

Color Management in the Real World



**Site-Visit Case Study with Grand Format
Solvent and UV-Curable Printers**



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Introduction

During November 2008 it was possible to visit a digital signage printing company with more than two dozen wide-format inkjet printers. This is the largest signage printing company in Slovenia, Print Division. I thank Nebojsa Stankovic for spending the time to take us around the entire facility, to both their buildings, and Zoran Markovic, Director, for a discussion of their past, present, and future plans. It is interesting to learn what future wide-format printers are of interest for their acquisition, and which other kinds of printer are not an interest.

This trip had been organized by Stefan Barbieri and Wolfgang Passler of BARBIERI electronic at the invitation of Print Division. Since two of us from FLAAR happened to be in Europe at the same time, we went along on this visit.

My interest was to see how color management equipment functioned in the real world, as well as to inspect the various printer brands and models that this large and successful print shop was using.



In this photo: Nicholas Hellmuth, Nebojsa Stankovic from Print Division, Wolfgang Passler & Stefan Barbieri from BARBIERI Electronic.

Photographic background

Print Division has a background in printing photographs. Their Durst Lambda 130 still works (for ten years), and is still in action, often two shifts a day. By coincidence BARBIERI electronic also has their background in photo labs: making densitometers since the 1980's.



Durst Lambda 130 at Print Division.



Big, Serious, Production of Billboards, Banners, and Signage

Print Division is a large and successful printing company. They are located in Maribor, northern Slovenia, a few kilometers south of Graz.¹ Four years ago Print Division had two printers: a Salsa and a NUR Fresco HiQ1800, today they have more than 25 printers in action:

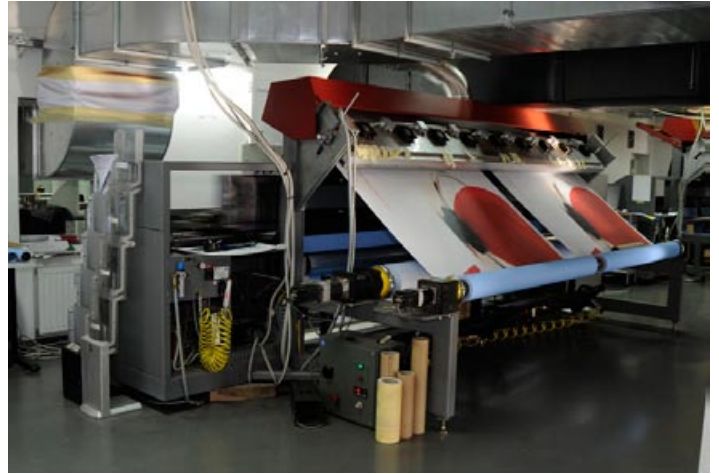
- 7 big solvent printers (mostly ISIJet 3400)
- 2 Seiko ColorPainter printers
- several Roland printers
- 8 UV-curable printers (three Bluestreak from ISI and five Durst Rho)
 - three Rho 160
 - one Rho 205
 - one Rho 600 Pictor
- three XES (Xerox) ColorGrafx X2, oil-based printers
- two textile printers (Mimaki Tx2 and ATP/Roland)
- a giant industrial-sized Monti Antonio calendering machine (a prestige brand of calendering system for dye sublimation from paper onto fabric).

Plus additional miscellaneous printers, and of course laminating equipment, etc.

The Colorfrafx X2 are used for low-cost backlit, indoor use only. The oil-based ink comes from Sun.

Of the Roland printers, each machine tends to be used for one specific material. One uses a Hexachrome ink set.

¹ *FLAAR had an office in Graz, Austria, for eight years while Hellmuth received his PhD at the university there.*



ISIJet 3400 Printers at Print Division.



UV curable Bluestreak from ISI.



Durst Rho 160 & 600 at Print Division.



XES (Xerox) ColorGrafx X2.



Mimaki Tx2.



ATP/Roland.



NUR Fresco HiQ1800.



Monti Antonio calendering machine.

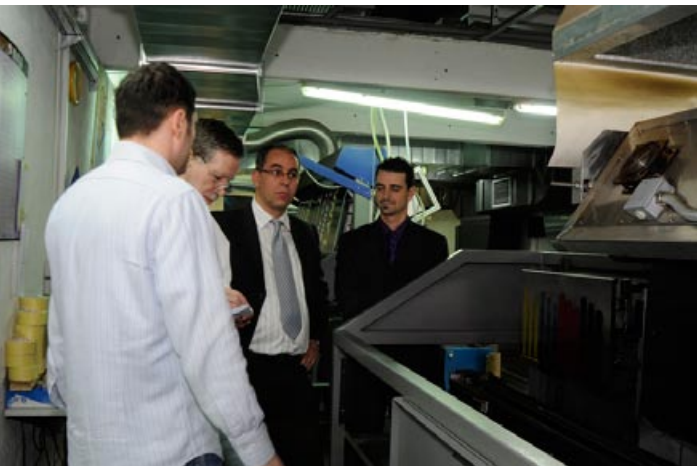
In-house Tech Support & Repairs

The ISI BlueStreak UV-cured roll-to-roll printers are usable primarily because the printshop is capable of maintaining and repairing the ISI printers in-house. Gretag Imaging started to sell these printers many years ago, before this Gretag printing division imploded (its remains were bought by Océ). Then ColorSpan started to sell the ISI printers, but dropped them after a year or so. Then ISI exhibited at a few trade shows on their own (about four years ago, but not since then). The manager of technology at Print Division said "ISI solvent printers; when you finally make it work, it's great." In other words, these are labor intensive printers. This is not something that outside tech support will resolve for you. The reason Print Division has been so successful is because on their own they can not only repair and maintain these grand format printers, they can modify the printers' hardware.

For example, each printer was modified to allow it to handle better one or more specific kinds of materials. This is the philosophy of Print Division: customize each printer to better handle one or two specific materials. Instead of buying one brand-new expensive printer to handle everything, they have achieved success by buying many second-hand printers and then modifying them in-house to handle their own specific needs.

Modifying the ISI Solvent Printers

For example, Print Division modified the machine with indirect pre-heating, and added their own mesh kit (for printing on any material where the ink goes through the weave onto the platen).



ISIJet 3400 printers at Print Division.

Substrates used

Because of the number of tons of materials that Print Division uses each year, they work together with paper manufacturers to obtain access to materials that have the qualities that they need to add. Paper manufacturers in turn can learn from Print Division about what features are beneficial to offer on new substrates or improving traditional substrates for the new reality.

Stankovic commented that Lenzing blueback paper is very cheap yet gets the job done. They use Aconda backlit for their UV printers. They would like to use more recyclable PE

Modifying the BlueStreak UV Printers

The BlueStreak is developed and manufactured at the same factory in Alabama as are the ISI solvent printers. The BlueStreak is an old NUR Blueboard printer, retrofitted to a UV-curable printer by ISI.

The BlueStreak are okay as long as you have enough experience to further modify them yourself. Print Division modifies most of their UV printers; for example, they put a static bar on the Rho 205.

The USB system of the BlueStreaks all needed to be significantly modified. The pattern is clear: capable engineers work in the manufacturing plant, but they are light years away from the reality of day to day printing (the only manufacturer of printers who is also an end-user, an actual sign printing company is Grapo).

An air extraction system was required on the UV lamp assemblage. The next improvement which is needed will be to angle the UV curing lamp assemblage. Durst already learned the advantage of setting the curing lamps at an angle from comments earlier from the experience of Print Division. In other words, the technical capability of Print Division (personified by Nebojsa Stankovic's knowledge and experience in grand format printer hardware and software) is sufficient to allow this printing company to be a significant resource for improving the features of any printer.

On the BlueStreak UV-curing printers, they also needed to add extra insulation between the UV lamps and the printhead area (the UV lamps are from Fusion, but insulation would have been required no matter what kind of brand of lamp).



UV curable BlueStreak from ISI.

Textile Printers

“I have an ATP textile printer, and have not had any service issues for two years.” Print Division also has a Mimaki TX2. They use Ciba (Ciba Speciality Chemicals Inc) inks, though evidently it took this ink company a while to make textile inks that were acceptable. They have a giant Monti Antonio calendering machine.



ATP textile printer.



Mimaki TX2.



Monti Antonio calendering machine.



Cost Benefits of Using a Capable RIP and ICC Color Profiles

It is a well known secret that proficient color management can help you lower ink consumption. Print Division estimates they save 20-25% of the solvent ink needed on PVC, vinyl, and banner material. He said that “with UV the savings is even more.” (higher percent and also higher cost savings since the UV ink is more expensive to begin with). Also, a liter of UV ink covers almost 50% more square meters than a liter of solvent ink, so your cost savings are further multiplied.

“Even a small percent less ink translates into tens of liters ink savings per month.” At a price of an average of \$100 per liter (for smaller UV printers the ink can cost up to \$250 per liter!), you are saving a thousand dollars (or more) a month.

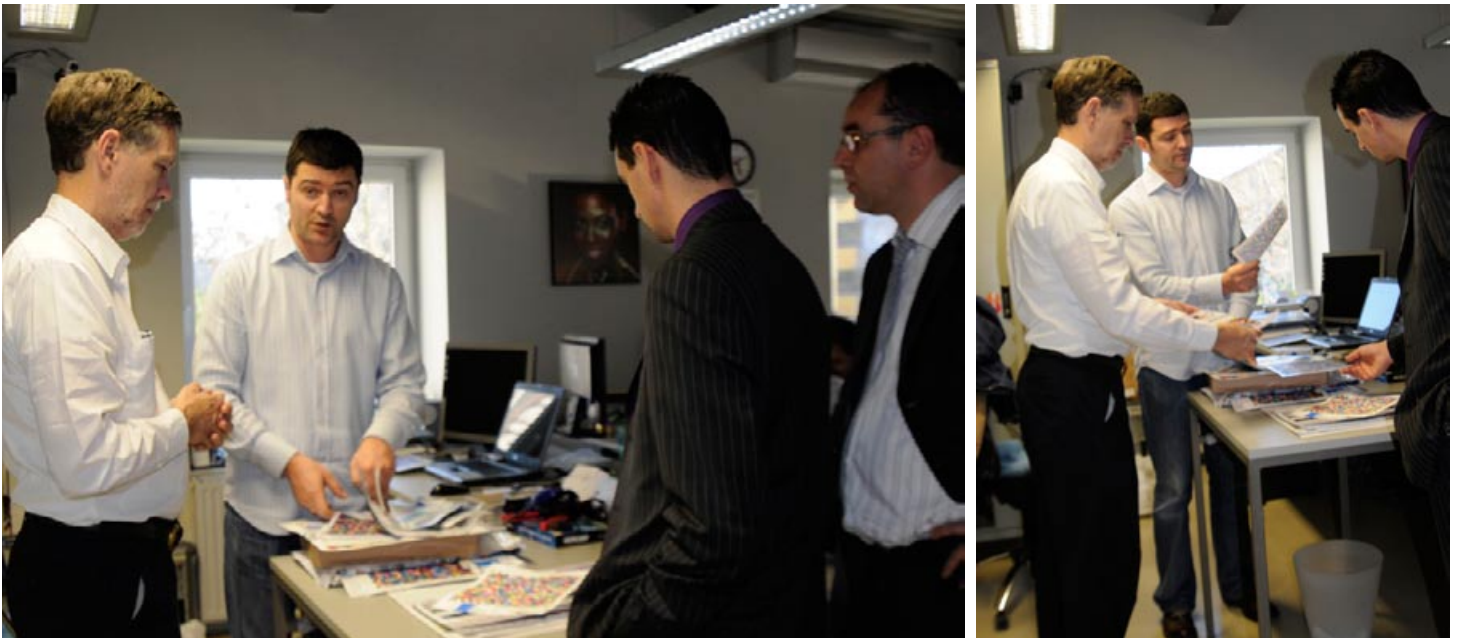
By using a BARBIERI color management system which has been designed to fulfill specially the needs of UV and solvent printing, you don't need the tiny percentage of some colors when creating the colors you need. The normal inkjet printer will use a percentage of CMY in more cases than really needed. BARBIERI can reduce the need for some of that color.

GCR helps reduce need for colors still more.

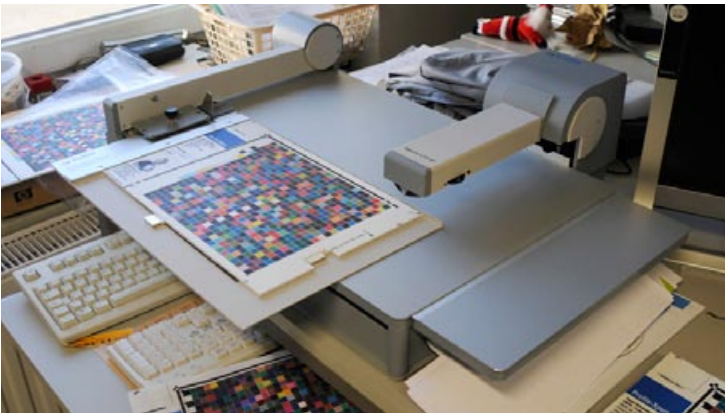
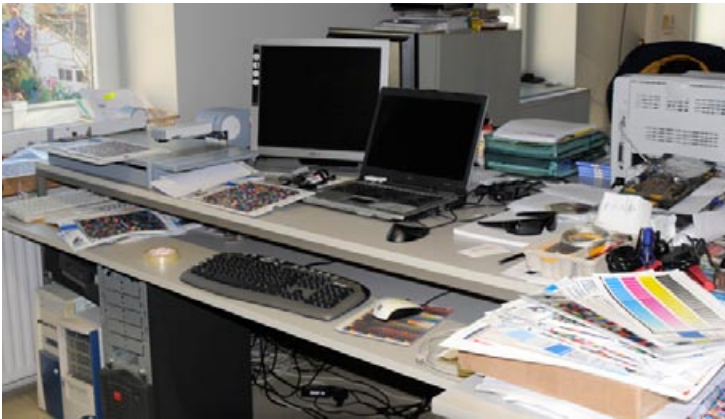
“If you use 800 liters a month of ink you can save 2000 Euros a month in just solvent ink (and we save more than that on UV ink).”

Since the BARBIERI spectrophotometer and associated ICC color profiling software costs X-thousand Euros, you need just two or three months of color management and you have already paid for your BARBIERI workflow solution. Even if you have only one UV printer, you will eventually save enough ink to cover the cost of your BARBIERI system. This assumes you have been doing no linearization, no setting of ink limits, and no GCR previously.

The tech support person of a Canon dealer said that he can save his clients up to 40% in ink usage when they learn how to handle a good RIP and color management workflow.



Nebojsa Stankovic from Print Division, explaining how Print Division saves ink consumption with color management from BARBIERI Electronic products.



BARBIERI Spectro LFP at Print Division.

BARBIERI spectrophotometers ease of use

“Barbieri helped me a lot. Now I can do color management with my left hand” (previously he had used a GretagMacbeth system for several years).

“About three or four times a week we use the Barbieri.”

“If there are a few nozzles out, we may do a quick recalibration with the Barbieri Spectro LFP to enable running the printer until it is back in full form.”

“Using the Barbieri equipment is such easy that no special knowledge or training is needed. Everyone can use it.”

BARBIERI hardware can be used with both Macintosh and PC.

Caldera RIP is a capable software

When I asked about their RIP, the reply was “Caldera, they do a good job.” Stankovic said that he had modified the linearization (using the BARBIERI Spectro LFP) to get even better results. Again, this company has so many printers, cranks out so many kilometers of signage, that they know the hardware and software well enough to tweak it.

Another printshop owner (in another city) has a Durst Rho and an Oce Arizona 250. He uses Onyx RIP on his Oce and uses Caldera on the Rho. He says that with Onyx he can't get some Pantone colors, but with Caldera he can get the perfect orange that he and his clients need.

If you really get into your software, if you are either a geek or extremely proficient, you can also tweak some aspects.

Applications

The three Durst Rho 160 printers are used mainly for backlit. “The Spectro LFP from Barbieri is the only device who is able to measure such transparent media” said Stankovic.

Concluding Comments

Print Division initially used a GretagMacBeth Spectrolino/Spectroscan (rated as one of the better color instruments of recent years). But “now that we have the Barbieri Spectro LFP, we have replaced it 110%”. More than this, now we are saving a lot of money on inks thanks to the investment in this state of the art color management equipment.”

Appendix A:

Visit to demo room and factory of BARBIERI electronic in Europe

It is the practice of FLAAR to visit the headquarters of any company whose products we are evaluating because it is important to know what's behind the product. For example, what if the company that makes your product is close to bankruptcy? What if the manufacturer of your printer has a cash flow problem and can't pay their invoices? Perhaps they will lower their quality, use cheaper parts, and what used to be a great printer last year will gradually become a machine plagued with problems.

I visited one RIP company in Europe whose entire previously substantial office suite was clearly empty: no more employees other than three people. Clearly this company was not going to survive (this was about eight years ago). About three months after my visit what little remains of this company disintegrated and its pieces were bought by others.



Merely having a large and successful parent company is no guarantee for success of a product. 3M Cactus RIP would be a good example: huge company behind it (3M), but the product line disintegrated (it was considered an excellent RIP software in its heyday).

DuPont is an even better example: tons of money, a Fortune 500 company: but if you own their Artistri textile printer or worse, their Cromaprint 22 UV printer, their resale value after DuPont abandoned handling printer hardware is about zilch.

And what about the people who thought that buying a Swiss-made UV flatbed was a good investment? Their half-million dollar Luscher JetPrint system is now an expensive doorstop. Even to ship a printer this size to the dumpster is a significant expense (Luscher basically could not get the overall system to work adequately, and simply dropped out of the inkjet manufacturing market).

Most printshop owners do not want to buy a product from a company that is going under. Indeed many owners and managers of large printshops said they were not interested in buying a printer, no matter how good it is, from a company that is about to be bought by someone else.

BARBIERI electronic company is in good health, is successful, and is family-owned and family operated. So this company has none of the problems listed above.



BARBIERI electronic factory visit.

So, in addition to wanting to learn about a company's products, there are many reasons for FLAAR to visit a company factory, demo room, and headquarters. We wish to learn who stands behind the product. In Brixen (Bressanone, South Tirol, which is part of northern Italy), it was possible to see the founder of the company, Siegfried Barbieri still at work every day. Stefan Barbieri is General Manager as well as Product Manager of color management solutions, Markus Barbieri handles research and development as Technical Manager. He had just returned from technical conferences (ICC Developer Conference and ICC Meeting) in the US. Wolfgang Passler is International Marketing and Sales Manager. Everyone is pictured on the www.barbierielectronic.com web site.

BARBIERI electronic was founded in 1983 as manufacturer of densitometers for the photographic process control and very soon they became leader in this market. Since more than ten years they are producing high quality spectrophotometers. Today BARBIERI focuses mainly on the professional UV and solvent printing market (wide, super-wide, flatbed and special printing).

I have noticed the BARBIERI electronic booth at trade shows for almost ten years now, since Photokina 1998. As mentioned above, this is a family run business, which tends to be an asset, since if your own family name is the brand name, you want



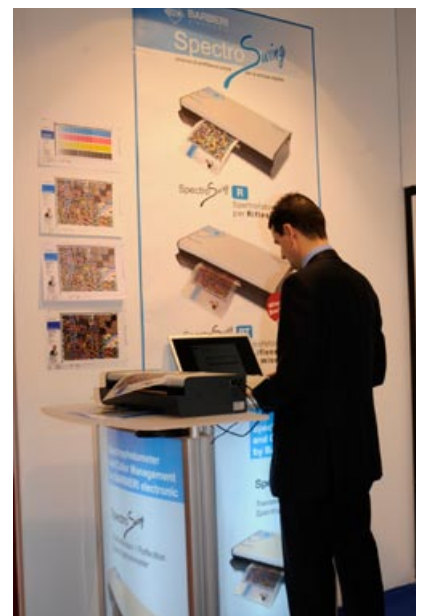
Siegfried Barbieri at the center of this photo.

to be sure it is respected. Indeed the spectrophotometers manufactured here are considered at the high-end. These are not really competition for X-Rite because X-Rite has understandably gone after the entry-level market, which is typical for the US. In Europe there is more interest in sophisticated European-type equipment, what GretagMacbeth represented in past years. But those high-end Gretag instruments are no longer manufactured.

BARBIERI electronic besides offering special measuring devices to OEM customers have two main products, the Spectro Swing and Spectro LFP. Both devices are unique worldwide thanks to their special features (fully automatic measurements also of transmissive media is one of them). The Spectro Swing is used for measurements of thin flexible media in the production environment as well as for fine art and photographic printing (not to confuse with the iSis from X-Rite which is mainly for the proofing market). It is also the entry level device from BARBIERI. The Spectro LFP indeed is specifically developed to serve as a universal measuring device as it can really measure every kind of media. This thanks to its ability to measure automatically also thick media, transparent ones and even the measuring aperture can be switched from a smaller to a wider one. This device is Barbieri's answer to the very fast growing UV, solvent and Industrial printing market where almost every day new media, Ink and applications arise.



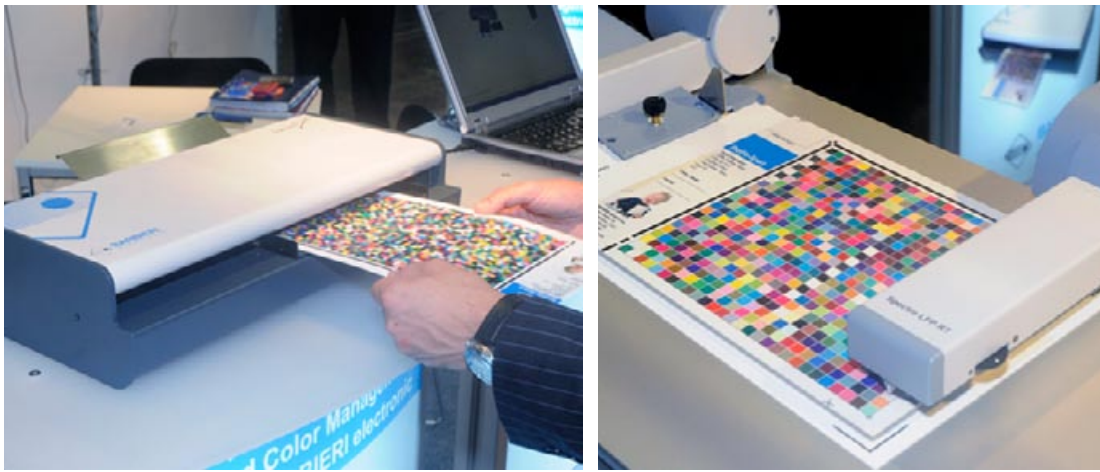
BARBIERI electronic.



BARBIERI electronic booth at VISCOM Italy 2008.

Ten years ago color management equipment was made to read on inkjet or photographic paper. Today printshops are printing on fabrics, wood, ceramics, glass, stone, banner and a diverse variety of other materials. Now that the Océ LightJet is no longer made, more companies are doing backlit with UV-cured inkjet printers. So you need a spectrophotometer which can handle also transmissive materials. The BARBIERI Spectro LFP can handle all these materials. Other brands of spectrophotometers can not.

Many printer and RIP manufacturers recognized the Spectro LFP as an ideal solution for production level printing at the high-end, and many printer and RIP manufacturers are specifically using BARBIERI equipment regularly. Some of them are: Durst, EFI VUTEK, Gandinnovations, Mutoh, Spühl, Neolt, Azon (Germany), Océ, Epson (Italy), Folex, Mactac, Caldera, Efi, ColorGate, Ergosoft, CGS, GMG (Italy), Onyx, SAi, Wasatch and many others.



BARBIERI electronic booth at Photokina 2008.



BARBIERI electronic booth at FESPA Digital 2008.

Why does FLAAR go to this effort to learn about color management?

Our background is in large-format photography of thousand-year old cultural heritage of Latin America. FLAAR was the consultant through Japan's Ministry of Education for Japan's National Museum of Ethnology, Osaka, in the dawn of digital imaging in 1996. In the earlier 1990's FLAAR was already recognized worldwide as one of the premier specialists in large-format professional photography of architectural history (Maya pyramids and temples) and of artifacts. Photographs from the FLAAR Photo Archive of pre-Columbian archaeology grace many Japanese coffee table art books, as well as books on ethno-botany of cacao (chocolate). Dr Hellmuth has also lectured at the Museum of Tobacco, Tokyo (tobacco was widely used by the ancient Maya, both as cigars and also as an ingredient in potent sacred trance sessions). Previously in the 1970's Nicholas had done research in the Archivo General de Indias, Seville, Spain, on Spanish notes from 1696 of prehispanic tobacco use among the Choltilacandon Maya of Chiapas, Mexico (adjacent to the current border with Guatemala).

FLAAR had the first digital circumferential rollout camera in the world by 1997 (as beta-tester for BetterLight tri-linear scanning backs for 4x5 cameras such as Sinar, Linhof, Cambo, ArcaSwiss, etc).

Already several years ago FLAAR was recognized as an innovative leader in high-end digital photography in anthropology and archaeology. Indeed Dr Hellmuth was selected circa 2002 by the Malta Centre for Restoration to train their entire photographic staff (part of the University of Malta department of cultural heritage for the Island of Malta).

Today FLAAR specializes in Maya ethno-botany and ethno-zoology research, the study of tropical flora and fauna of Guatemala relative to the Maya culture past and present. It is essential to have the colors of the different flowers and bird species as precise as possible. So our interest in color management is to learn for our own needs. Once we have studied what equipment is available, we simply make the results of our own evaluations available to the general public.



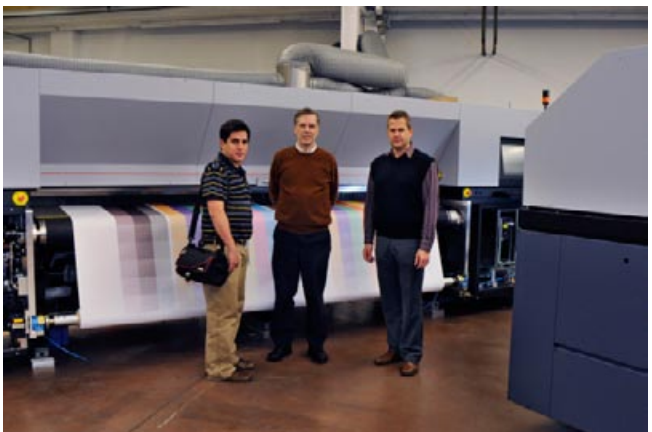
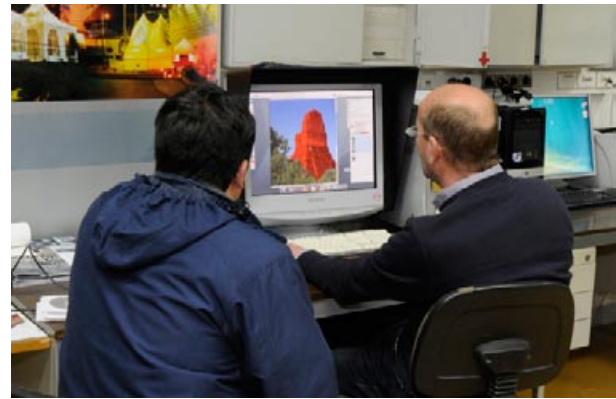
Here you can see the Durst Rho 320R at VISCOM Italy printing examples of FLAAR research on cacao, which is indigenous to Guatemala and adjacent countries.



Since FLAAR is non-profit, we appreciate it when companies provide research sponsorship. This funding also helps cover the costs of the approximately 14+ students who work for the FLAAR Projects as photography assistants, graphic designers, and the web designers who take what we learn and put it on the Internet for the over one million readers of the FLAAR Reports web pages. For example, current research sponsorship from BARBIERI electronic made it possible to offer Guatemalan university student Luis Sacayon the opportunity to spend three days at VISCOM Italy to learn about all the UV, solvent, and textile printers; to spend the time in Brixen to learn about spectrophotometers and color management, and then to undertake two site-visit case studies of printshops in Slovenia: Print Division in Maribor, and another separate printshop south of Ljubljana the day he flew back to the FLAAR offices.



Here is Luis Sacayón at Print Division site visit in Maribor Slovenia.



Here is Luis Sacayón at Durst factory visit at Brixen Italy.

Students who work on FLAAR research projects gain an advantage in terms of experience, that is helpful to them after they graduate and need to move out into the more commercially oriented world.

The color of an ancient mural, the color of a macaw's feathers, the white balance of the sacred water lily, are the reasons why FLAAR is interested in color management workflow, which also includes RIP software for linearization. We exhibit our photographs using wide-format inkjet prints and prefer that the color be accurate for the audience that will study our material.



Waterlilys from Monterrico Guatemala.



Photos from La Ruta Maya.



Durst factory visit, Brixen Italy October 2008.



Durst factory visit, Brixen Italy October 2008.



Durst factory visit, Brixen Italy November 2008.

Here are examples of FLAAR photographs where color management is important. These photographs are printed on a UV-cured printer with BARBIERI spectrophotometers during the ICC profiles and using Caldera RIP software.

Appendix B: Comments on BARBIERI Color Management Equipment

Visiting a manufacturer's headquarters is one step in an evaluation of the company that stands behind the product. But more important is to learn how end-users feel about the product. Does it work? Is the product robust? Is it user friendly?

As long as we are looking at reader comments about spectrophotometers, I would like to add the comments from an additional printer person elsewhere (not in Slovenia). This colleague has experience in grand format solvent printers and grand format UV printers, actually more years of experience with superwide printers than I have.

"Both my production manager and I are in full agreement that the LFP is by absolute far the best device we have ever seen or used, and you deserve to be congratulated on it, I feel that it's a pure example on Barbieri Electronic's focus on accuracy, quality, and being the best."

"The accuracy is very high. The three-point detector enables reading the correct patches fully automatically even if the chart is mounted not straight (also for Gretag)".

"Practically, Barbieri spectrophotometers are built with a metal frame allowing the heavy materials to be placed and have stability while measurements are performed."

"I do believe that this machine was designed for environments like digital printing workshops, where dust, vibrations, is mostly present. This is really a device to work with."

"It is like Caldera Nicholas, once you try it you cannot stop loving it. I like to use their devices. I work with pleasure and have fun."

"Reading transparent materials is also possible while in any other device on the market it is not. I have recommended the Barbieri machine to one of the customers and in shortest time he had reliable profiles on backlit materials."

"Had a play with the BARBIERI Spectro LFP on Friday, it performed brilliantly!"

Editor's comment:

I intend to continue interviewing printer operators and inspecting printshops that use color management equipment. Indeed I am especially interested in screen printing companies who are switching to UV-curable flatbed printers. Most of these screen printing companies are accustomed to using spot colors, and thus when they enter the world of large-format inkjet printers they tend to tweak the color by eye: they do not use a spectrophotometer or any ICC color profiles.

My intent is to do a study to compare before-and-after, to learn how such a screen printing company fares after it has instituted color management workflow using a spectrophotometer and ICC profiling software.

FLAAR is also interested in on-board spectrophotometers, such as that on the HP Z3200, the different system on the Epson 7900 and 9900, and what will be on the next generation of Canon water-based printers (obviously they can't afford to be the only fine art printer with no on-board color management system).

While on the subject of color management, this also includes working with RIP software. Our first sponsored research project is with Caldera, initiated with a visit to their headquarters in Strasbourg, France. Here it was possible to have hands-on experience with their capable technical staff.

During 2009 we look forward to additional color management workflow and RIP software sponsored research projects.

To obtain information about color management hardware and software for North America (especially USA), about the advantages of BARBIERI electronic, contact.

Don Bobenhouse
e-mail: dbobenhouse@smartstuffinc.com
Office phone: 636-532-6131

SmartStuff is the master distributor for BARBIERI electronic in the USA. In the past SmartStuff was master distributor for Kodak CreoScitex scanners (the best flatbed scanner in the world).

FLAAR has visited the offices of SmartStuff (they are near the office FLAAR in St Louis, Missouri). We know the company and the manager, Don Bobenhouse.



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

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 and color management equipment.

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 man-

agement 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 their distributors 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

If you have questions about color management, if you are in the US you can contact: ImageTech at:

www.ImageTechDigital.com

Mark Spandorf (owner and president), 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

www.BARBIERIElectronic.com

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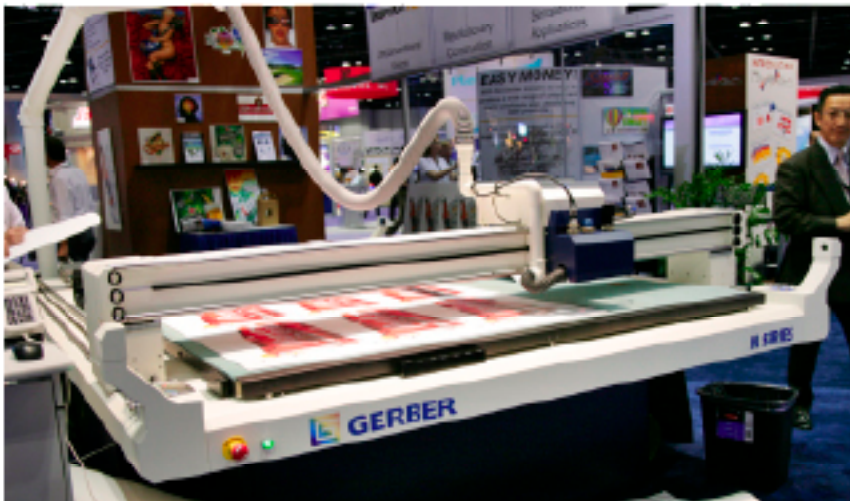
As soon as you have your UV-flatbed printer, your printshop will desire to have a cutter or trimmer.

First you need to trim. Simple cutting of the edges of your board so the edges are neat and clean. Then of course some clients will ask if you can do contour-cutting. This means you can offer additional services and earn additional income.

The best way to learn about trimmers is to ask a distributor who has more than one brand. This way they do not push their house brand and denigrate brands that they do not carry. Also, you want a real person that actually has experience. Otherwise you get a "box pusher" who is simply an Internet sales person, who does not know trimmer from dimmer.

The person we suggest is Mike Lind because his company, Reprographic Designs, handles all leading brands: KeenCut, Neolt, Meteor Metoschnitt, RotaTrim, etc. You can contact him at 1 281 492 2714 or malind@msn.com.

His company is also the Master Distributor for Cruse reprographic scanners in the US and adjacent countries.



XY Cutter Options

In a period of economic recession printshops will tend to ask about options that are priced lower than high-end prices. Thus we suggest a possible solution at mid-range price: Gerber M class cutters. I have inspected two huge factory complexes of Gerber Scientific in 2008 (especially their cutters for fabrics) and will be visiting their facilities again in 2009.

To contact Gerber:

Phone (US): 800-222-7446, email: cservice@gspinc.com

Fax: 800-227-6228 or 860-648-8064

Phone (Intl): 860-648-8028, email: gspinternational@gspinc.com

We have seen Gerber cutters at work during major trade shows, both in Europe and in the US. Gerber has dealers all across the US and Canada, and in Europe is served by Spandex.

When you acquire a UV-curable wide-format printer you will eventually learn that an XY flatbed cutter is a useful accessory for thick rigid materials. The advantage of having an XY cutter is that you are selling not just the print, but a finished work. To stay ahead of the competing printshops in your city it helps to offer your clients a solution for every step of the printing workflow.



Dr. Hellmuth shows a sample processed by the Gerber M Series cutter exhibited at GraphExpo '08.



Gerber M Series cutter at ISA '08.

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. We do not mind eating crow, though so far it is primarily a different philosophy we practice, because since we are not dependent on sales commissions we can openly list the glitches and defects of those printers that have an occasional problem.

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

Licensing Information

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

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

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

Update Policy

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

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

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

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

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

Please Note

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

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

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

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

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

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

Citing and Crediting

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

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

The material in this report is not only copyright, it is also based on years of research. Therefore if you cite or quote a pertinent section, please provide a proper credit, which would be minimally "Nicholas Hellmuth, year, www.FLAAR.org." If the quote is more than a few words then academic tradition would expect that a footnote or entry in your bibliography would reference the complete title. Publisher would be www.FLAAR.org.

If you intend to quote any portion of a FLAAR review in a PowerPoint presentation, if this is in reference to any product that your company

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

Legal notice

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

Advisory

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

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

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

Or the product may indeed have a glitch but one that is so benign for us, or maybe we have long ago gotten used to it and have a 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 manufac-

turers. Same with hundreds of solvent printers and dozens of water-based printers. We observe as best we can, but we cannot take each printer apart to inspect each feature. And for UV printers, these are too expensive to move into our own facilities for long-range testing, so we do as best as is possible under the circumstances. And when a deficiency does become apparent, usually from word-of-mouth or from an end-user, it may take time to get this written up and issued in a new release.

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

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

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

But even when we like a product and recommend it, we still can't guarantee or certify any make or model nor its profitability in use because we don't know the conditions under which a printer system might be utilized in someone else's facility. For ink and media, especially after-market third-party ink and media, it is essential that you test it first, under your conditions. We have no way to assure that any ink or media will be acceptable for your specific needs in your specific print shop. As a result, products are described "as is" and without warranties as to performance or merchantability, or of fitness for a particular purpose. Any such statements in our reports or on our web sites or in discussions do not constitute warranties and shall not be relied on by the buyer in deciding whether to purchase and/or use products we discuss because of the diversity of conditions, materials and/or equipment under which these products may be used. Thus please recognize that no warranty of fitness or profitability for a particular purpose is offered.

The user is advised to test products thoroughly before relying on them. We do not have any special means of analyzing chemical contents or flammability of inks, media, or laminates, nor how these need to be controlled by local laws in your community. There may well be

hazardous chemicals, or outgassing that we are not aware of. Be aware that some inks have severe health hazards associated with them. Some are hazardous to breathe; others are hazardous if you get them on your skin. For example, some chemicals such as cyclohexanone do not sound like chemicals you want to breathe every day. Be sure to obtain, read, and understand the MSDS sheets for the inks, media, and laminates that you intend to use. Both solvent, eco-solvent, and UV-curable inks are substances whose full range of health and environmental hazards are not yet fully revealed. It is essential you use common sense and in general be realistic about the hazards involved, especially those which are not listed or which have not yet been described. FLAAR is not able to list all hazards since we are not necessarily aware of the chemical components of the products we discuss. Our reports are on usability, not on health hazards.

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

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

Results you see at trade shows may not be realistic

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

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

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

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

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

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

Factors influencing output

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

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

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

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

Be aware that some RIPs can only accept ICC color profiles: you quickly find out the hard way that you can't tweak these profiles nor generate new ones. So be sure to get a RIP which can handle all aspects of color management. Many RIPs come in different levels. You may buy one level and be disappointed that the RIP won't do everything. That's because those features you may be lacking are available only in the next level higher of that RIP, often at considerable extra cost. Same thing in the progression of Chevy through Pontiac to Cadillac, or the new Suburbans. A Chevy Suburban simply does not have all the bells and whistles of the Cadillac Escalade version of this SUV.

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

Most newer printer models tend to overcome deficiencies of earlier models. It is possible that our comparative comments point out a glitch in a particular printer that has been taken care of through an improvement in firmware or even an entirely new printer model. So if

we point out a deficiency in a particular printer brand, the model you may buy may not exhibit this headache, or your kind of printing may not trigger the problem. Or you may find a work-around.

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

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

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

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

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

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

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

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

Although we have found several makes and models to work very well in our facilities, how well they work in your facilities may also depend on your local dealer. Some dealers are excellent; others just sell you a box and can't provide much service after the sale. Indeed some

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

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

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

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

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

Taking into consideration we do not know the conditions in which you may be using your hardware, software, or consumables, neither the author nor FLAAR nor either university is liable for liability, loss or damage caused either directly or indirectly by the suggestions in this report nor by hardware, software, or techniques described herein because.

Availability of spare parts may be a significant issue

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

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

Lack of Tech Support Personnel is increasing

The book of sales in the third quarter of 2008 resulted in many tech support problems.

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

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

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

Counterfeit parts are a problem with many printers made in China

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

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

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

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

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

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

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

Be sure to check all FLAAR resources

Please realize that with over 200 different FLAAR Reports on UV printers, you need to be sure to check the more obscure ones too.

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

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

Acknowledgements

With 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 incapacibilities 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 in past years and for funds to allow us to attend all major international trade shows, which are ideal locations for us to gather information. We thank Sun LLC, Caldera, Raster Printers (EFI Rastek), DEC LexJet, DigiFab, Barbieri electronic, Mutoh Europe, IP&I, Dilli, Yuhan-Kimberly, GCC, Grapo, Durst, and WP Digital for providing funds so that we can make more of our publications free to end-users. During 2000-2001 we had grants to cover all the costs of our publications, and all FLAAR Reports were free in those early years. As that early grant naturally expired after a few years, we had to begin charging for some of our reports to cover costs. Now (in 2009), 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) and the over half a million who read either our [wide-format-printers.org](http://www.wide-format-printers.org) site or our roughly half million combined who read our digital-photography.org and www.FineArtGicleePrinters.org sites.

Barbieri electronic (color management), Caldera (RIP), ColorSpan, DEC, Durst, Gerber, Grapo, IP&I, Mimaki USA, Mutoh, Dilli, GCC, NUR, Oce, Shiraz (RIP), Sun, Teckwin, VUTEk, WP Digital, 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.

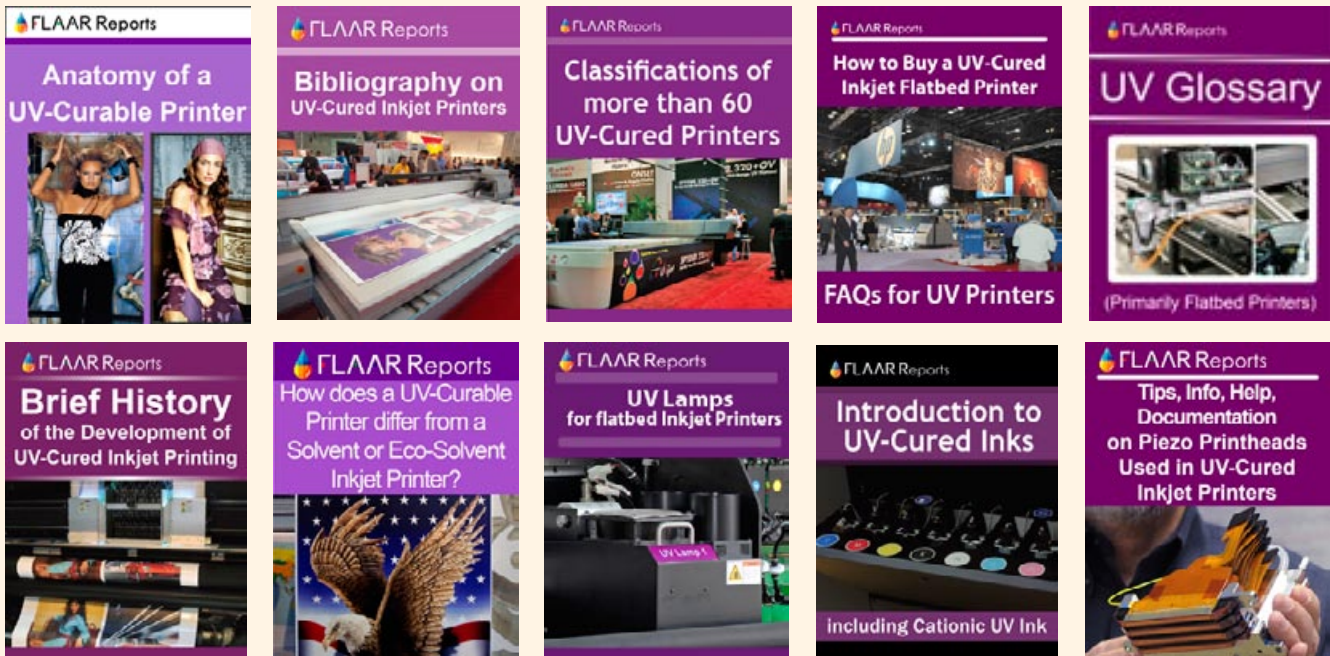
FLAAR also serves as consultants to Fortune 500 companies as well as smaller companies and individuals who seek help on which printers to consider when they need digital imaging hardware and software.

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.

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