

Brief History of the Development of UV-Cured Inkjet Printing



Introduction

UV-curing has been around for a long time in the world of screen printing. But the UV-curing of inkjet inks is barely ten years old.

It is amazing how little information and documentation is available on the development of UV printers during 1997-2001. FLAAR did not begin noticing UV printers until DRUPA 2000 and did not begin dedicating our resources to evaluating this technology full-time until DRUPA 2004. Within two years FLAAR had become the de-facto leader in consulting, evaluations, marketing information, and applications in this field of UV-curable wide-format inkjet printers. By DRUPA 2008 FLAAR Reports covered more than 90% of the principal brands and models of UV-cured printers for signage and related applications (we do not cover UV printers for labels or narrow format).

Since there is so little information available about the years 1997-2001, much of the information herein is courtesy of Michel Caza, Bryan Stringer, Raul Molina and Bill Grambsch. I thank Bruce Butler for sending me a copy of a 1999 Perfect Print brochure; it would help immensely to have a complete set of Perfect and Mechatron brochures, and Sias and early Scitex brochures. My fax # is 419 352 1971.

This introduction to a time-line is only for UV-curing for wide-format inkjet. I do not cover UV-curing of narrow-format label printers.

There are many uncertainties, and some errors, in this reconstructed history for the reason that no one who worked on UV printers in their period has written cogent notes in a year-by-year or company-by-company format. In effect, I have to start from scratch. I have personal experience abundantly from DRUPA 2004 onward, but only limited experience at DRUPA 2000.

So this history of UV printers comes "as is" and will be updated as soon as the many individuals who worked on UV printers in those years can kindly provide corrections and additions to this reconstruction.

Faint Beginnings of UV-Cured Inkjet development in the 1990's

The idea of a UV inkjet printer is proposed by Michel Caza to NUR in mid-1990's. But NUR at that time does not yet see a market or technology, and decides not to develop one. The NUR person says "it's impossible to build this kind of printer."

But Alberto Braza puts printheads on a flatbed (see Appendix).

Someone bought 50% of Siastech, to make a UV printer

"1990's"

mid-1990's a company named Data Mate developed and manufactured one of the first flatbed wide-format inkjet printers ever made. This printer was named the "Rembrandt." It used printheads from Sharp. There is already a brief FLAAR Report on this early flatbed based on seeing two of them in Israel. Otherwise, no specific dates are known and no documentation is available; if you know the dates, please let me know: ReaderService@FLAAR.org.

1997

1997 Mechatron begins development of what eventually became the Zund 215 (Seybold Vol 29, Nums 15 & 16, July 17, 2000, p. 20). These printers were sold by Perfectaprint AG. Mechatron evidently had experience building flatbed cutters.

Circa 1997, Raster Graphics bought Perfecta Print. But Raster Graphics then finds out that Perfectprint only had the right to sell this new UV printer. It turns out that Perfect Print did not actually manufacturer the printer.

The owner of Perfect Print cashes in handsomely and moves to South Africa to enjoy his clever retirement income.



1997 Raster Graphics prototype. Unclear whether this is something Raster Graphics actually designed and built, or whether this is a Raster Graphics version of the Perfect Print printer.

199-, Sias Digital, SiasPrint K1520 and K2030. According to the Seybold Reports, Sias had sold 6 UV units already by the time of DRUPA 2000. This was before the Durst Rho or Inca Eagle were past prototype stage. The Sias printer ended up as the basis for the Scitex Vision VEEjet+ (still with Xaar printheads after all those years). I do not have the dates of the transition from Sias to Scitex, nor what intermediary companies were involved (tips and info would be appreciated).

Most of these early flatbed printers were with solvent or dye-sublimation or other standard inks. In these years there were not yet UV-curable inks readily available for printheads for inkjet technology.

1998

1998 Zund cleverly buys Mechatron A.G. and thus “owns” the actual printer that was previously sold through Perfecta Print (Raster Graphics had bought Perfecta Print, but after Zund bought the manufacturer, Raster Graphics had nothing left to sell).

1999 “Color printing system” (no model listed in Zund history) is introduced at FESPA Munich and ITMA (Paris). www.zund.com/index.asp?topic_id=418&m=385&g=47

199- Perfecta Print PrintMaster (roll-to-roll). I have a copy of a brochure sent in an e-mail on 15-6-99 showing two Perfect Print PrintMaster machines. One is the PrintMaster PM 2200B (primarily for roll-to-roll material). The other is the PrintMaster PM 2200R (no wind-up reel, but yet it advertises itself for textiles, etc. It offers an “option” for glass and metal, but so does the “B” version. So it is very confusing what the differences and why two models that both claim to accept roll-fed and rigid.

Both offer Xaar 180 printheads but also offer Epson printheads. A separate option is “IR or UV drying”. Hard to know whether it means drying or curing. But elsewhere it does mention “UV ink applications” for both models. My notes indicate that earlier versions of the Perfect machines were solvent-based. So seemingly Sericol was offering a rudimentary UV-curable ink by summer 1999.



Perfecta Print PrintMaster at Drupa 2000

199? The major breakthrough, especially for Perfecta/Mechatron, was the availability of UV-curable ink by Sericol. Prior to that, most inkjet flatbeds were solvent-based or used early UV inks from Spain or Italy (Caza, personal communication).

1999

What is missing from the years 1997-2001 are brochures.

I am also missing information on how Siantec acquired flatbed technology, and when they switched from solvent to UV, since their patents (the ones I saw) are on solvent, not UV. Or whether it was Scitex Vision that switched their solvent flatbed to a UV one afterwards.

I am also unsure of the relation between the end of Sias digit UV printer and Siantec (since in these years I was studying Encad, HP and Roland).

2000

2000 Perfecta Print SheetMaster (the rigid version), scheduled to ship by August.

2000 Zund UVjet Sheetmaster shown at DRUPA 2000. Zund Combiprint UV120-F Zund UVjet 215-R (some sources call it the -R, others the -RF)

2000 Sias Digit (sic), SGIA 2000, in booth of M&R Screen (?) (Bill Grambsch). A web site lists this as SGIA 2001, so I am not sure which is the correct year, but Michel Caza also lists SGIA NewOrleans 2000 for the K1520 and K2030 digital flatbed press.

Zund Combiprint UV120-F

Zund UVjet 215-R (some sources call it the -R, others the -RF)

2000 Durst Rho 160 shown at DRUPA 2000 and Photokina 2000 Still had Xaar printheads and was not yet functional at DRUPA 2000. It is my impression that Durst began working on UV technology before Inca, but since everyone had to use Sericol ink and Xaar heads, it was not easy to keep new developments secret for long.

2000 DRUPA 2000, Barco shows prototype of the factory (went on to become the Agfa :Dotrix several years later)



Durst Rho 160 at SFC Graphics

2001

Anyone who has brochures from 2000-2001, I would really appreciate faxed copies or PDFs. For example, I can remember the solvent-based VUTEK flatbed printer circa 2000-2001, but it became UV so quickly that none of my brochures or photos show the details of the pre-UV version.

And I don't have details of the UV printers that failed via bedigital (they started to make one themselves, it was not successful, and so bedigital took on the GRAPO line of UV printers).

There was also a printer developed later in Hungary. I have no information on this, how far they advanced, or why they stopped.

2001 Zund Uvjet 215-Combi launched by Zund

2001 Zund Uvjet 215-C, but still has problems of over heating of the Xaar heads.

2001 B&P takes on distribution of the Zund UVjet 215C UV curable ink printing system in the UK. B&P quickly becomes the world's largest flatbed UV technology installer to date.

2001 Inca Eagle ships in the UK.



Zund Uvjet 215-Combi

2001 Sias Digit (?), from SIASprint, was shown at SGIA 2001, distributed by M&R (<http://boxboard.com> report on SGIA of that year).

200x First VUTEk flatbed solvent ink printer

200x VUTEk tries flash UV lamps (IMI 2004: Integration Tec-nology). This early printer went through many growing pains, as would be expected of such a new technology. The difference is that in 2000-2002, there was no voracious competition to take all your sales away; there was no watchful public that was eager to see every flip-flop of UV-cured technology. And although FLAAR was present at DRUPA 2000, CeBIT, Photokina, ISA, and SGIA (as well as Seybold San Francisco, DPI, etc) in those years, we too were still learning about UV-curable technology. Plus our expertise in those years was fine art photography and giclee.

Most early UV printers use Xaar printheads.

200x bedigital, in Spain, attempts to design and build their own UV printer. But they never bring this to market. Instead they OEM UV printers from GRAPO.

2002

2002 First Inca Eagle 44 installed in the US.

2002 Scitex Vision International buys French company Siantec SARL, practically for peanuts.

2003

2003 Zund is #1 with over 250 installations for the UVJet 215 Combi www.zund.com/indexsp?topicid=418&m=385&g=47

2003 FESPA, Scitex Vision launched VEEjet flatbed UV, based on technology from Siantec.

2004

2004 GRAPO, a sign printing company, designs and builds their own UV curable combo style printer. It actually works so well they can offer a 2-year warranty (no other manufacturer offers that long a warranty). By late 2006, GRAPO has sold 200 of these printers, which is probably more than Scitex Vision sold of their VEEjet during the same years (2004-2005). This shows that yes, a start-up company can indeed develop a UV printer. Unfortunately several other companies failed utterly, including Agfa, Zund (XY-flat, Zund 250).

2004 While GRAPO is growing, Hypernics is waning. By 2005 Hypernics is out of business, as is its US distributor, Azero (their brand in the US was Creon).



VUTEK Print samples at Photokina 2000

2004 NUR courageously launches the world's first dedicated roll-to-roll UV-curable grand format ink jet printer: the NUR Expedio. In subsequent years NUR's daring entry into the roll-to-roll segment of the market results in them gaining over 70% of the roll-to-roll UV market.



Nur Expedio 5000 at SGIA 2004

2004 Sun Chemical, German office, shows a prototype narrow format single-pass UV printer for the packaging industry. But this develops very slowly in following years and even four years later is not a well known printer.

2004 ColorSpan DisplayMaker 72UVR is launched at SGIA '04. This printer goes on to outsell the Zund.

2005

2005 (?) Ardeje UV printer launched at Paris. Regrettably it has never been shown in the US or outside France, and emails sent to the company asking for information were never answered. Since this printer never appeared in 2007 or 2008, I assume it has been withdrawn due to lack of distributors outside France. Unfortunately I never had the chance to see this printer anywhere. Too bad, since I rate this as among the most intriguing UV printers ever designed.

2005 Shown internationally only at FESPA Munich '05, Sprint II, marketed by a Spanish company, PIT. The printer itself was the first UV printer that dared to try Seiko printheads. The machine was manufactured by a company in Bulgaria that made screen printing equipment. Never saw or heard of this printer again after it's expensive first showing.

2005 Agfa :Anapurna 100, branded also as Mutoh Cobra. Prototype shown at FESPA Munich, but was too complex and failed to mature. The Agfa Thieme UV printer is introduced but also has issues.

2006

2006 by late 2006, Aellora closes its doors.

2006 September, HP has mammoth event in Barcelona, Spain: they showcase lots of new printers. I did not attend, but there is a million tons of PR stuck all over the Internet touting all the printers launched here. Sadly, not one single one of these new printers ever is actually put into full production.

200X Several prototype UV machines have been made by engineer Raul Molina.

2007

2007 The ColorSpan DisplayMaker 72UV series (R and X models) have sold over 900 units, outselling the Zund two to one.

2007 FESPA Germany, DYSS shows a UV printer, but it's in the screen printing hall so almost no one sees it; not even FLAAR! I did not see it until SGIA later that year.

2007 FESPA, Screen shows a prototype of their new 2.5 meter combo-style printer and shows samples produced by a prototype small flatbed UV printer.

2007 FESPA, Augend, the renamed company that used to be Infiniti Europe, show two huge printing presses: one with solvent ink the other with UV ink (Augend RF20 UV). The latter is a concept only. These printers are later advertised to be shown at one of the VISCOM venues for that year, but they never reappear and did not reappear at FESPA Digital in 2008 either.

2007 There is no Lüscher JetPrint in the Lüscher booth at FEPA Germany. But Lüscher says nothing to the public (at least nothing loud enough for us to hear it!). Although Lüscher pulls out without notifying people, someone is still trying to sell their huge UV printer to unsuspecting buyers in the UK.

2007 Zund decides not to continue making UV cuable printers; a Swiss product too expensive (and they need their factory space for their growing and successful XY flatbed cutter line).

2007 DuPont finally realizes that it's too expensive to provide tech support to Chinese-made UV printers, and it pulls out just before SGIA, leaving a large vacant space at the trade show booth. DuPont never admits its problems; the PR release is completely in positive PR-language. By this date most people suspected also that DuPont did not really manufacture the UV ink that for three years they claimed was their own. So now three companies are out: DuPont, Lüscher, and Zund.



ColorSpan DisplayMaker 72UV at ISA 07



Zund 215 Plus UV at Fespa 06



DuPont Cromaprint 22uv at Fespa 07



Luscher JetPrint UV at Fespa 05

2007 Autumn, SGIA, Saati shows the Dilli Jupiter, the Aellora hybrid ink UV printer reborn. But a few months later Saati shuts down it's newborn UV inkjet project.

2007 SGIA, Lotte, a huge Korean conglomerate, introduces their Innojet UV900 specialized niche-market flatbed.

2007 Gerber daringly shows a prototype of a flatbed printer at SGIA, using cationic UV ink. It prints only a few hours a day, and very slowly.

2007 HP launches HP Scitex XL2200 with X2 MEMS printhead at SGIA, autumn '07. It claims significantly higher printing speed than the NUR Expedio Revolution a few aisles away. HP Scitex subsequently sells about 40 units. However by about December 2007, HP buys NUR and replaces it's own XL2200 with the NUR line of Expedio printers.

2007 HP buys ColorSpan from MacDermid.

2007 Autumn, VISCOM Germany, Mimaki Europe shows a prototype roll-to-roll UV printer; not grand format.

2007 December, VUTEk has sold 300 of its QS series printers. But the question would be, (for all brands of UV printers, including ColorSpan), how many were returned by the end-users as unsatisfactory?



HP Scitex XL2200

2008

2008 Graphics of the Americas, Miami, late February. EFI VUTEk pull out; Gerber pulls out, but Matan shows its Barak 5 for the first time in the US.

2008 Pre-DRUPA HP Scitex event in Israel, three days; HP shows all the former NUR UV printers in "HP gray" color with new HP Scitex names. No X2 printhead. HP unveils their exciting new HP latex ink.

2008 at a trade show in the Czech Republic, March 2008, REDot introduces their Monsoon UV printer. No one knows anything about where this company came from; they don't even have a web site at this time.

2008 April, FESPA Digital, Gerber pulls its cationic printer out of the show with the result that the Spandex booth (Gerber partner in Europe) has no UV printer whatsoever. Not even a large poster advertisement makes any mention of the Gerber ion. Yet Gerber claims this printer is ready for shipping the following month. Something is fishy somewhere.



2008 at FESPA Digital Mutoh reveals to the public the first in its line of UV printers: a \$120,000+ “Zephyr” UV printer. This is the first major international contender that is hybrid style other than ColorSpan (Keundo and Neolt/Milano are also hybrid but are not major contenders). Two niche market UV printers are shown at FESPA: Chimigraf shows a narrow format single-pass UV printer for tiles and for printing fake wood décor. And Bernstein shows a UV printer for thick objects which uses a retrofitted Mimaki chassis mounted on their own (non-Mimaki) flatbed table.

2008 DRUPA: Agfa reintroduces its :Anapurna 100 printer, stalled for three years. Such a stall has been fatal for Zund.

People who are familiar with what happened in the 1990's

Michel Caza, former President of FESPA (roughly the European equivalent of SGIA but larger and more powerful within Europe).

Patrice Giraud, ESISAR, Valence, France.

Rak Kumar, head of Raster Graphics; key person in Gretag Imaging when they bought Raster Graphics; key person in Océ when they bought Gretag. When eventually let go by Océ, he founded Raster Printers.

Bryan Stringer, used to work at B&P (Lightbrigade, London; he is the “B” of this company); currently Planet Digital.

Bill Grambsch, ACCI, distributor for Zund and now Dilli UV printers

Raul Molina, Ecuatex Digital, system integration engineer who worked on several of the really early UV printers.

In Detail: Sias Digital (courtesy of Raul Molina)

When the Sias Print became better known, over 400 were requested, but only four a month could be manufactured.

Scitex Vision bought the rights to this printer after 20 prototype versions had been sold.

A key person was Fernando Frazquet. The owner of Sias, Alberto Braza, had differences with Fernando, and so Frazquet was disengaged from the company. Then Alberto Braza died. Since the UV printer had been his idea, much of the innovation died with him. There were also differences of opinion also between Fernando Frazquet and Giuseppe Principe, who succeeded Umberto (personal communication from people who were familiar with the scene in those years).

1998 was the first prototype. It used an MIT 128-nozzle printhead, and solvent ink, since UV-curable ink for inkjet printers was not yet available.

DIGITAL UV PIEZO INK-JET FLAT BED – THE “ANCESTER” PRESS FROM SIAS SOME HISTORY

Digital printing UV flat bed... How it started ?

In a certain manner, the way this happened was quite funny : Historically, the idea came probably from me when, speaking in a Show (Visual Com in France 1997 perhaps), I complained about the awful smell and potential danger of the solvents and suggest an exhibitor (NUR) to try to build “UV system” as we did since so many years ago for offset and screen - with the advantage of a giant polyvalence about the substrates and a much better “ecological friendship”... “This is absolutely impossible... technically !” they said ! ... My first idea was “ecological” of course, but, as screen printing in “UV only” since 1979, the immediate second sight was for the fantastic possibilities of the UV technology about the variety of substrates becoming printable ...

Then, the idea stood somewhere in my head and I spoke later with Umberto Brasa (he was one of my best friend since 1962, and we worked together on a lot of screen equipments and machinery!)..

The idea was to use the mechanical expertise of SIAS in flat bed screen printing, combined with its knowledge in matter of UV technology for screen + Xaar piezo heads... He found a company (in South of France) for the electronic part, software and two others (in Spain and Italy) for the UV pigmented inks...

Then, alas, Umberto left us for another world - May 1999), a terrible shock for me and I though the whole project was forgotten..

But the successor of Umberto (Giuseppe Principe, his brother in law) took the destiny of SIAS in hands and decided to keep going with the project...

As a result, the first operational UV machine - already sold at a few ex in Europe (France, Belgium, Spain, etc..) was exhibited in New-Orleans during the SGIA Show (1>4 November 2000) and engendered a tremendous interest, included from some huge European basically screenprinting companies that I introduced to the concept... May be unfortunately because the first press they have got then where far from being good !...



Here under the few lines I wrote about it in the FESPA Magazine number 27.:

SHORT ARTICLE WRITTEN IN FESPA WORLD MAGAZINE =

“Presented in SGIA NEW-ORLEANS from 01 > 04 11 2000

Number one, the SIAS Piezo UV ink-jet digital flat-bed press (K1520 & K2030) A most interesting device for screenprinters willing to become a part of the digital world : everything looks familiar. Flat bed, you can print any rigid substrate up to a thickness of 5 cm (2”), paper/board, any plastic, but also glass and stone, without any special undercoating, nor than overcoating, up to a size of 2 x 3 meters. This with a resolution of 720 dpi (360 dpi doubled) at a speed of 40 m²/hour (of course 80 m² at 360 dpi), an excellent resistance of the ink to the solar UV and chemical and physical aggressions. The new fact is the use of an UV system which both prevent the VOC emission (50% of solvents in most solvent piezo systems) and give an excellent adhesion without any dispersion of the ink on practically any type of substrate. The Driver was a Mutoh RJ-6100 4 pigmented colours.

Later on (early 2001), I had to study the press (K2030) in my company in France, Graficaza, for six months in β stage for tests in production and the report I made about the liability of the press (as it was at that moment), unfortunately, was not very favourable ! But I precisely indicated in details what had to be improved to make it working well ! Alas, a few weeks later, unfortunately despite they were anyway two years in advance, the new management of SIAS decided to stop the project ! Then it was probably Scitex Vision who took the succession, soon followed by Sericol.

Appendix, Information courtesy of **Michel Caza**

Reality Check

Being at a university absolutely 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, since we are not dependent on sales commissions we can openly list the glitches and defects of those printers that have an occasional problem.

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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.

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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 workaround. And not all glitches manifest themselves in all situations, so our evaluator may not have been sufficiently affected that he or she made an issue of any particular situation. Yet such a glitch that we don't emphasize may turn out to be adverse for your different or special application needs.

Equally often, what at first might be blamed on a bad product, usually 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 courses 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.

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.

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.

And 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.

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.

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.

Acknowledgements

Fortunately the university covers some of the operating costs of FLAAR on their campus. Thus we do not really have much incentive to pocket hush money from producers of lousy products. 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 is fairly evident rather quickly.

With 12 employees the funding has to come from somewhere, so although the universities cover the core expenses, 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 and for funds to allow us to attend all major international trade shows, which are ideal locations for us to gather information. We thank Drytac, Sun LLC, Bordeaux Digital PrintInk, Mutoh Europe, NUR (now part of HP), IP&I, Dilli, Yuhan-Kimberly, VUTEK 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. Currently our reports on lamination tips are sponsored by Drytac and our publications on eco-solvent ink printers are sponsored by Mutoh Europe. Now (in 2007), we are seeking corporate sponsorship so we can gradually return to making at least 20% of our publications free to our readers.

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 350,000+ who read either our wide-format-printers.org site or our roughly half million combined who read our digital-photography.org and www.FineArtGicleePrinters.org sites.

ColorSpan, Grapo, IP&I, Mutoh, Dilli, GCC, NUR, Sun, Teckwin, VUTEk, Xerox, Yuhan-Kimberly, Zund have each brought FLAAR staff to their headquarters and printer factories. Bordeaux 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 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 are universities employees (as is 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 primarily income is from Encad printers. Kinkos has settled on the HP 5000 as its main money maker production machine, and so on.

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

Grant funding, sponsorship, demonstration equipment, and training are supplied from all sides of the spectrum of printer equipment and software engineering companies. Thus, there is no incentive to favor one faction over another. We receive support from three manufacturers of thermal printheads (Canon, ColorSpan and HP) and also have multiple printers from two manufacturers of piezo printers (Epson 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.

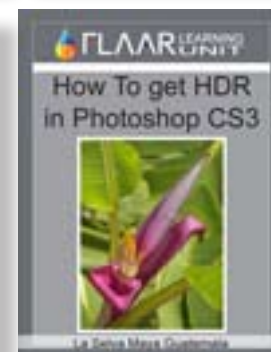
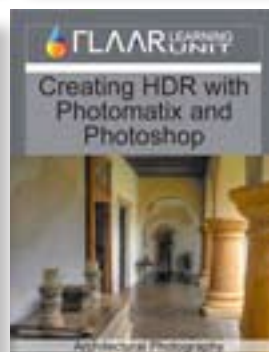
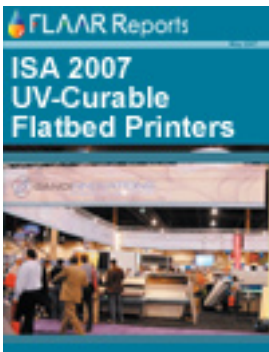
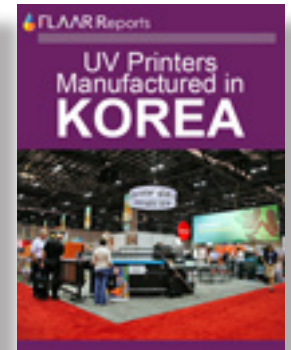
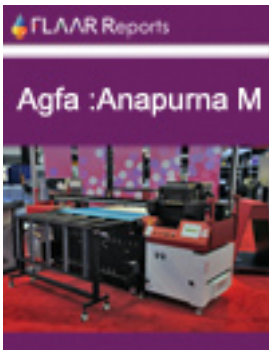
FLAAR also covers its costs of maintaining the immense system of 8 web sites in three languages and its university facilities in part by serving as a consultant such as assisting inkjet manufacturers learn more about the pros and cons of their own printers as well as how to improve their next generation 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.

Order these FLAAR Reports

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



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