

12 Colors, Fast, Wide-Format Print onto Silk, Cotton, Polyester



Yuhan-Kimberly

Production Textile Printers



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Introduction

It was possible to inspect this printer at the factory demo room an hour south of Seoul, Korea in October 2008, a few days before SGIA. The machine I inspected in Korea was an advanced prototype since the production model had already been sent to SGIA in Atlanta.

At SGIA both the Technical Writer from FLAAR (Jose Melgar) and Hellmuth scrutinized the printer in the booth. In order to undertake a full evaluation I will need to inspect a production model in a printshop that is using this printer on a daily basis out in the real world. But I wish to issue this First Look discussion to reveal the color gamut and potential of this printer.

The color is spectacular. Twelve colors for textiles beats eight colors and definitely is superior to six-color output. The actual specifications of the full gamut will be available in color charts and spec sheets from Yuhan-Kimberly by the end of the year.

This printer is especially apt for silk, and also for cotton. You get production speeds without having to pay a million dollars. You get precision engineering of a single beam carriage instead of a complex double-carriage system such as the complicated DuPont Artistri. A double-carriage system begs to have disjunction between the two printing paths.

The main advantage of the current model is that you have an experienced textile ink company (Yuhan-Kimberly) combined with a printer manufacturer with plenty of experience making grand format printers but at reasonable cost (Keundo).



Yuhan K2 VU-1800 printheads and printed sample.

THE BASICS

1. Brand name, model?

The code name was K2, Kimberly plus Keundo. The initial launch name is the Visual Ultimate VU: 1800. Since this is a water-based ink, it is appropriate to have the abbreviation as VU and not as UV (“UV” would be misinterpreted as UltraViolet; this is water-based, not a UV chemistry).

My suggestions for a future non-numerical name would be to have a designation inspired by its speed and 12-color capability.



Nicholas inspecting the inside of the Yuhan-Kimberly K2 in the Keundo factory the week before SGIA 08.



FLAAR continued the evaluation at SGIA 08. The printer was exhibited as the VU:1800

2. What is the nature of the company behind the brand name? Is this company the manufacturer, distributor, or rebranding?

Yuhan-Kimberly is the Korean branch of the Fortune 500 company Kimberly-Clark. Yuhan-Kimberly is also the regional distributor of the DuPont Artistri textile printer, so they have plenty of experience with wide-format industrial production textile printers (and inks). Yuhan-Kimberly also had experience with ATP textile printers from Italy and with their own textile printers over the last several years.

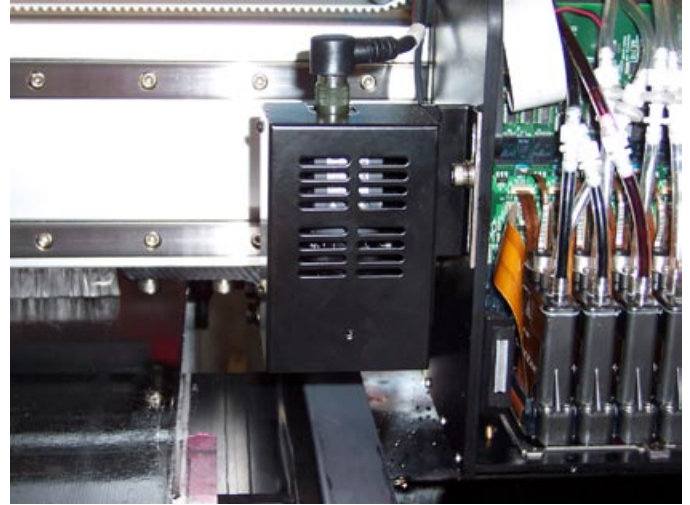
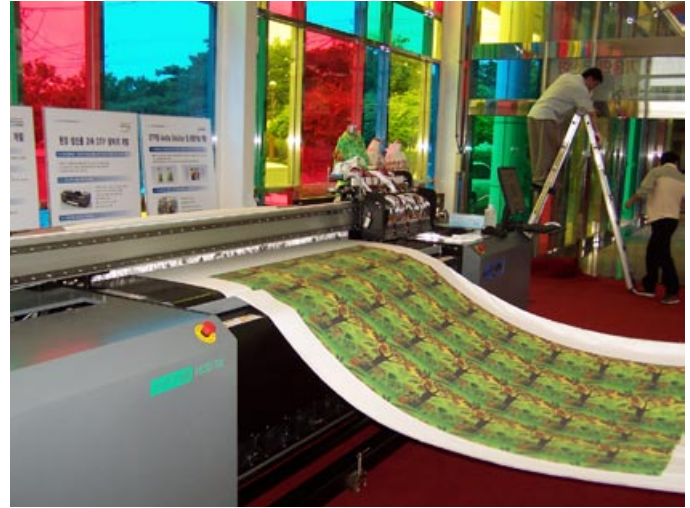
3. Does the machine manufacturer also manufacture inks for textiles?

Yuhan-Kimberly has more than a decade of experience making textile inks. If you remember the ColorSpan textile printer? It's color gamut was among the best in the world in those days (downside was it's aging HP thermal printheads).

Yuhan-Kimberly has substantial ink testing labs and ink chemists, including Dr SuJin Moon, Director, Digital Textile Printing, Research & Operations. She and her team on the 5th floor of their headquarters next door to the DTP Link offices and textile printer demo center. Dr Tim McCraw, General Manager, Digital Textile Printing, likewise has years of experience in the textile ink and textile printer industry.

4. Does the machine manufacturer also make textiles to print on with this machine?

Most manufacturers of inkjet printers do not themselves make printable textiles because there are scores of textile manufacturers and hundreds of kinds of fabrics you can print on.



The Yuhan-Kimberly printer is an advanced model with experience from the Keundo SupraQ 1800-TX. Here is the earlier generation model at a trade show. The purpose of showing this earlier model is to document that this is a serious production printer and has been functioning as a prototype already now since its first trade show appearances elsewhere.

5. What other printers are the same or similar chassis from this manufacturer or distributor?

The chassis and printer engine of this new printer are not retrofitted onto previous Keundo solvent or UV-cured printers. The size, shape, and fabric feeding system is specially designed to handle textiles and textile inks. The initial model was the Keundo SupraQ 1800-TX that has been exhibited in Korea. It is well known in the industry that Keundo has been working on advanced textile printers for the last several years.

6. When and where was this model first introduced?

The first advanced prototype of this textile printer is being introduced at SGIA 2008.

7. List price?

Price will not be over \$250,000, so significantly less than textile production printers made elsewhere.



The printer was officially launched at SGIA 08. Nicholas Hellmuth examining print samples of the VU:1800.

TECH SUPPORT & WARRANTY

8. What is the original warranty period?

The original period is 12 months.

9. Can you provide an extended hardware warranty? Who provides the service? The dealer or the manufacturer?

You can decide this when the contract is made. When the printer fails within the first 3 months after the purchase, Yuhan-Kimberly provides a warranty service. If the printer fails again, a warranty service is provided until the 15th month if the previous service was provided in the 12th month after purchase.

10. Who does the repairs?

Yuhan-Kimberly designates a repairman.

CONSTRUCTION: AESTHETICS

11. How can you describe the design of the printer?

Basic industrial design. Clean and simple, with rounded borders.

12. Can you easily tell which is the "front" and which is the "back"?

Not easily, other than by the design of the printhead carriage.



The printer has a clean industrial design. You can tell which is the front by the location of the GUI, the main control area and the design of the printhead carriage.

CONSTRUCTION: BUILD QUALITY

*13. What is the solid-ness of the construction of the outer body?
Is it plastic? Metal? Heavy gauge?*

This is a solid machine made by a company with experience in grand-format printers.

14. Is there a front hood and also a back hood?

There is no particular need for a hood or cover for a textile printer.

FEATURES: MEDIA: Heaters

15. How many heaters are used?

An ample heater stretches across the entire front of the printing area. But this heater is to keep from getting wet ink on the adjacent material when being rolled up. This heater is not to fix or steam the ink chemicals.

16. Is there an air blower as dryer? Where is it situated?

There is a clearing (brush) system inside, under the combo belt, and air dryer, to clean threads off the sticky belt.



This is a solid machine that counts with an ample heater stretches across the entire front of the printing area.



STRUCTURE OF THE PRINTER: Media Transport Mechanism & Media Path

17. Was this printer made originally as a textile ink printer, or is it retrofitted for textiles? If retrofitted, what was the original brand or model?

This printer system is the result of three years of R&D by Keundo and Yuhan-Kimberly, based on their experience with the pros and cons of the DuPont Artistri and other textile printers.

18. Is there a moving transport belt or a stationary platen?

This printer uses a sticky transport belt to move the fabric under the printhead carriage. A sticky belt means that stretch fabrics are not being stretched or even moved while being printed on.

19. Describe the platen.

There is not an actual platen because this is a combo system. In other words, it has a transport belt.

20. Are there edge guards at each side (end) of the platen? At left, or at right, or both?

Since the fabric adheres to the transport belt, there is no need of edge guards.



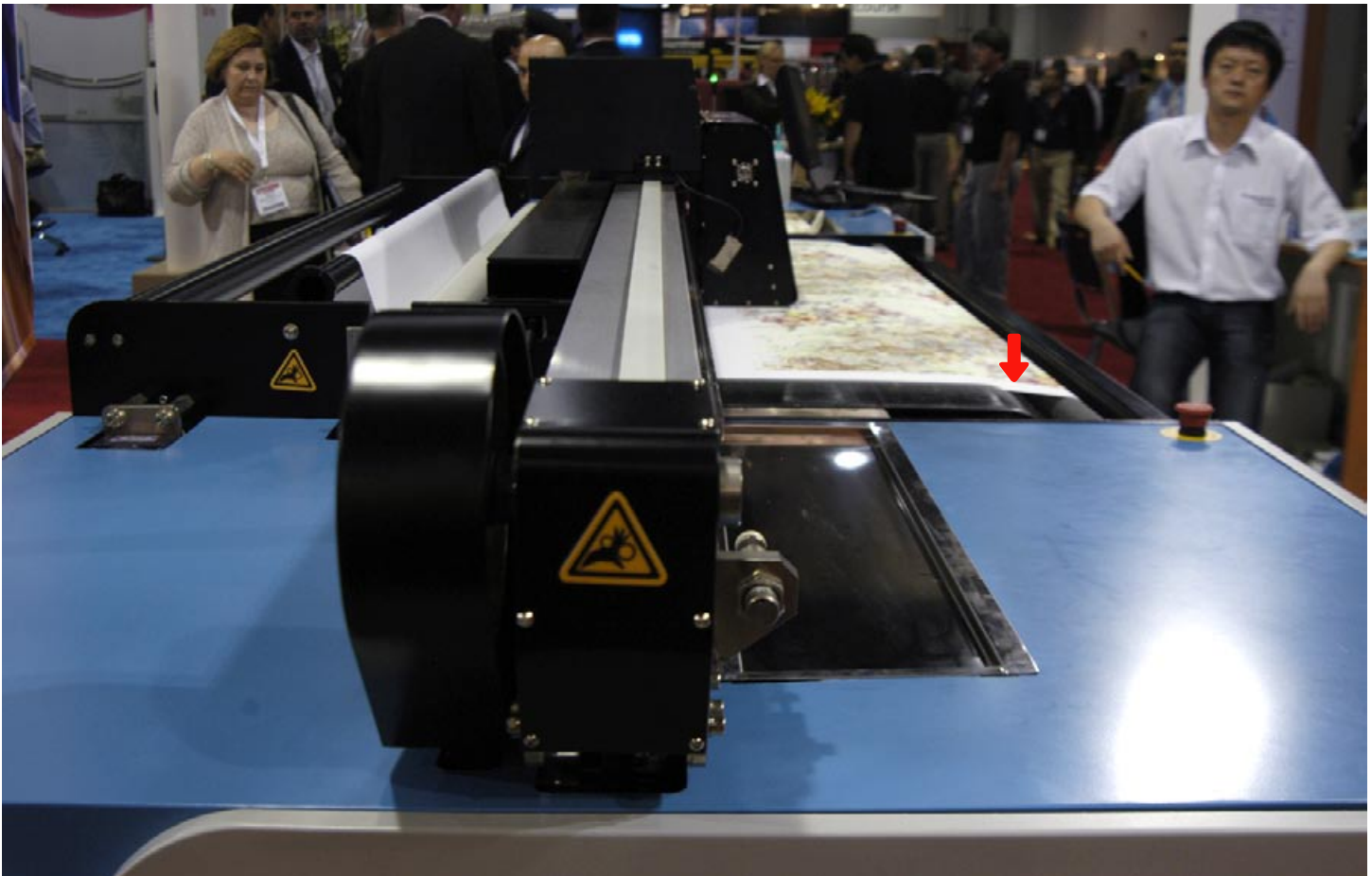
STRUCTURE OF THE PRINTER: Transport Belt

21. Size, does it stick out?

No, it doesn't stick out. The transport belt ends "inside" the main frame.

22. If a combo-design, with a conveyor belt, does the texture of the belt, with a heavy vacuum, leave a banding imprint on the surface of any thin lightweight material?

The surface of the transport belt is smooth. It wouldn't leave marks on the media.



The adhesive transport belt ends inside the main framework.

FEATURES: MEDIA: Roll-to-roll feeding

23. How is roll media fed? Pinch roller against grit roller?

Media is moved by the adhesive transport belt. There is no need of pinch rollers.

24. How is the roll held at the feeding position? On a spindle? On a saddle?

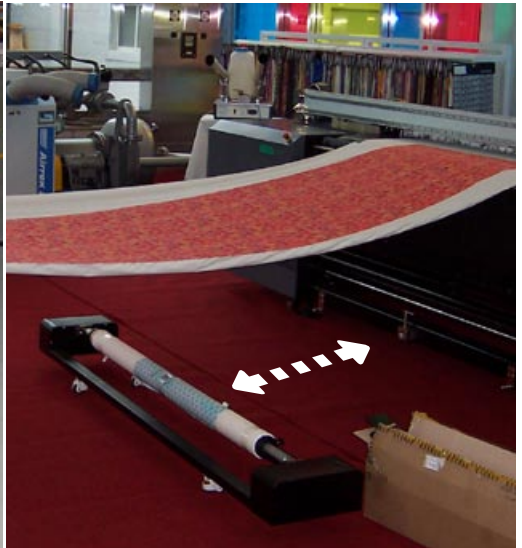
The feeding roll is held on a spindle. You can roll away the frame that holds the spindle.

25. At the front, is there an extra roller bar(s) near the platen or transport belt? Is it a bar to roll under the media, or over the media, or are there both (in addition to pinch roller/grit roller arrangement).

At the end of the transport belt at the front there is a roller that rolls under the media and drives it to the heating unit.

26. What about the take-up reel? Does it work unattended? Does media skew when it is wound up?

The take-up system works unattended. This frame can also be wheeled away.



The take-up system and the feeding system can be detached and rolled away.

OPERATING THE PRINTER

27. In the main area for operation, is the machine software based (touch screen), or with physical control buttons? Or Both?

In the main area of operation, the machine has physical buttons. You can operate via software, but through a keyboard or mouse. There are no touch-screen applications.

28. Where does the operator stand or sit?

The operator stands at the front right, but he does not need to be there all the time.

29. What controls are at the back of the printer?

You have a switch for the pinch roll, a switch for the brush and a switch for the supply system.

30. What controls are at either end of the printer?

There are no controls at either end.



Photo at left, controls in the front. Photo at right, the controls at the back. Most of the operations are software based.

SAFETY & HEALTH CONSIDERATIONS

31. How many emergency stop buttons are there, and where are they located?

There are two buttons at the front, at each side of the transport belt.

32. How much odor is emitted by the ink or heat sublimation process? How much subsequent outgassing is there, and for how long does the stuff smell?

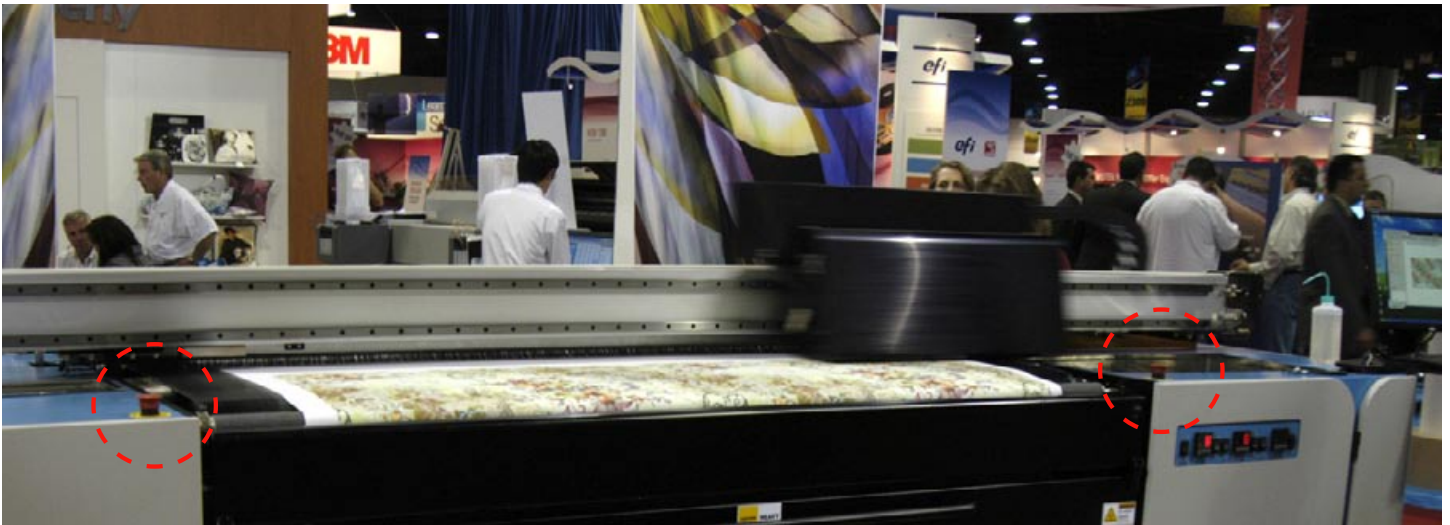
Not a significant amount of odor.

33. What system of ventilation or exhaust system is built into the printer? Or if not required, what would common sense dictate? Is it adequate to clear the work area of gasses and fumes?

It does not need a ventilation system because this is an exposed printer. Besides, it prints with water-based inks. Water-based ink smell is not as harmful as solvent ink.

34. What moving parts might hit a person if they are standing near the printer?

Because this is an exposed printer, there is always the risk of somebody sticking their hand on the way of the printhead carriage. The fact that the feeding and the take-up frames are separate structures might cause a person to bump with them.



Emergency stop buttons are in the front, at each side of the printing area.



PRINthead TECHNOLOGY

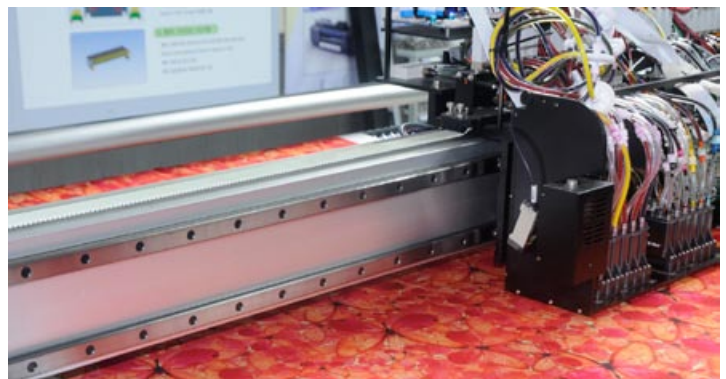
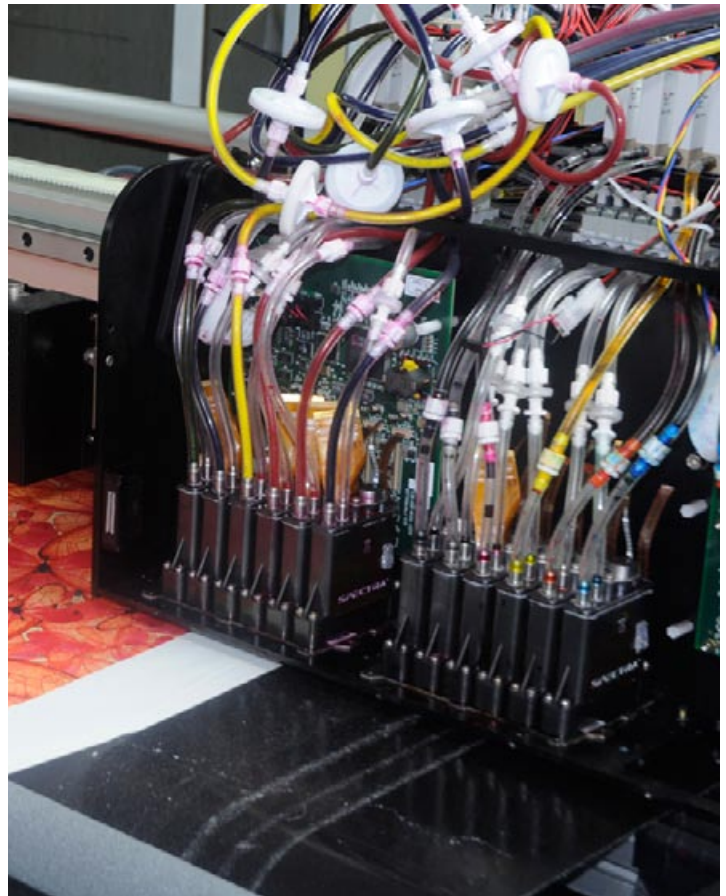
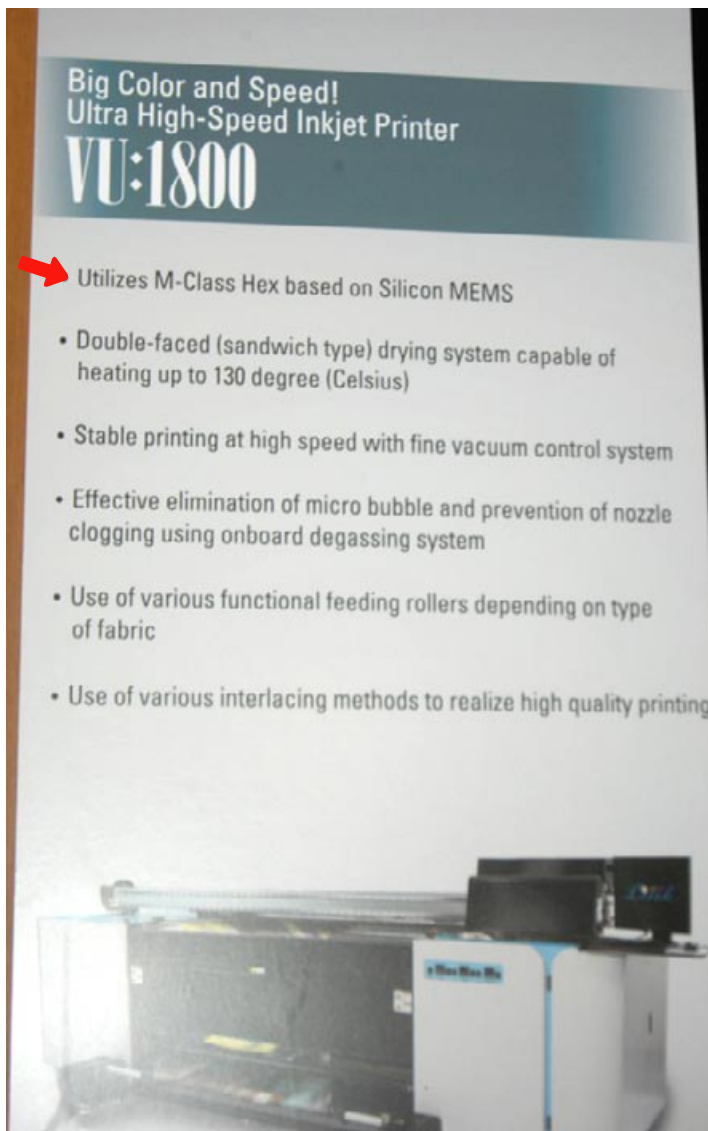
35. What is the brand of the printhead, and model?

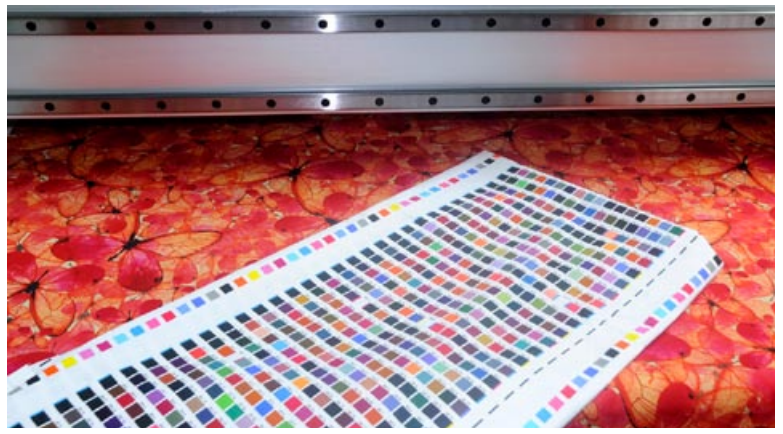
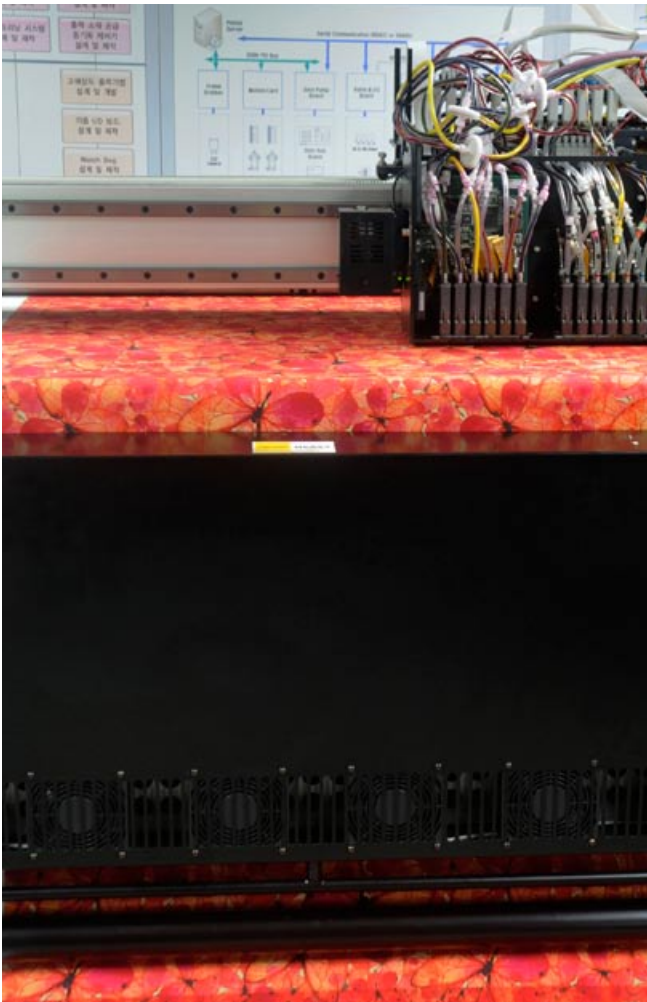
Yuhan-Kimberly decided they did not want a “me too” printer that used the same printheads as other textile printers. They did not opt for a Seiko printhead. This Seiko printhead has potential purging and cleaning issues on the VUTEK QS-series UV printers. It was interesting that similar issues (excessive need for spitting (weeping) and purging) was comparable to the Seiko printhead issues on the DuPont printer. Whether this is an ink delivery system issue or only a printhead issue remains unclear, but two printers with similar heads both have the same need for excessive purging.

So Yuhan-Kimberly selected the Spectra M Class MEMS technology printhead as a way to distinguish their printer as having new and better technology than other textile printers.

36. Is the brand and model of printhead clearly identified in the published specifications?

You could read “Utilizes M-Class Hex based on Silicon MEMS” on a banner exhibited at SGIA 08 by Yuhan-Kimberly.





Nicholas Hellmuth and Yuhan-Kimberly personnel examining the print tests.



YoungChul Eum (President, CEO, Keundo), Dr Tim McCraw (Yuhan-Kimberly), Dr Nicholas Hellmuth (FLAAR) inspecting the R&D testing area, Korea.

PRINTHEAD POSITIONING

37. *How many total number of printheads?*

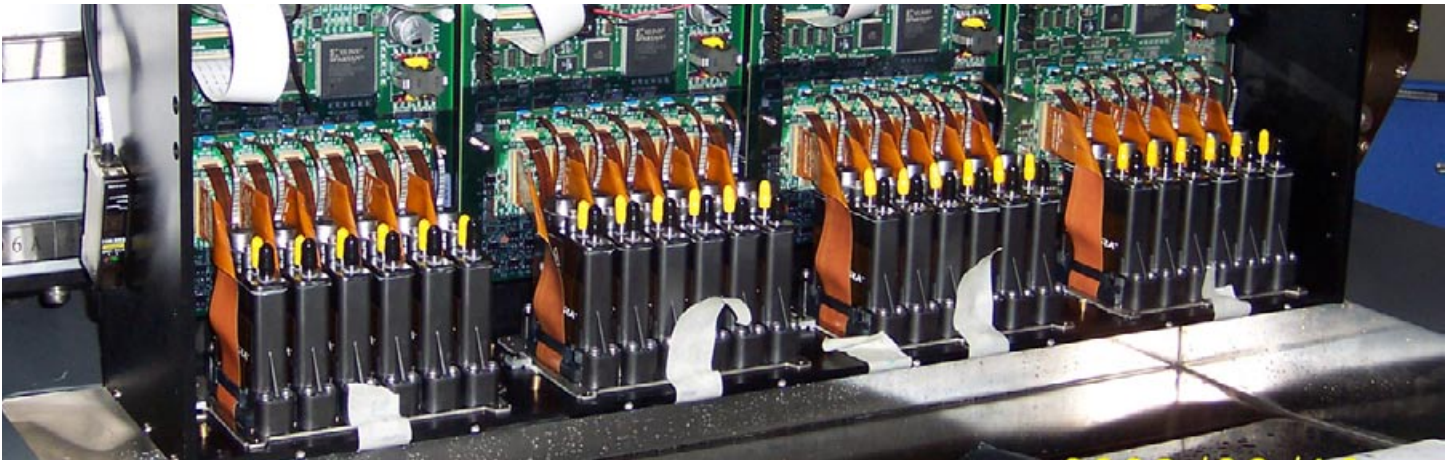
24 printheads

38. *Are printheads arranged in a cluster, or in an array?*

Printheads are packed in four groups of six.

39. *Are the printheads at an angle to the movement of the carriage, or at 90-degrees?*

Printheads are at 90-degrees.



INK

40. *How many different kinds of ink are available?*

Although DTP Link's website does not yet have information on the VU:1800, it does mention the ink manufactured by Yuhan-Kimberly: UJET Reactive Ink.

41. *What company makes the inks? Choices include DuPont, Sericol, Sun, Triangle, Inkwin, and many others.*

Yuhan-Kimberly makes its own ink for textile printers.



Dr. Hellmuth in front of the VU:1800, holding one of the many samples printed at SGIA 08.

Pros

The primary benefit of this printer is that the company in charge knows textile inks and knows textiles from the beginning. Yuhan-Kimberly has an entire fabric and design department. They work with the interior design faculty and students at the local university.

I am not familiar with another textile printer in this price range which is made by a textile company. Other textile company printers are twice as expensive. Most textile printers are made by solvent and/or UV printer manufacturers. Since they already have the frames available they simply add dye sublimation ink and/or heat treatment.

But having your own textile ink labs, your own textile ink team, your own textile ink testing facilities; plus having years of experience with fabrics. And, learning the pros and cons of the DuPont textile printers inside out by being a distributor, plus knowing the ColorSpan FabriJet and the Encad textile printer over a decade ago, all provides more than additional prior experience. But best to ask them directly, www.DTPlink.com

The second benefit is that you can select which kind of textile ink you wish to specialize in. You are not limited to dye sublimation ink that can print only on polyester materials.

The third benefit is that Keundo knows how to make grand format printers at a reasonable cost. I have visited a printshop (in Las Vegas) that had a solvent printer and two liquid laminators from Keundo. The owner was content with all three Keundo products.



FLAAR is able to offer first-hand information because we get our knowledge directly from the factories and manufacturers. Here, Nicholas Hellmuth learns in detail the mechanisms of the VU:1800.

Reality Check

Realize that you need heat treatment for inkjet printed textiles or a calendering system if you do prefer to sublimate the disperse dye ink.

Every printer has a few weak points as well as issues. As soon as it is possible to inspect a printshop that is using this VU:180 on a regular basis we will need to update and expand the coverage.

Discussion

If you are ready for serious production of digitally designed textiles, you should look at this printer. If you are starting at entry-level, consider the MC3 from the same company, Yuhan-Kimberly. There is a separate FLAAR Report on this.

First issued October 2008.

Most recently updated November 2008.

As of 2009, Yuhan-Kimberly has ceased manufacturing textile printers and ConVerd has ceased selling wide-format textile printers.

Our suggested brand is DigiFab textile equipment. Besides the inkjet printer for textiles, the StampaJet, DigiFab has several related products such as heat transfer sublimation equipment and RIP software especially for textiles.

If you need more information about DigiFab textile printers, please contact:

Los Angeles - Main Office - Factory	New York Office
5015 Pacific Blvd.	1412 Broadway, Suite 2100
Vernon, CA 90058	New York, NY 10018
Tel. (323) 581-4500	Tel. (212) 944-9882
Fax. (323) 582-4500	Fax. (212) 944-9659

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Alex K. Izimirlian (VP Engineering): alex@digifab.com and
webmaster@digifab.com

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. 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.

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

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

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.

It is also crucial to realize that an ink (that we inspect, that works well where we inspect it), your printer, your printhead, the heat, humidity and dust conditions in your printshop, may cause that ink to react differently in your printer. And, there are different batches of ink. Even in the really big multi-national billion-dollar ink companies, occasionally one batch will have issues. There are over 100 ink companies; six colors per company, many flavors of ink per company per color. We have no realistic manner of testing each ink. The same is true of media and substrates. One production run can have a glitch: chemical or physical, even in the best of companies. A major Swiss-owned media company, for example, had several months of media which were almost unusable. Yet other kinds of media from the same company are okay (though we stopped using that brand and stopped recommending them after all the issues we ourselves experienced).

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. Plus, there is no way to know if all MSDS sheets are honest to begin with! Our reports are on usability, not on health hazards.

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

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

Results you see at trade shows may not be realistic

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

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

Both 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 hard-

ware 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. Please be aware that our comments or evaluations on any after-market ink would need the end-user to use customized ICC profiles (and not merely generic profiles).

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

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

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

Just remember that every machine has quirks, even the ones we like. It is possible that the particular kind of images, resolution, inks, media, or other factors in your facility are sufficiently different than in ours that a printer which works just fine for us may be totally unsatisfactory for you and your clients. However it may be that the specific kind of printing you need to do may never occasion that shortcoming. Or, it may be that your printer was manufactured on a Monday and has defects that are atypical, show up more in the kind of media you use which we may not use as often or at all during our evaluations. Equally possibly a printer that was a disaster for someone else may work flawlessly for you and be a real money maker for your company. So if we inspect a printer in a printshop (a site-visit case study), and that owner/operator is content with their printer and we mention this; don't expect that you will automatically get the same results in your own printshop.

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

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

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

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

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

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

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

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

Yes, it is rather self-evident that we would never ask a manufacturer to send a product which we knew in advance from our studies was no

good. But there are a few other printers which are great but we simply do not have them in our facilities yet.

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

Realize that a FLAAR Report on a printer is not by itself a recommendation of that printer. In your local temperature, in your local humidity, with the dust that is in your local air, with your local operator, and with disorientation of the insides of a printer during rough shipment and installation, we have no knowledge of what conditions you will face in your own printshop. We tend to inspect a printer first in the manufacturing plant demo room: no disjointed parts from any shipment since this printer has not been lifed by cranes and run over a rough pot-holed highway or kept in 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 you printer is made in an industrialized country, if you are in the US and the manufacturer is X-thousand kilometers or miles away, the wait may be many days, or weeks.

Lack of Tech Support Personnel is increasing

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

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

Any new printer, no matter who the manufacturer, or how good is the engineering 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 sce-

nario for this was the half-million dollar LUSCHER JetPrint: so being "Made in Switzerland" was not much help.

Counterfeit parts are a problem with many printers made in China

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

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

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

It is typical for some enthusiastic vendors to claim verbally that their printer can print on anything and everything. But once you unpack the printer and set it up, you find that it requires primer on some materials; on other materials it adheres for a few weeks but then falls off. And on most hybrid and many combo printers, some heavy, thick, or smooth-surfaced materials skew badly. Since the claim that the printer will print on everything is usually verbal, it is tough to prove this aspect of misleading advertising to a jury.

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

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

Be sure to check all FLAAR resources

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

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

Acknowledgements

With 19 employees the funding has to come from somewhere, so we do welcome project sponsorship, research grants, contributions that facilitate our educational programs, scholarships for co-op interns

and graduate students, and comparable project-oriented funding from manufacturers. The benefit for the end-user is a principle called academic freedom, in this case,

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

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

Besides, it does not take any money to see which printers and RIPs function as advertised and which don't. We saw one hyped printer grind to a halt, malfunction, or otherwise publicly display its incapacities at several trade shows in a row. At each of those same trade shows another brand had over 30 of their printers in booths in virtually every hall, each one producing museum quality exhibits. Not our fault when we report what we see over and over and over again. One of our readers wrote us recently, "Nicholas, last month you recommended the as one of several possible printers for our needs; we bought this. It was the best capital expenditure we have made in the last several years. Just wanted to tell you how much we appreciate your evaluations...."

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

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

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

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

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

the better brands before we seek sponsorship. After all, out of the by now one million readers, we have heard plenty about every single printer out there.

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

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

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

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

We have visited the world headquarters and demo rooms of HP in Barcelona and received informative and helpful technology briefings

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

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

We thank 3P Inkjet Textiles and HP for providing inkjet textiles so we could learn about the different results on the various textiles. IJ Technologies, 3P Inkjet Textiles, ColorSpan, Encad, HP, Nan Ya Pepa, Oracal, Tara and other companies have provided inkjet media so we can try it out and see how it works (or not as the case may be; several inkjet media failed miserably, one from Taiwan, the other evidently from Germany!). We thank Aurelon, Canon, ColorGate, ColorSpan, ErgoSoft, HP, PerfectProof, PosterJet, Onyx, Ilford, CSE ColorBurst, ScanvecAmiable, Wasatch and many other RIP companies for providing their hardware and software RIPs.

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

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

We really liked some of the results whereas some of the other products were a bit disappointing. Providing samples does not influence the evaluations because the evaluators are students, professors, and staff of Bowling Green State University. These personnel are not hired by any inkjet printer company; they were universities employees (as was also true for Nicholas Hellmuth). The testing person for the HP ColorPro (desktop printer) said he frankly preferred his Epson printer. When we saw the rest results we did not include this 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.

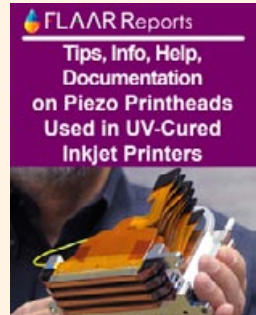
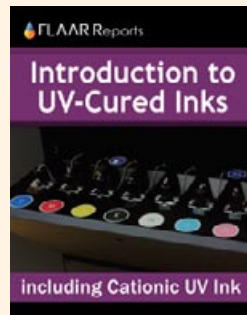
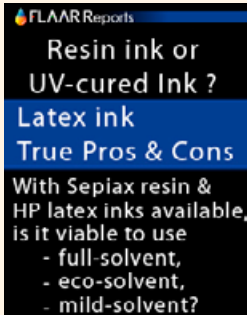
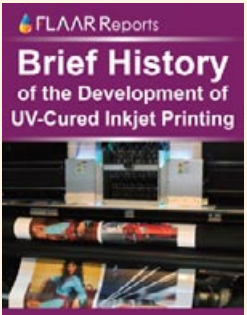
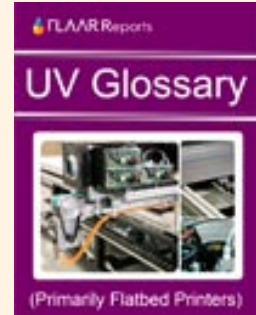
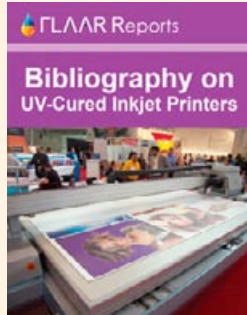
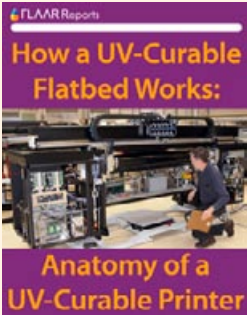
Yet we have documentation of several print shop companies whose business was ruined by specific brands that failed repeatedly. It is noteworthy that it is always the same brand or printer at both locations: one due to banding and printheads then simply no longer printing one color; the other brand due 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 three manufacturers of piezo printers (Epson, Seiko, Mutoh, and Mimaki). This is because piezo has definite advantage for some applications; thermal printheads have advantages

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

<p>List of UV Printers Manufactured in Taiwan 2010</p>	<p>UV Market TRENDS</p> <p>Observable at FESPA Digital Europe 2009</p>	<p>TRENDS, Part II: Markets & Technologies</p> <p>UV-cured printers at ISA 2009</p>	<p>TRENDS, Part I: Analysis One by One of the UV-cured printers</p> <p>ISA '09</p>	<p>UV Cured Printer TRENDS at Dubai 2010</p>
<p>TRENDS of UV-Cured Wide-Format Printers</p> <p>Shanghai '09</p>	<p>UV COMBO FLATBEDS</p> <p>Shanghai 2009</p>	<p>TRENDS IN HYBRID STRUCTURE UV PRINTERS</p> <p>Shanghai 2009</p>	<p>UV Roll-to-roll</p> <p>Observable at Shanghai 2009</p>	<p>UV Flatbed Printers</p> <p>at APPEXPO, Shanghai '09</p>
<p>Trends in Wide-Format UV Printers</p> <p>Observable at SGIA '09</p>	<p>UV-Cured Inkjet Printers at VISCOM ITALY 2009</p>	<p>Learning more of UV-Curable TRENDS</p> <p>By visiting viscom Paris '09</p>	<p>UV Printers Trends 2008</p> <p>SGIA '08 PART I</p>	<p>Flatbed & Roll-to-Roll UV Printers</p> <p>SGIA '08 Part II</p>

UV Printers Manufactured in China, Korea and Taiwan

<p>Chinese UV Inkjet Printers 2009</p> <p>Comprehensive FLAAR Inventory</p>	<p>UV Printers Manufactured in Korea 2009</p> <p>Trends, Markets & Applications</p>	<p>UV Printers Manufactured in KOREA 2010</p>	<p>List of UV Printers Manufactured in Taiwan 2009</p>	<p>List of UV Printers Manufactured in Taiwan 2010</p>
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