice cooperation with many printer factories, including Chinese companies and oversea companies.

In its office in Shanghai, I communicated with its employees who are especially responsible for the market information collection and I find that they don't only know the Chinese market, but know the Europe and America market as well. Since I need to test the ink by visiting an actual printshop that uses it, I asked what customers they had in Guatemala. It turned out that the printshop they listed there was in a building next door to my former office building, and the owner of the printshop is, if I remember correctly, a reader of the FLAAR Reports from past years. So as soon as I return to Guatemala I will visit him.

I also learned that most Mimaki JV3 printers in Asia don't need a chipped cartridge since if the Chinese customers couldn't use alternative ink, Mimaki couldn't sell many printers here because of the high cost of officially sanctioned ink, so most overseas customers use the cartridge. But there are also many uncoded printers outside China. Then they showed me at least 5 kinds of chips for the Mimaki JV3. After considerable testing of several different chip versions, they found the Mr. Right. But in many other Asia ink firms; they only offer bottles of ink, without appropriate cartridges.

### **Different training program& Team**



*Michael Li, in his office.*



*Inspecting material in the corporate offices. FLAAR took the time to inspect the factory, the headquarters, and all the laboratories (about 20 rooms in the labs alone, which is why that is a separate report).*



*Sales staff of INKWIN .*



*Scanning Electron Microscopy.*



*Testing the ink on another printer. These tests are in the corporate and sales headquarters, in the middle of Shanghai.*





*View from hotel across the street from InkWin headquarters. As you can see, they are centrally located. Clearly this is not an start-up ink company operating out of a basement or garage somewhere. Indeed, when I ask about InkWin in other countries, they indicate they know the company's reputation.*

### History of the growth of an ink company:

**2001** Jinan Best Inkjet Technology Co., Ltd., predecessor of Inkwin was founded.

**2002** Mainly OEM for printer manufacturers.

**2003** Constructed R&D Center at Shanghai Donghua University

**2004** Shanghai Inkwin Inkjet Technology Co., Ltd. was founded .

Initiated "INKWIN" brand to the world market. Applied for five patents related to sophisticated ink formulations.

**2005** Achieved Creative Hi-Tech Enterprise Mark Premier inks manufacturer status, and initiated the production of environmentally-friendly solvent inks in large volume in China

Exhibited at ISA and SGIA.

**2006** Developed BIO solvent inks, a major breakthrough in protecting the environment

Honored as the 1st session member of Inkjet Printing Industries Association of China

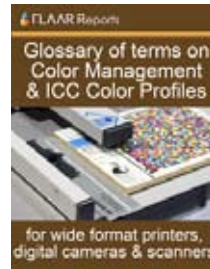
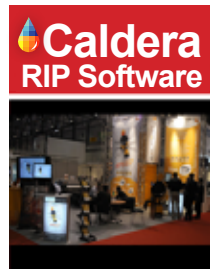
**2007** Acquired approval certification from XAAR printhead company, Achieved the only approval certification of the PALL filter company for an ink manufacturer in Asia.

Began construction of 30,000.60 square meters for a new factory

**2008** Developed a new line of inks, the Digital Fabric Dye Sublimation series Inks .



InkWin at Fespa.



These reports on RIP software and Color Management for serious UV printers are free downloads on all FLAAR web sites (follow the link to 'free downloads') [http://www.wide-format-printers.net/reviews\\_reports\\_evaluations/free\\_download.php](http://www.wide-format-printers.net/reviews_reports_evaluations/free_download.php)

## RIP, COLOR MANAGEMENT, and ICC Color Profiles options

Once you have a serious UV-curable wide-format printer, you may prefer to have an equally serious RIP software.

The RIP software for simple water-based printers such as Canon, Epson, and HP may not be the same RIP software that could be most effective and productive on a UV-curable flat-bed or UV-cured roll-to-roll production printer.

I first noticed Caldera RIP on Gandinnovations UV printers several years ago, then I saw Caldera being used at the Mutoh Europe factory demo room in Belgium.

When I was visiting the Durst factories in Europe I again noticed that they were using Caldera RIP software.

So I requested access from Caldera so I could visit their world headquarters in Strasbourg, France, to spend several days learning more about their RIP. As a result there is now a FLAAR Report photo essay on this software.

Most recently I have seen Caldera RIP at the Shanghai printer trade show in China, at DRUPA in Germany, at FESPA Digital in Geneva, SGIA '08 and Viscom Italy '08.

When I visited a large printshop in Maribor, northern Slovenia, they were using Caldera RIP and the manager of technical services for this company said, "Caldera does a good job." This company in Slovenia has about eight UV printers (about five of them from Durst) and an equal number of large solvent printers. They

originally used a GretagMacbeth color management system but switched to BARBIERI because the BARBIERI spectrophotometer can read more efficiently and can handle textiles, backlit, wood and other materials that are either awkward or difficult on other brands of color management instruments. You can learn about the BARBIERI equipment either from their headquarters in Brixen or from Caldera worldwide.



Caldera also offers a highly regarded spectrophotometer from Barbieri, the leading color management company in Italy (they are headquartered in the same city as Durst, the manufacturer of Rho UV-cured printers).



**For further information on Caldera** contact Joseph MERGUI [mergui@caldera.fr](mailto:mergui@caldera.fr)  
**If you have questions about color management**, if you are in the US you can contact: ImageTech at: [www.ImageTechDigital.com](http://www.ImageTechDigital.com)  
 Mark Spandorf (owner and president), [mark@imagetechdigital.com](mailto:mark@imagetechdigital.com) or 510 238-8905. If you are in Europe or the rest of the world you can contact BARBIERI directly at: BARBIERI electronic snc, [info@BARBIERIElectronic.com](mailto:info@BARBIERIElectronic.com) [www.BARBIERIElectronic.com](http://www.BARBIERIElectronic.com)  
 Tel.: +39 0472 834 024, Fax: +39 0472 833 845.

## 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 than ours, please let us know at [ReaderService@FLAAR.org](mailto: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).

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## 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](mailto: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](http://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

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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](http://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](http://www.wide-format-printers.NET).

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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.

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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 work-around. 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.

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 may 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.

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.

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

#### **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.

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.

### Acknowledgements

With 15 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 incapacities 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 recommended 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 and for funds to allow us to attend all major international trade shows, which are ideal locations for us to gather information. We thank Sun LLC, Caldera, Raster Printers, LexJet, DigiFab, Barbieri electronic, Mutoh Europe, IP&I, Dilli, Yuhan-Kimberly, InkWin, GCC, Grapo, Durst, Teckwin and Zund 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 2008), 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.

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](http://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](http://www.FineArtGicleePrinters.org) sites.

Barbieri electronic (color management), Caldera (RIP), ColorSpan, DEC, Durst, Gerber, Grapo, IP&I, Mimaki USA, Mutoh, Dilli, GCC, NUR, Oce, Shiraz (RIP), Sun, Teckwin, VUTEk, Xerox, Yuhan-Kimberly, Zund have each brought FLAAR staff to their headquarters and printer factories. Bordeaux, InkWin and Sunflower ink have brought us to inspect their ink manufacturing facilities and demo rooms. We have visited the world headquarters and demo rooms of HP in Barcelona and received informative and helpful technology briefings. 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 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 Hewlett-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 primary 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, 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.

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.

Free Sample Publications  
**FLAAR Reports**

You can find these and more reports at: [www.wide-format-printers.NET](http://www.wide-format-printers.NET)


FLAAR Reports  
**Custom Wallpaper Digitally Printed**  
  
Yuhan-Kimberly  
UJET MC3 Express

FLAAR Reports  
**Direct printing on Textiles**  
  
DigiFab  
StampaJet I-64

FLAAR Reports  
**Books and Publications on Color Management & ICC Color Profiles**  


FLAAR Reports  
**Durst Rho 351R**  


FLAAR Reports  
**Flatbed Printing (UV-Cured) & XY Flatbed Contour Cutting**  


FLAAR Reports  
**Raster Printers Daytona H700UV**  


FLAAR Reports  
**Entry-Level Dedicated Flatbed UV Printer**  
  
Raster Printers  
Daytona T600UV

FLAAR Reports  
**Dedicated Flatbed UV-Cured Printer**  
  
GRAPO Manta


FLAAR Reports  
**Wide-Format Printer for Textiles Silk, Cotton, Polyester**  
  
Yuhan-Kimberly  
UJet MC3-Premium

FLAAR Reports  
**Mid-Range UV Combo printer**  
  
Dilli NeoPlus UVP-2506(W), 1606(W)

FLAAR Reports  
**RIP Software for Solvent & UV**  
  
Caldera RIP Software


FLAAR Reports  
**Glossary of terms on Color Management & ICC Color Profiles**  
  
for wide format printers,  
digital cameras & scanners

FLAAR Reports  
**One-Pass per Color Speed, together with high quality**  
  
Preview of New UV Printer  
Grapo Shark

FLAAR Reports  
**Eco-Solvent, Bio-Solvent & Dye Sublimation Textile Inks**  
  
How to Judge After-Market Inks (Third-Party Alternative Inks)

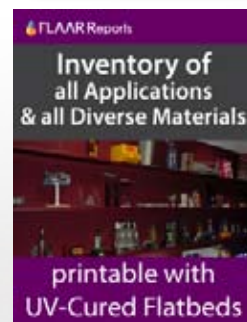
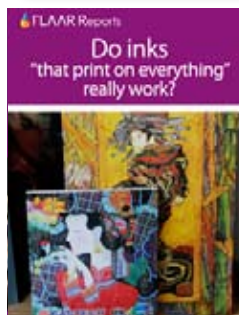
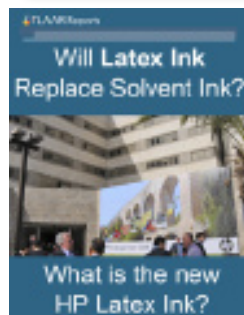
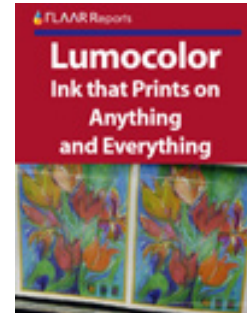
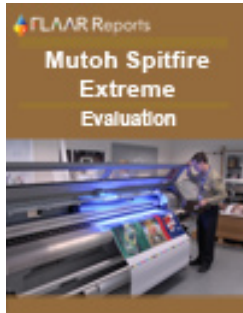
FLAAR Reports  
**GCC LaserPro CO2 Laser Engraver Laser Cutter**  


FLAAR Reports  
**12 Colors, Fast, Wide-Format Print onto Silk, Cotton, Polyester**  
  
Yuhan-Kimberly  
Production Textile Printers

FLAAR Reports  
**Reproducing 3D Objects with a 3D Scanner and a 3D Rapid Prototyper**  


## These FLAAR Reports

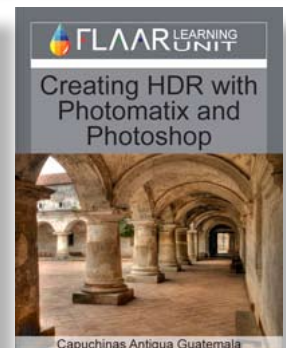
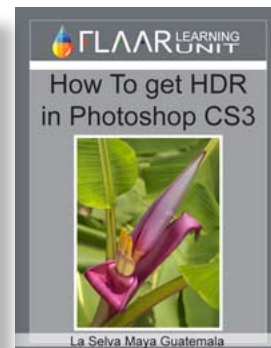
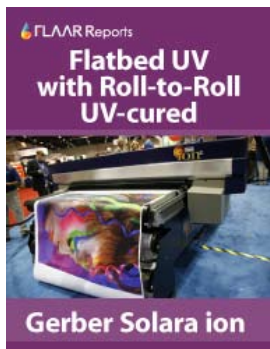
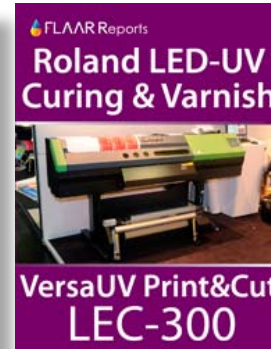
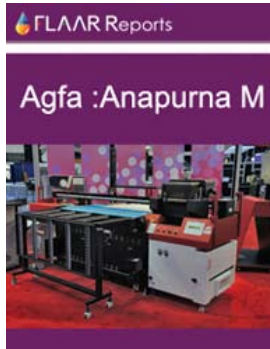
can be obtained at no cost by filling out the Survey-Inquiry Form, which you can find by clicking on the "Access to Survey for Free FLAAR Reports" link on [www.wide-format-printers.NET](http://www.wide-format-printers.NET)



The advantages of filling out the FLAAR Survey-Inquiry Form are that you can receive multiple benefits: up to six additional different FLAAR Reports (at no cost) but titles you can't download without filling out the request form. Second, you get access to the digital imaging specialists of our partners who can answer your questions in person on the telephone.

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Each month Dr Nicholas Hellmuth travels around the world to investigate and learn more about the new technology.

This site is dedicated to bring you the latest facts on UV-Curable systems, that's why you will find the newest information, if you acquire your Subscription you will have access to these and more FLAAR Reports.

You can have more information at [ReaderService@FLAAR.org](mailto:ReaderService@FLAAR.org)